Equity Financing, Equity Lending, and Price Pressure:

The Case of DRIP Arbitrage

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Abstract

Dividend reinvestment plans (DRIPs) with discount offer shareholders the choice between receiving cash dividends or additional shares at a discount. We provide evidence on DRIP arbitrage where DRIP arbitrageurs extract the DRIP discount through short-term equity borrowing. We show the relation between equity lending, equity financing, and stock returns through DRIP arbitrage. DRIP arbitrage increases search costs in the equity lending market and creates negative price pressure in the stock market around dividend dates. Restrictions on equity lending impede DRIP arbitrage and negatively affect equity financing. Our results are more pronounced when the demand for DRIP arbitrage is higher.

Keywords Equity lending; Short selling; Equity Financing; Price pressure; Dividend reinvestment plan

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Abstract

Dividend reinvestment plans (DRIPs) with discount offer shareholders the choice between receiving cash dividends or additional shares at a discount. We provide evidence on DRIP arbitrage where DRIP arbitrageurs extract the DRIP discount through short-term equity borrowing. We show the relation between equity lending, equity financing, and stock returns through DRIP arbitrage. DRIP arbitrage increases search costs in the equity lending market and creates negative price pressure in the stock market around dividend dates. Restrictions on equity lending impede DRIP arbitrage and negatively affect equity financing. Our results are more pronounced when the demand for DRIP arbitrage is higher.

1. Introduction

Dividend reinvestment plans (DRIPs) offer shareholders the choice between receiving cash dividends or additional shares in lieu of cash dividends.[1] DRIP is a popular alternative form of financing around the world. For example, DRIPs account for 10% to 30% of annual equity raising in Australia from 1996 to 2014. The aggregate value of DRIPs in Europe has jumped ten-folds to reach €27 billion in 2016.[2] In DRIPs with discount, new shares are issued at a discount to the market price. The price difference between the two choices creates an arbitrage opportunity. The development of the equity-lending market allows DRIP arbitrageurs to borrow stocks and participate in DRIPs with discount by the dividend record date. The arbitrageur then sells the new shares allocated to them to capture the profit, which is roughly equal to the market value of the new shares minus the cash dividend and the equity loan fee.

The global equity lending market has grown significantly with total lendable assets of $15 trillion and lending revenue of $8.2 billion as of the end of 2019.[3] Arbitrage activities, which are fueled by the ease of equity lending, boost the equity lenders' revenue. Notably, a substantial portion of equity lending activities concentrate around periodic dividend record dates when daily equity lending volume and loan fees surge by many folds (Saffi and Sigurdsson, 2011; Moser et al., 2013; Aggarwal et al., 2015). Equity borrowing for short selling also increases substantially around corporate financing events, such as seasoned equity offerings (SEOs) (Henry and Koski, 2010; Dutordoir et al., 2019).

In this paper, we show evidence of DRIP arbitrage activities and relate them to the equity borrowing patterns around dividend dates. Using DRIP arbitrage as a setting, we examine the link

[1] DRIPs are commonly known as scrip dividends in some countries.
[2] See 'Scrip dividends boost European securities lending' on IHS Markit's website.
[3] For more securities lending statistics and trends, see articles published by IHS Markit and Securities Lending Times.

between equity lending and the success of equity raising. We also examine the effects of DRIP arbitrage on the equity lending and stock markets.

We focus on firms that offer DRIPs with new share issuance in the S&P/ASX200 index from 2007 through 2018. Under the imputation tax system in Australia, firms have the incentive to offer DRIPs to maintain a high dividend payout, so that shareholders can benefit from the tax credit and to concurrently retain cash for potential investments (Abraham et al., 2015). The Australian setting provides us with an ideal laboratory to conduct our empirical tests, which can be generalized to other financial markets.[4] We are also able to collect detailed information on DRIPs, which are not available in the U.S. due to litigation risks and confidentiality issues (Berkman and Koch, 2017). Moreover, it is important to note that not all equity borrowings are for the purpose of short selling. However, the lack of data on short selling pushes researchers to use equity lending as a proxy for short selling (e.g. Saffi and Sigurdsson, 2011). Australian data allow us to differentiate between equity borrowing and short selling, which is important to our tests. Furthermore, the same tax treatment for cash dividends and DRIPs enable us to rule out other competing hypotheses, especially tax-related explanations for the increased trading and equity lending around ex-dividend dates.[5]

To illustrate the role of DRIP arbitrage on equity borrowing activities, Figure 1 plots the demand for equity loan for National Australia Bank (NAB) – a large stock in Australia commonly involved in DRIP arbitrage. We observe recurring spikes in equity borrowing around the dividend record dates whenever NAB offered a DRIP with discount during which the equity lending market

[4] DRIP arbitrage is similar to scrip dividend arbitrage. JPMorgan newsletters and Securities Lending Times provide discussions and evidence on DRIP/scrip dividend arbitrage in the U.K., Hong Kong, and Singapore.

[5] Previous studies typically associate the surge in equity borrowing activities around dividend dates with tax arbitrage (see McDonald, 2001; Christoffersen et al., 2005; Thornock, 2013). Tax-induced dividend-trading around ex-dividend dates was popular in many European countries, but it is increasingly difficult due to changes in tax laws (McDonald, 2001; Christoffersen et al., 2005). Changes in the tax regulations in Australia also curb cross-border tax-arbitrage trades around dividend dates (King, 2005).

was liquid. There was no significant surge in equity borrowing when NAB cancelled its DRIP discount in July 2010 or when equity borrowing was restricted during the 2008-2009 short selling ban.

We generalize the findings from our exemplar to the cross-section of firms. First, we document DRIP arbitrage activities that are fueled by equity lending. As DRIP arbitrageurs rush to borrow stocks to participate in DRIPs with discount, the demand for short-term equity loans surge on the dividend record date. Notably, the supply of equity loan remains roughly constant throughout the dividend dates. Consistent with DRIP arbitrage being a short-term trade, the average equity loan tenure shortens over the record date.

Second, we find that equity lenders earn a large portion of their revenue over the dividend record date from DRIP arbitrage trades. However, the surge in demand for equity borrowing due to DRIP arbitrage affects the equity lending market in several dimensions. Equity loan fee and the spread in loan fee increase substantially around the dividend record date. The probability of loan fee on special also increases.[6] Moreover, on-lending – the practice of financing equity loan with borrowed security and lend it onward to another borrower – decreases because stocks involved in DRIP arbitrage can no longer be lent onward.

Third, we relate DRIP arbitrage with the behavior of stocks over the DRIP pricing period. Many parties have the motivation to manipulative stock prices downward over the pricing period. Since the price for new shares is determined by the volume weighted average price (VWAP) over the pricing period, DRIP participants are entitled to more shares when VWAP is lower.[7] Moreover, DRIP arbitrageurs' shorting over the pricing period to lock in their profit may contribute to a

[6] This finding is consistent with previous studies that find elevated equity loan fees when the loan demand is already high (e.g. Kolasinski et al., 2013) or when search cost is high (e.g. Duffie et al., 2002; Chague et al., 2017).
[7] Gerard and Nanda's (1993) equity-offering underpricing model also suggests such price manipulation over the pricing period of SEOs.

temporary price pressure. We find negative abnormal stock returns and increased short-selling in firms with DRIP discount, compared to those without discount. Moreover, the abnormal negative returns reverse immediately following the DRIP pricing period. Since higher dividends attract more DRIP arbitrage, the negative price pressure is more pronounced in stocks with larger DRIP issue size and higher dividend yield. A calendar-time trading strategy that exploits the negative price pressure over the DRIP pricing period earns a significant positive profit of around 0.09% per day (around 23% per year).

Fourth, we relate DRIP arbitrage with the success of equity raising in DRIPs, measured by the participation rate and issue size of DRIPs. We show that the participation rate (issue size) in DRIPs is significantly higher (larger) in firms with DRIP discount than those without discount. Importantly, DRIP discount only helps in raising more equity in DRIPs if there is heavy equity borrowing that fuels DRIP arbitrage. Short-selling was prohibited and equity lending volume collapsed during the 2008-2009 short-selling ban period in Australia. Using the short-selling ban period as a quasi-natural experiment, when equity borrowing was restricted, we find that DRIP discount did not contribute to significantly higher participation rate or issue size compared to DRIPs without discount. Our finding highlights the importance of equity lending in the success of equity raising.

Overall, our results are more pronounced in stocks with higher demand for DRIP arbitrage, i.e. those with higher DRIP discounts, dividends, and equity borrowing. Our findings are not driven by liquidity issues because we find that DRIP arbitrage is more common in large, liquid stocks where equity borrowing is relatively easy.

Our study contributes to several streams of literature. Previous studies examine the impact of equity borrowing or short-selling activities on market quality and price efficiency. Thornock

(2013) and Barbosa et al., (2019) focus on equity borrowing associated with differences in dividend taxes. Other studies examine the influence of short-selling around corporate events, such as mergers (Mitchell et al., 2004), convertible bond issues (Choi et al., 2009), seasoned equity offerings (Henry and Koski, 2010), and rights issues (Balachandran et al., 2012). Some firms accelerate their equity raising process in response to the undesirable increase in short selling (Gustafson, 2018; Dutordoir et al., 2019). We show a surge in equity borrowing driven by DRIP arbitrage and its impact on the stock and equity lending markets around the dividend record date and the DRIP pricing period.

Our study also relates to the literature on the price and trading behaviors around dividend dates. The predominant idea is tax-induced trading where investors are involved in dividend-capture by buying before the ex-dividend date (e.g. Elton and Gruber, 1970; Lakonishok and Vermaelen, 1986; Karpoff and Walking, 1990; Michaely and Vila, 1996; McDonald, 2001; Christoffersen et al., 2005). Our paper adds to the literature on non-tax related motivations behind the trading activities around dividend dates (see Kato and Loewenstein, 1995; Hao et al., 2010; Hartzmark and Solomon, 2013; Harris et al., 2015).

Furthermore, we extend the literature on equity raising, especially DRIPs. Previous studies on DRIPs examine the stock return patterns around DRIP announcement dates (Dhillon et al., 1992) and payment dates (Ogden, 1994; Berkman and Koch, 2017; and Yadav, 2017). Other papers focus on the value relevance of DRIP. For example, Hansen et al. (1985) and Finnerty (1989) examine the impact of DRIP on shareholders' wealth and cost of capital, respectively.[8] Along with recent studies that link securities lending to corporate financing (Bai et al., 2018; Campbello et al., 2018), we relate equity lending to the success of equity finance, using DRIPs as an experimental setting.

[8] Previous studies on Australian DRIPs include Chan et al. (1995, 1996). Recently, Abraham et al. (2015) examine Australian firms' characteristics and their decision to adopt DRIP.

The remainder of the paper proceeds as follows. Section 2 discusses the institutional background and the mechanism of DRIP arbitrage. Section 3 describes the sample. Section 4 presents the results. Section 5 concludes.

2. Institutional background and DRIP arbitrage

2.1. DRIPs and the security lending market in Australia

DRIPs allow shareholders to reinvest their cash dividends in additional shares at no cost.[9] They were introduced in Australia in 1982. Following the passage of a series of imputation tax legislations since 1987, firms in Australia have strong incentives to distribute dividends to their shareholders who benefit from the tax credit under the tax imputation system (Abraham et al., 2015). DRIPs became a popular alternative form of capital raising as it allows firms to maintain a high payout ratio and concurrently retain cash for future investments (see Chan et al., 1995; Pattenden and Twite, 2008). DRIPs account for about 8% to 28% of annual equity raising from 1996 through 2014.[10] Their popularity peaked in the years following the global financial crisis when firms had to strengthen their balance sheet, but dropped in recent years as interest rates in Australia are at their historical low, making debt financing relatively cheap.

The DRIP prospectus contains all the rules of a DRIP, such as the pricing of the new share issue, percentage discount, and the eligibility of participation.[11] While most firms removed the maximum limit on participation, some firms still retain a limit on participation for individual

[9] Shareholders are not charged commissions, brokerage fees, or other transaction costs typically associated with a security issuance.
[10] See Australian Financial Markets Association annual reports at http://www.afma.com.au/annual-report.
[11] Firms usually follow similar rules for their DRIPs, but the board of directors retain the right to alter the rules or suspend a DRIP. Shareholders may choose any level of participation in a DRIP, but they have to decide by 5.00pm on the record date. Recently, the ASX changed its listing rule to allow shareholders to decide by 5.00pm on the business day following the record date. The new rule (i.e. ASX listing rule Appendix 6A) applies to record dates after 14 April 2014.

investors, but some trustees are exempted from it. Investors from certain countries, such as the U.S. are not allowed to participate in some Australian DRIPs.

The security lending market in Australia is a $15-billion borrower-driven market with a decentralized network of bilateral relationships (Carroll and Clarke, 2014).[12] The value of equity on-loan had dropped from its peak of $60 billion to between $15 and $25 billion after the Global Financial Crisis. The lenders (beneficial owners) are usually superannuation (pension) funds, insurance companies, and investment managers. The incentive to lend is to profit from idle assets. This practice is consistent with the increasing trend for U.S. mutual funds to lend shares (Evans, Ferreira, and Prado, 2017). The borrowers include hedge funds and quant funds. The main motivations for borrowing are to maintain trading strategies and to cover equity settlement obligations.

2.2. DRIP and the dividend timeline

Figure 2 shows the timeline from the dividend announcement date to the payment date and the average number of days between two adjacent dates in our sample. In Australia, a firm typically announces its half-yearly dividends and its intention to offer a DRIP (along with the DRIP rules) on the dividend announcement date, which coincides with the earnings announcement date. Stocks that are bought on or after the ex-dividend date do not carry the dividend declared. However, equity borrowers are entitled to the dividend declared as long as they borrow cum-dividend shares on or before the dividend record date (Barbosa et al., 2019).[13] Shareholders, including investors who borrow cum-dividend shares, can decide on their participation in the DRIP on or before the

[12] For further details on securities lending in Australia, see King (2005), Leece et at. (2012), Ali et al. (2014a, b), and 'An Introduction to Securities Lending (Australia)' available at www.asla.com.au.
[13] Unlike spot market transactions, equity lending and borrowing are registered without delay.

dividend record date.[14] Shareholders will automatically receive cash dividend, unless they choose to participate in a DRIP. Some shareholders simply do not participate in DRIPs due to inattention[15] or certain restrictions. For example, passive index-trackers are constrained by their investment mandate and certain foreign shareholders (e.g. investors from the U.S.) are ineligible to participate in a DRIP. The price of the new shares allocated under a DRIP is then determined by the volume weighted average daily price (VWAP) over the DRIP pricing period. Finally, shareholders will receive their allocated shares under the DRIP on the dividend payment date.

2.3. Mechanism of DRIP arbitrage

Firms often offer a discount to boost the participation rate of DRIPs (Abraham et al., 2015). Discount DRIPs provide shareholders with the choice between receiving cash dividends or additional shares, which are priced at a discount to the market price, in lieu of cash dividends. The price difference between the two options creates an arbitrage opportunity.[16] The DRIP arbitrageur's profit,

$$\pi = \Delta N \times P - DIV_{reimburse} - LoanFee$$

$$= \left[\frac{DIV}{\text{VWAP}\ (1-Disc)}\right] \times \text{VWAP} - DIV_{reimburse} - LoanFee \quad (1)$$

$$= DIV\left[\frac{Disc}{1\text{-}Disc}\right] - LoanFee \quad (2)$$

where ΔN is the number of additional shares issued in the DRIP, P is the market price of the firm's shares, VWAP is the volume weighted average price over the DRIP pricing period, *DIV* and

[14] In our sample period, the dividend record date is on average four business days after the ex-dividend date. However, the gap between the ex-dividend and the record date shortened over time. The ASX changed some of its listing rules on 14 April 2014. The record date would be the business day following the ex-dividend date. Firms with a record date on or after 22 April 2014 would follow the new timetable.

[15] Cash dividend is the default option when a dividend payment carries a DRIP.

[16] See Appendix A, Fabozzi and Mann (2005), and Faulkner (2007) for anecdotal evidence on DRIP arbitrage. Scholes and Wolfson (1989) claim that they were able to profit substantially by participating in DRIPs with discount.

$DIV_{reimburse}$ are the amount of dividend and the dividend the borrower needs to reimburse the lender, *LoanFee* is the equity loan fee, and *Disc* is the percentage discount in a DRIP.

To profit from DRIP discount, arbitrageurs should borrow as many stocks as possible and choose to participate in the DRIP on or before the record date. Each shareholder is only entitled to either the cash distribution or new shares in the DRIP. To facilitate DRIP arbitrage, it is crucial for the equity lender to elect to receive cash dividend and lend the stock to the DRIP arbitrageur, who then elect to receive new shares issued in the DRIP (ΔN) that are priced at a percentage discount (*Disc*) relative to the VWAP. The equity borrower, who holds the cum-dividend shares over the record date, needs to return the borrowed shares and reimburse the lender the amount of dividends ($DIV_{reimburse}$). Equations (1) and (2) show that as long as the DRIP arbitrageur manages to sell the stocks at P = VWAP, she can lock in the arbitrage profit, which is equal to the DRIP discount ($DIV\left[\frac{Disc}{1\text{-}Disc}\right]$) minus the borrowing costs (*LoanFee*). Given the popularity of stocks in the ASX200, a DRIP arbitrageur may have already owned the shares. She can simply sell the portion related to the DRIP, which is equal to the number of additional shares (in lieu of cash dividends) they will receive in the DRIP. Alternatively, DRIP arbitrageurs may wish to hedge against the price movements over the DRIP pricing period by using derivatives, such as equity options or index options (see Scholes and Wolfson, 1989).

To benefit from DRIP discounts, Chan et al. (1995) suggest that funds or individual investors, such as Scholes and Wolfson (1989), may buy more shares before the ex-dividend date and choose to participate in DRIPs with discount before the record date. However, the investor who buys shares to participate in DRIPs with discount (as opposed to borrowing shares to conduct DRIP arbitrage) does not lock in the guaranteed ‘arbitrage profit’ because she still faces price risk until she receives the new shares on the dividend payment date.

Overall, DRIP discount and a liquid equity lending market are vital for the success of the equity issuance in a DRIP.[17] The two conditions attract DRIP arbitrageurs (equity borrowers) to take-up the new shares in DRIPs that are otherwise left unsubscribed by the constrained shareholders (equity lenders), who have to take the cash dividend. It is a win-win situation for many parties. The lender and the intermediary (investment bank) earn the lending fees. The borrower extracts the DRIP discount. Alternatively, the lender, borrower, and the intermediary may share the profit. The firm is better off as it solves its external financing problem caused by the high dividend payout. Similar to any seasoned equity offering (SEO), non-participating shareholders loses out in a DRIP due to the dilution effect unless there is proper compensation (see Hansen et al., 1985).

3. Data and descriptive statistics

3.1. Sample and data sources

Our sample includes firms in the ASX200 index that offered DRIPs from January 2007 through June 2018. We examine firms in the ASX200 index, which account for around 90% of the total market capitalization of all firms listed on the Australian Securities Exchange (ASX) (Comerton-Forde et al. 2016).[18] The focus on firms in the ASX200 alleviates the concern of microstructure issues (e.g. thin-trading) that plague Australian micro stocks.

We collect data on dividends and DRIPs from firms' announcements on the Australian Securities Exchange (ASX), firms' websites, and Morningstar's DatAnalysis. We obtain stock-

[17] There is no opportunity for DRIP arbitrage once a firm cancels the DRIP discount. See Appendix A for anecdotal evidence.

[18] The Australian stock market (the ASX) is highly concentrated. As of 2019, apart from the ASX200, the remainder of the stock market is populated by about 1600 small and micro stocks.

related and intra-day order book data from the Securities Industry Research Centre of Asia-Pacific (SIRCA). We acquire equity lending data from Markit and supplement them with additional data from the ASX. Daily short-selling data are collected from the ASX daily report and Bloomberg. Other firm-level financial data are sourced from Datastream.

3.2. Identification strategy

Comparing firms with and without DRIP discount rules out alternative hypotheses on arbitrage-trading around dividend dates. First, our setting allows us to dismiss tax-arbitrage as a potential explanation (e.g. see McDonald, 2001; Christoffersen et al., 2005) because both firms with and without DRIP discount face the same tax treatments. Moreover, cash dividends and new shares allocated under the DRIP are treated equally for tax purposes in Australia.[19] Second, we can also reject the dividend-capture hypothesis (e.g. Karpoff and Walkling, 1990) because the increased buying pressure of cum-dividend shares before the ex-dividend date applies to both firms with and without DRIP discount. Furthermore, we examine the stock return and trading behavior in the DRIP pricing period – a period with no new information – as opposed to informative events, such as the dividend announcements or high trading periods, such as around ex-dividend dates. Third, using DRIPs in ASX200 as an experimental setting to examine the impact of equity lending is ideal because, unlike other corporate events, DRIPs are often predictable events that carry minimal new information. They are analogous to small periodic rights issues that are capped by the amount of dividend declared.

3.3. Descriptive statistics

Panel A of Table 1 reports the frequency of firms that offer DRIPs and the issue size over the sample period. Around one in two firms in the ASX200 offered DRIPs in 2007, but the

[19] Dividend arbitrage in Australia is also curbed by the change in law in 1997 (i.e. the 45-day rule) (King, 2005).

frequency of DRIPs in the ASX200 declined to around 30% in 2018.[20] The new shares issued in a DRIP are priced based on the volume weighted average market price (VWAP) of the firm's shares over a number of days following the dividend record date – the 'DRIP pricing period'. Firms often offer a discount on the issue price in their DRIPs to encourage participation. The percentage of firms with DRIP discount was 62% in 2007. It increased to 74% in 2009, but slowly decreased to around 32% in 2017. The total issue size in DRIPs was $11.46 billion in 2008 when firms raised equity through DRIPs to strengthen their balance sheet during the Global Financial Crisis. The issue size decreased following the crisis, but remained at $6.1 billion in 2017. Despite the continuous drop in the number of DRIPs in the ASX200, DRIPs with discount still accounted for 74% of the total equity raised in DRIPs as of 2017. The statistics suggest that DRIPs concentrated in a smaller number of firms, which managed to raise equity successfully using DRIPs with discount in recent years.[21]

We compare the characteristics of firms with and without DRIP discount in Panel B of Table 1. *Ln(MktCap)* is the log of market capitalization. *MB* is the ratio of market equity to book equity. *DYield* is dividend per share scaled by stock price. *Leverage* is debt divided by debt and equity. *PRet* is the 60-day buy-and-hold return ending 20 days prior to the ex-dividend date. *Illiquidity* is Amihud's price impact measure, computed as the yearly average of daily absolute return scaled by daily dollar turnover. *Turnover* is daily traded volume divided by number of shares outstanding. *Bid-Ask* is the difference between daily closing ask and bid prices scaled by daily closing price. *IntraVol* is intraday volatility, measured as the log of the ratio of the highest price in the day to the lowest price in the day. *STD(return)* is the standard deviation of daily stock return over the

[20] Firms in the ASX typically pay dividend twice per year.

[21] Table IA2 shows that around one third of DRIPs are concentrated in the materials, real estate, and consumer services industries. However, there is no clear pattern in the propensity of firms in certain industry to offer discount.

previous year. *PRate* measures the proportion of a dividend payment that is issued as new shares (in lieu of cash dividends) in a DRIP. *IssueSize* measures the new share issuance in a DRIP as a percentage of total shares outstanding. *Underwriter* indicates whether a DRIP is underwritten. *Disc%* is the percentage discount applied in the pricing of the new shares in a DRIP. *PP_Length* measures the number of trading days in the pricing period. [22]

Firms with DRIP discount have smaller market capitalization, lower market-to-book ratio, lower financial leverage, and lower liquidity compared to firms without DRIP discount. Both groups of firms have no difference in past returns, but firms with DRIP discount have higher dividend yield. The average pricing discount for new share issue in firms with DRIP discount is 2.5%.[23] Around 16% of DRIPs with discount are underwritten, but only 2% of those without discount are underwritten. DRIPs with discount have a higher average participation rate (33%) than those without discount (9%). On average, the issue size of DRIPs with discount is around 1% of the total shares outstanding, but that of DRIPs without discount is only 0.2%. The average DRIP pricing period is nine days for both groups.

4. Main results

4.1. Evidence of DRIP arbitrage

DRIP arbitrage involves bilateral equity-loan contracts, which are not disclosed. We infer DRIP arbitrage trades indirectly through the available data. DRIP arbitrageurs need to borrow as many stocks that entitle them to participate in DRIP discount as possible. Compared to DRIPs

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[22] All continuous variables are winsorized at the 1% and 99% levels to avoid the influence of outliers.
[23] The DRIP discount was around 5–10% from the 1980s through early 1990s (Chan et al., 1995), but dropped to 1–5% in the following period (1995–2009) (Abraham et al., 2015).

without discount, we should observe increased demand for short-term equity loan around the dividend record date in DRIPs with discount.

We compare the equity loan statistics of firms with and without DRIP discount around their dividend record dates in Figure 3. Panel A plots the active utilization rate of lendable supply (*UTIL*), which is the percentage of actively lendable securities that are currently loaned out. Prior to the record date (t = 0), *UTIL* in firms with (without) DRIP discount is around 25% (17%). The *UTIL* of stocks with DRIP discount increases sharply to 50% on the dividend record date before dropping to its pre-record date value.[24] In contrast, there is no significant change in *UTIL* for DRIPs without discount around the same period. Previous studies find a similar run-up and reversal in *UTIL* for all dividend paying stocks around the dividend record date in financial markets around the world (Saffi and Sigurdsson, 2011). However, our finding is 2.5 times more than the global average. Specifically, we attribute the pattern to DRIP arbitrage.

Equity loan fees and other transactions costs deter arbitrageurs from borrowing stocks for longer than necessary. DRIP arbitrageurs only need to borrow stocks over a few days to participate in DRIPs with discount. We show the average equity loan tenure (*ETenure*) in Panel B of Figure 3. Average *ETenure* starts to fall 7 days before the dividend record date from 115 days to 80 days on the record date before reverting to its pre-record date level. The evidence of a short loan tenure supports the DRIP arbitrage explanation and rules out the tax arbitrage because tax arbitrage requires a longer loan tenure (King, 2005). On the other hand, the average *ETenure* in DRIPs without discount slightly decrease leading to the record date before reverting back to its year-long average.

[24] The surge in quantity of loan demand contrasts with the tax-related trading documented by Thornock (2013). He finds a drop in the supply of lendable shares in tax sensitive lenders.

Furthermore, we decompose *UTIL* into the demand for (*ELoan%*) and the supply of equity loan (*ESupply%*). Following Aggarwal et al. (2015), *ELoan%* is total equity loan value scaled by market capitalization. *ESupply%* is the value of actively lendable securities divided by market capitalization. Panels C and D of Figure 3 plot the average *ELoan%* and *ESupply%* around the dividend record date. Similar to *UTIL*, we observe a runup and reversal in *ELoan%* centered on the record date only for stocks with DRIP discount. Average *ESupply%* in stocks with DRIP discount remains largely similar over the record date, but dips slightly over the days following the record date. In contrast, average *ELoan%* and *ESupply%* in stocks without DRIP discount remain relatively stable over the same period. Our finding contrasts with tax-driven trading where the supply of equity loan decreases substantially because lenders restrict their supply to avoid additional tax burden (Thornock, 2013; Barbosa, et al., 2019).

We control for other firm characteristics and liquidity in our regression analysis in Table 2. We include the dummy variable, *Rec* to capture the 5-day period surrounding the record date; the DRIP discount dummy, *Disc_D* to capture the effect of DRIP arbitrage on the equity lending market; and the percentage DRIP discount dummy, *Disc%* to examine the incremental effect from the magnitude of DRIP discount. In Panel A, the coefficients on *Rec* show that *UTIL* and *ELoan%* increase, but *ETenure* and *ESupply%* drop around the dividend record date for all firms. Importantly, the coefficients on the interaction term, *Rec* × *Disc_D* imply that the magnitude of *UTIL* and *ELoan%* (*ETenure*) are multiple times higher (shorter) for DRIPs with discount than those without discount. Similarly, the coefficients on the interaction term, *Rec* × *Disc%* suggest that DRIPs with higher magnitude of discount experience higher *UTIL* and *ELoan%*, but shorter *ETenure* over the dividend record date. However, there is no significant difference in *ESupply%* between DRIPs with and without discount.

Next, we partition our sample into two groups according to dividend yield (*DYield*), firm size (*Ln(MktCap)*), and illiquidity (*Illiquidity*). Panels B to D report the coefficients on the interaction term *Rec* × *Disc_D*. In general, we find that the increased short-term equity borrowing surrounding the dividend record date is more pronounced in stocks with higher dividend yield, better liquidity, and larger size. The results confirm that DRIP arbitrage is not isolated in small, illiquid stocks.

Taken together, the evidence shows a surge in demand for short-term equity loan in stocks with DRIP discount around the dividend record date. Consistent with Equation (2), the demand is increasing in dividends and the magnitude of DRIP discount. We interpret the findings as evidence of DRIP arbitrage activities.

4.2. DRIP arbitrage and its impact on the equity lending market

Thornock (2013) and Barbosa et al. (2019) find that equity lending activities around dividend dates are affected by equity lenders' and short sellers' different reactions to taxes. In the case of DRIP, arbitrage trades may limit short-selling by draining equity borrowing opportunities and negatively affect market quality. In this section, we examine DRIP arbitrage's impact on the equity lending market.

On-lending is common in the equity lending market. A lender intermediary may fund an equity loan with borrowed security and lend it onward to another borrower, creating a 'chain of loans' (see Carroll and Clarke, 2014). To facilitate DRIP arbitrage, the equity lender has to choose cash dividend (i.e. forfeit the DRIP) and lend the stock to the borrower (i.e. the DRIP arbitrageurs), who then elects to receive new shares in the DRIP. If an equity lender chooses to receive new shares in the DRIP instead, the stock can no longer be used for the purpose of DRIP arbitrage or any onward loan. As a result, intermediaries need to search for alternative equity lenders who are willing to take the cash dividend and lend to their clients (the borrowers) around the dividend record date. We expect on-lending activities to drop in the period around dividend record dates due to DRIP arbitrageurs' strong demand for stocks with DRIP discount because the same stock can no longer be lent onward over the record date.

Panel A of Figure 4 plots the ratio of gross to net value of equity loans (*OnLending*), which measures the number of equity loans that are financed by borrowed equity.[25] The average *OnLending* in stocks with DRIP discount drops from 2.5 over the days leading to the dividend record date to 1.5 on the record date, before reverting back to 2.25 after the record date. The dip in *OnLending* is absent in DRIPs without discount. The drop reflects the breakdown of on-lending around the record date due to DRIP arbitrage.

The equity lending market clears at a price when loan supply meets loan demand (Thornock, 2013). Specifically, Kolasinski et al. (2013) find evidence of significantly higher loan fees due to an increase in loan demand when demand is already high. We expect the surge in borrowing demand by DRIP arbitrageurs to drive up loan fees around the dividend record date.[26]

We define loan fee (*LoanFee*) as the value-weighted average fee for all current equity loan, expressed as basis points (bps) per annum. Panel B of Figure 4 shows a surge in average *LoanFee* in firms with DRIP discount from 60bps days before the record date to 325bps on the record date before dropping back to its pre-record date level. This pattern is consistent with that of Thornock (2013), but the magnitude is around three times larger than the global average fee of 100 bps over the dividend record date (Saffi and Sigurdsson, 2011). The average fees in firms without DRIP discount do not exhibit such a salient pattern around the record date.

[25] Our measure of on-lending follows Carroll and Clarke (2014). A ratio of one means there is no on-lending.
[26] We do not rule out other borrowing demands prior to the dividend record date. However, the demand from DRIP arbitrage competes with and crowds out borrowings for other purposes, driving up loan fees.

The opacity of the equity lending market may create difficulties for borrowers to locate equity loans prior to the dividend record date. The search frictions provide some lenders with the bargaining power to charge higher loan fees than others (Duffie et al., 2002). Chague et al. (2017) show that worse connected borrowers with higher search costs pay higher loan fees. We predict an increased search costs in firms with DRIP discount before the dividend record date due to the increased demand from DRIP arbitrage trades.

Equity borrowers are not only concerned with the level of fees, but also the variance of fees (D'Avolio, 2002). Similar to Kolasinski et al. (2013) and Thornock (2013), we proxy for search costs using the spread in loan fees (*FeeSpread*), defined as the difference between a stock's the maximum and minimum daily equity loan fees. We can also interpret *FeeSpread* as a form of short-selling risk (Engelberg et al., 2018). We compare the *FeeSpread* in firms with and without DRIP discount in Panel C of Figure 4. The figure shows that the average *FeeSpread* in firms with DRIP discount starts to increase prior to the record dividend date and surge to more than 2 times of its pre-record date level around the record date before dropping back to the pre-record date level of 250 bps. In contrast, stocks without DRIP discount only experience a mild change in *FeeSpread* around the record date.

Equity loans on special (i.e. extremely high loan fees) are extreme outcomes (Thornock, 2013). They are expensive and difficult to be borrowed by small institutions and small hedge funds (Fabozzi and Mann, 2005) and face a high likelihood of recall (D'Avolio, 2002). We hypothesize that the strong demand for DRIPs with discount for DRIP arbitrage increases the likelihood of extreme loan fees on the dividend record date.

We examine the probability of a spike in loan fees on the dividend record date using a logistic regression. A spike in fees is defined as fees on special if the three-day average loan fee around the record date is greater than 250 bps p.a. Models 1 and 2 of Table 3 report the result. The significantly positive coefficient on *Disc_D* (t-stats = 2.9) implies that DRIPs with discount, which attract DRIP arbitrage, contribute to a higher likelihood of extreme loan fees on the dividend record date.[27] Model 2 suggests that the likelihood of extreme loan fees increases with the magnitude of DRIP discount (*DRIP%*).

Equity lending fee is becoming an increasingly important source of income for mutual funds (Evans, Ferreira, and Prado, 2017). Equity lending to facilitate scrip dividend arbitrage contributed to around 7% of European securities lending revenue in 2017.[28] The importance of equity lending income motivates us to examine the equity lending revenue around the dividend record date when DRIP arbitrage trades occur. We define *LendRev* as equity lenders' revenue from equity lending and reinvestments scaled by lendable assets, expressed as basis points (bps) per annum. Panel D of Figure 4 shows that average *LendRev* for stocks with DRIP discount increases from 16bps p.a. to 76bps p.a. on the dividend record date and reverts back to 15bps p.a. ten days following the record date. In contrast, the average *LendRev* for stocks without DRIP discount remains rather low (14bps p.a.) over the dividend record date. Furthermore, we examine the percentage of annual equity lending revenue that is earned within the five-day period around the dividend record date (*LendRev%*). Models 3 in Panel A of Table 3 shows that the percentage of annual revenue generated by DRIPs with discount around the record date is 17% more than DRIPs without discount. Moreover, Model 4 suggest that *LendRev%* is increasing in the size of DRIP discount. The results suggest that lending revenue to facilitate DRIP arbitrage is an important source of income for equity lenders.

[27] Consistent with Thornock (2013), the likelihood for a fee spike is higher for firms have smaller size or higher dividend yield. However, we find that firms with high turnover are less likely to have a fee spike.
[28] See https://ihsmarkit.com/research-analysis/16022017-Equities-Scrip-dividends-boost-European-securities-lending.html

As robustness checks, we control for potential influences of firm characteristics and liquidity on our results. Models 1 through 6 in Panel B of Table 3 report the results. First, *LoanFee*, *FeeSpread*, and *LendRev* are significantly higher for firms with DRIP discount (*DRIP_D*) and those with higher magnitude of DRIP discount (*DRIP%*). Second, *LoanFee*, *FeeSpread*, and *LendRev* are elevated on the record date for all firms (*Rec*). Importantly, the magnitude of the increase in *LoanFee*, *FeeSpread*, and *LendRev* over the record date (*Rec* × *Disc_D*) is multiple times higher in firms with DRIP discount, compared to those without discount. Moreover, the significantly positive coefficients on *Rec* × *Disc%* suggest that *LoanFee*, *FeeSpread*, and *LendRev* increase with the magnitude of DRIP discount.

Overall, there is a decline in trading quality in the equity loan market driven by DRIP arbitrage activities. We find significantly lower on-lending ratio, but higher loan fees, fee spread, and likelihood of spikes in fees, in firms with DRIP discount around the dividend record date. We also observe that a significant proportion of annual lending revenue concentrates around the dividend record date.

4.3. DRIP arbitrage and its impact on the stock market

4.3.1. Overall patterns around ex-dividend date

Value relevant information on dividends, DRIPs, and earnings is released on the dividend announcement date, which coincides with the earnings announcement. Market efficiency (e.g. Fama, 1970) implies that any price adjustments related to the signaling effect from the dividend payment, the increase in the supply of stocks in a new issue DRIP or any other new information should occur around the announcement day. Even if the demand curve is downward sloping, investors should have anticipated the supply shock and adjusted their demand accordingly (Corwin, 2003). This is true for both firms with and without DRIP discount. Apart from the price run-up leading up to the ex-dividend date due to dividend capture (e.g. Hartzmark and Solomon, 2013), tax-induced trading (e.g. Lakonishok and Vermaelen, 1986), and liquidity issues (e.g. Michaely and Vila, 1996) there should not be any other predictable price movements over the period following the announcement date or around the ex-dividend date.

Figure 5 shows the pattern of stock returns, short volume, and order imbalance around the ex-dividend date. Panel A plots the average daily excess market returns (*AbRet*) over the 20-day period surrounding the ex-dividend date ($t = 0$). There is a run-up in *AbRet* in stocks with or without DRIP discount in the days prior to ex-div date. Following the ex-div date, only stocks with DRIP discount experience a reversal in *AbRet*, but not those without discount. Furthermore, they face another wave of negative *AbRet* around four to eight days following the record date.

Panel B of Figure 5 shows the average abnormal daily short-selling flow (*AbShort*) around the ex-dividend date. Similar to Henry and Koski (2010) and Comerton-Forde et al. (2016), we define *AbShort* as daily short-selling flow minus expected short-selling flow. Daily short-selling flow is daily short-selling volume scaled by total shares outstanding. Expected short-selling flow is the average daily short-selling flow in the previous year. We observe an increase in *AbShort* in stocks with or without DRIP discount leading up to the ex-div date and a reversal following the ex-div date. Notably, only stocks with DRIP discount experience an increased *AbShort* around five days following the ex-div date.

We plot the order imbalance (*OI*) around the ex-dividend date in Panel C of Figure 5. *OI* is the difference between buyer-initiated volume and seller-initiated volume as a percentage of the sum of buyer-and seller-initiated volume. Similar to the patterns in *AbRet*, Panel C shows that stocks with or without DRIP discount attract more buying pressure before the ex-dividend date. However, only stocks with DRIP discount experience a reversal (i.e. more selling pressure) in the two days after the ex-dividend date. Moreover, they face another round of selling pressure, starting five days after the ex-div date. In contrast, stocks without DRIP only experience a buying pressure prior to the ex-div date without any selling pressure afterwards.

The run-up and reversal in returns are consistent with the dividend-catching or tax-arbitrage phenomenon (e.g. Lakonishok and Vermaelen, 1986; Hartzmark and Solomon, 2013; Ainsworth et al., 2018). However, our results are distinct from previous studies as we find that only firms with DRIP discount experience negative *AbRet* and selling pressure days following the ex-div date. Moreover, we rule out tax-arbitrage trading as a reason behind the pattern because both DRIP with and without discount have the same tax treatment.

4.3.2. DRIP Pricing Period

There is no fixed rule for the start of the DRIP pricing period or the length of the pricing period. In our sample, the DRIP pricing period (95%) typically occur after the ex-dividend date. The most common length is 10 days (46%), followed by 5 (29%) and 7 days (5%).[29] In this section, we examine whether the patterns in stock returns and short-selling following the ex-dividend date is related to DRIP arbitrage trading activities over the DRIP pricing period.

The new shares issued in a DRIP with discount are priced according to the VWAP over the DRIP pricing period minus a percentage discount. The DRIP discount creates a wedge between the price of the new shares and those that are traded in the share market (secondary market). Moreover, the price of the new shares in a DRIP depends on the price of the (seasoned) shares in the share market (secondary market). This price setting mechanism creates potential price manipulations and further arbitrage opportunities over the DRIP pricing period. Gerard and

[29] The board of directors decide the length of the DRIP pricing period. Some firms maintain the same length over time, but others vary the length in almost every DRIP.

Nanda's (1993) theory of equity-offering underpricing suggests that informed traders have the motivation to influence the offer price by bidding in the offering and selling heavily in the secondary market to depress the offer price. Henry and Koski (2010) find evidence of abnormal short-selling around SEOs. Recently, firms seem to prefer shelf offerings and overnight offerings to traditional SEOs to avoid the negative price pressure from short-selling (Gustafson, 2018; Dutordoir, Strong, and Sun, 2019).

A number of parties have the incentive to depress the stock price of firms with DRIP over the DRIP pricing period. First, an investor with a large stake in a DRIP has that motive. Intuitively, she prefers a lower VWAP because she will be allocated with more shares in a DRIP. In a DRIP with discount, she gains more from the lower VWAP on top of the percentage DRIP discount. Second, investment banks that underwrite the DRIP issues has the reason to dampen the stock price as their profit increases with lower stock price (Pricha et al. 2016). The underwriter will short the stocks they underwrite in a DRIP to hedge and/or manipulate the price downward. A lower price reduces the risk and increases the underwriter's payoff. Furthermore, the DRIP arbitrageurs' sale of stocks to lock in their profit may create a temporary price pressure over the DRIP pricing period. Taken together, the price pressure hypothesis implies negative stock returns and increased short selling over the DRIP pricing period. The lack of any patterns in abnormal stock returns and short selling supports the efficient market hypothesis.

Given the irregular timing of the DRIP pricing period, we relate the DRIP pricing period to the pattern we observe following the ex-dividend date using regression analysis with a dummy variable to capture the effect of the DRIP pricing period. Table 4 reports the results. We include a dummy variable (*PreEx_D*), which indicates the five-day period before the ex-dividend day, to capture the price run-up prior to the ex-dividend date and another dummy variable (*PP_D*) for the

DRIP pricing period. The significant positive coefficients on *PreEx_D* across Models 1 to 3 confirm the price runup and the increase in short flow and order imbalance prior to the ex-div date in Figure 5. The coefficients on the DRIP discount dummy (*Disc_D*) and the pricing period (*PP_D*) imply that, apart from *AbShort*, *AbRet* and *OI* are similar between firms with and without DRIP discount and over the pricing period. Importantly, the coefficient on the interaction term (*Disc_D* × *PP_D*) is significantly negative in Model 1 and significantly positive in Model 2. They suggest that only firms with DRIP discount experience negative *AbRet* and increased *AbShort* over the pricing period. However, we do not find any significant differences in the *OI* between firms with and without DRIP discount. In short, the pattern in stock returns and short selling following the ex-dividend date is related to the trading activities over the DRIP pricing period.

Next, we focus on the stock behavior over the DRIP pricing period itself. Figure 6 illustrates the pattern of *AbRet*, *AbShort*, and *OI* over the DRIP pricing period. Since the length of the DRIP pricing period differs across firms, we use sub-panels (i) and (ii) within each panel in Figure 6 to facilitate a better comparison across different firms. The sub-panels center on the start and the end of the pricing period, respectively.[30] Panel A (i) shows that firms with DRIP discount experience a negative *AbRet* since the start of the pricing period (0.20% on Day 0). However, the *AbRet* reverts to a positive value after the end of the pricing period (0.25% on Day 1 in Panel A (ii)). The *AbShort* in firms with DRIP discount increases since the start of the pricing period (Panel B (i)) and decreases following the end of the pricing period (Panel B (ii)). Similarly, firms with DRIP discount have relatively more sell orders (i.e. negative *OI*) following the start of the pricing period (Panel C (i)), but the pattern reverses after the end of the pricing period (Panel C (ii)). In contrast,

[30] The start and the end of the pricing period are labelled as '0', respectively, in the sub-panels.

Panels A to C show that firms with no DRIP discount do not have a systematic pattern in *AbRet*, *AbShort*, and *OI* over the DRIP pricing period.

We control for firm characteristics and liquidity using regression analysis in Table 5. The significant coefficients on *Disc_D* × *PP_D* in Models 1 to 3 of Panel A confirm the decrease in *AbRet* and *OI* and the increase in *AbShort* in DRIPs with discount over the DRIP pricing period. We include a dummy variable (*Post_PP_D*) to capture the five-day period following the pricing period in Models 4 to 6. The positive coefficient on *Disc_D* × *Post_PP_D* in Model 4 shows the return reversal following the end of the DRIP pricing period in DRIPs with discount. Taken together, depressed *AbRet* and increased *AbShort* over the DRIP pricing period, followed by a reversal in *AbRet* support the price pressure hypothesis.

To relate DRIP arbitrage activities with the price pressure over the DRIP pricing period, we introduce *ELoan%* in our regression analysis. *ELoan%* is the total equity loan value scaled by market capitalization on the dividend record date. It captures the surge in borrowing demand for DRIP arbitrage. We focus on the DRIP pricing period and control for the determinants of stock returns and short flows and other firm characteristics in our regressions. We also compute the cumulative excess market returns (*CumuRet*). Panel B of Table 5 reports the results. Models 1 to 3 show that increased equity lending on dividend record date (*ELoan%*) is associated with significantly lower *AbRet* and *CumuRet*, but higher *AbShort* over the DRIP pricing period. The result implies that DRIP arbitrage, which is related to elevated equity lending on dividend record date, creates negative price pressure over the DRIP pricing period.[31] In the presence of *ELoan%*,

[31] Arbitrage activities also create price pressure around other corporate events, such as mergers (Mitchell et al., 2004) and convertible bond issuances (De Jong et al., 2011). Short selling increases around convertible bond (Choi et al., 2009) and SEO issues (Henry and Koski, 2010; Dutordoir et al., 2019).

Disc_D and *Disc%* are not significant in explaining *AbRet*, *AbShort*, or *OI* in the pricing period.[32] The result suggests that DRIP discount *per se* does not cause a negative price pressure over the DRIP pricing period. Consistent with Pricha et al. (2016), the use of underwriters in a DRIP leads to lower *AbRet* and high *AbShort*.

Furthermore, we expect the price pressure to increase with the size of the new share issue in the DRIP (*IssueSize*) because larger *IssueSize* implies more DRIP arbitrage trades. Given that *IssueSize* is bounded by the size of the dividend, the price effect should be more pronounced in stocks with high dividend yield (*DYield*). Intuitively, higher *DYield* also attract more DRIP arbitrage trades. Moreover, we should observe greater price pressure in DRIPs of illiquid stocks due to their higher price impact. To test these hypotheses, we partition our sample into two sub-groups according to issue size, dividend yield, and liquidity. Panels C to E of Table 5 report the result. The impact of DRIP arbitrage on the cumulative returns (*CumRet*) over the DRIP pricing period is around 90% and 40% greater in the sub-groups with larger issue size and higher dividend yield, compared to the overall results in Panel B. The impact of DRIP arbitrage on short flow (*AbShort*) is also greater in the sub-groups with larger issue size and higher dividend yield. Panel E shows that illiquidity plays a role in the negative price impact as the DRIP arbitrage effect on the *CumuRet* in illiquid stocks (-0.366) is more than twice the magnitude of liquid stocks (-0.152). Similarly, the impact on *AbShort* is more pronounced in illiquid stocks. However, there is no significant difference in order imbalance across the sub-samples.

4.3.3. A trading strategy

[32] Robustness checks also show that *Disc_D* or *Disc%* (by itself) does not explain the variations in *AbRet*, *AbShort*, or *OI* in the DRIP pricing period even without the presence of *ELoan%*.

Berkman and Koch (2017) suggest a trading strategy based on the positive price pressure on the dividend payment date in the U.S. We propose a zero-cost long-short calendar-time trading strategy that exploits the negative price impact over the DRIP pricing period in firms with DRIP discount. We implement the trading strategy as follows. In every calendar day in our sample period, we identify all firms with DRIP discount that will be within the DRIP pricing period in the following trading day (day *t*). We form a short position in a value-weighted portfolio with these firms on day *t*-1 and hold it for a trading day. We then create a long position in a portfolio that mimics the S&P/ASX200 index return. This real-time strategy effectively produces a market adjusted abnormal returns in calendar time.

We can implement the strategy on 2,221 out of 2,908 trading days (76%) in our sample period. Figure 7 plots the daily abnormal returns and cumulative returns for the trading strategy. The strategy produces positive returns on 1,174 days (53%). This strategy generates an average daily return of 0.092% (t-statistic = 2.27). The cumulative return over the sample period is around 204%. Most of the returns originate from the short side of the strategy with an average daily return of -0.072 (t-statistic = -2.35), while the average return of the ASX200 is insignificant (0.019%, t-statistic = 0.78). In sum, the results show that a naïve investment strategy can profit from the negative price pressure created by DRIP arbitrage.

4.4. DRIP arbitrage and the success of DRIPs

In this section, we examine the relation between DRIP arbitrage and the success of DRIP as a means to raise equity. We gauge the success of a firm's DRIP by examining the participation rate (*PRate*) and the relative issue size (*IssueSize*) of DRIPs. DRIP arbitrageurs are incentivized to borrow as many stocks as possible to participate in DRIPs with discount. We hypothesize that the increased borrowing demand due to DRIP arbitrage contributes to the success of DRIPs with discount. We test our conjecture using a multiple regression framework that controls for differences in firm characteristics and liquidity.

Panel A of Table 6 reports the results. First, we focus on Models 1 to 4. The significantly positive coefficient of *ELoan%* suggests that the increased demand for equity loan around the dividend record date is related to higher *PRate* and *IssueSize*. Importantly, the equity loan effect is incremental to the role of DRIP discount. Firms that offer a discount in the pricing of new shares in a DRIP attract higher *PRate* and *IssueSize* (19% and 0.5%) than those without discount. Moreover, *PRate* and *IssueSize* are also increasing in the magnitude of discount. The discount compensates participating shareholders for the dilution of their shares (see Corwin, 2003).[33] Consistent with Abraham et al. (2015), we also find that the use of underwriter is associated with more successful DRIPs. Underwritten DRIPs have higher *PRate* and *IssueSize* (3.6% and 0.9%) than non-underwritten DRIPs. Unsurprisingly, higher dividend yield leads to higher *IssueSize* since higher dividends attracts more investors to DRIPs.

Next, we use a quasi-natural experiment – short selling ban – to differentiate between the role of equity lending and DRIP discount in boosting the participation rate of DRIPs. Following other financial markets around the world, short selling was banned in Australia from 22 Sep to 13 Nov 2008.[34] For financial stocks, the ban was extended to 22 May 2009. Although the short selling ban did not strictly apply to all equity borrowing, the volume of equity lending collapsed over the ban period (Carrol and Clarke, 2014). The ban period shuts down the role of equity lending, which is necessary for DRIP arbitrage, in boosting the *PRate* and *IssueSize* of DRIPs. If DRIP discount *per se* helps boost the success of DRIPs, we should still observe an elevated *PRate* and *IssueSize*

[33] Similarly, Balachandran et al. (2008) find that shareholder takeup in rights offerings is influenced by the subscription price discount, amongst other things.
[34] See the report published by the Australian Securities and Investments Commission (ASIC) available at https://asic.gov.au/regulatory-resources/markets/short-selling/ for further details.

in DRIPs with discount, compared to those without discount. To test this hypothesis, we use a dummy variable (*ShortBan*) to indicate the short selling ban. The coefficients on *ShortBan* in Models 5 and 6 in Panel A of Table 6 show that *PRate* and *IssueSize* are lower during the short selling ban period. When we limit our analysis to only DRIPs over the short selling ban period in Models 7 and 8, we observe that DRIP discount does not boost *PRate* and *IssueSize* during the ban period when equity borrowing is restricted. Only underwritten DRIPs and DRIPs offered by large firms increase the *PRate* and *IssueSize* during the ban period. Furthermore, we partition our sample into two equal groups based on the demand for equity loans (*ELoan%*). Panel B of Table 6 shows that DRIPs with discount are associated with higher *PRate* and *IssueSize* only in stocks with high *ELoan%*, but not in those with low equity loans.

We also want to ensure that relation between DRIP arbitrage and the success of DRIPs are not driven by small, illiquid stocks. To do so, we partition our sample into two equal groups based on Amihud's (2002) illiquidity measure (*Illiquidity*) and firm size (*Ln(MktCap)*). The results in Panels C and D of Table 6 confirm that the relation between DRIP discount and *PRate* as well as *IssueSize* is stronger in large and liquid stocks. Thus, size and liquidity issues are not driving the results.

Taken together, the results suggest that DRIP discount *per se* is insufficient to boost the participation rate in DRIPs without the high demand for equity loans associated with DRIP arbitrage. Restricting equity lending leads to lower equity raised because equity providers (i.e. the arbitrageurs) are kept out of the market.

5. Conclusion

Dividend reinvestment plans (DRIPs) with discount give shareholders the opportunity to purchase new shares at a discount to the market price in lieu of cash dividends. The ease of equity borrowing facilitates DRIP arbitrage where arbitrageurs borrow shares to participate in DRIPs with discount and short shares at the market price to profit from the price difference.

In this paper, we use DRIP arbitrage to illustrate the relation between equity lending, equity raising, and stock returns. We mainly compare equity borrowing and stock return patterns between stocks with and without DRIP discount around important dividend dates. We also examine the differences in DRIP participation rates between the two groups. In general, our setup allows us to rule out alternative explanations, such as those based on tax, dividend capture, or liquidity.

We show that DRIP arbitrage contributes to the recurring spikes in short term equity borrowing volume around the dividend record dates documented in previous studies. The spikes only occur when there is DRIP discount. We find that equity loan fees and the spread in loan fees surge around dividend record dates as the elevated borrowing demand due to DRIP arbitrage increase the search costs for equity loan. Moreover, loan fees on special are also more common. We also find that equity lenders earn a large portion of their annual lending income over the dividend record dates from DRIP arbitrage trades. However, DRIP arbitrage reduces the volume of equity lending that are financed by borrowed equity. In general, the surge in equity borrowing around dividend record dates is increasing in the magnitude of dividends and DRIP discount.

Furthermore, we find that DRIP arbitrage helps to increase the participation rate and issue size of DRIPs with discount. Importantly, DRIP discount does not help in the success of equity raising when equity borrowing (that facilitates DRIP arbitrage) is restricted. Equity borrowing for DRIP arbitrage drives the negative abnormal stock returns and increased short selling volume in firms with DRIP discount over the DRIP pricing period. The negative price impact is more pronounced in stocks with larger DRIP issue size, higher dividend yield, and lower liquidity. A trading strategy that exploits the negative price pressure earns positive abnormal returns.

Overall, this paper provides a link between equity lending, the success of equity raising, and the behavior of stocks using DRIP arbitrage as a setting. Our results suggest that restrictions in the equity lending market may have unintended consequences on capital raising and stock returns.

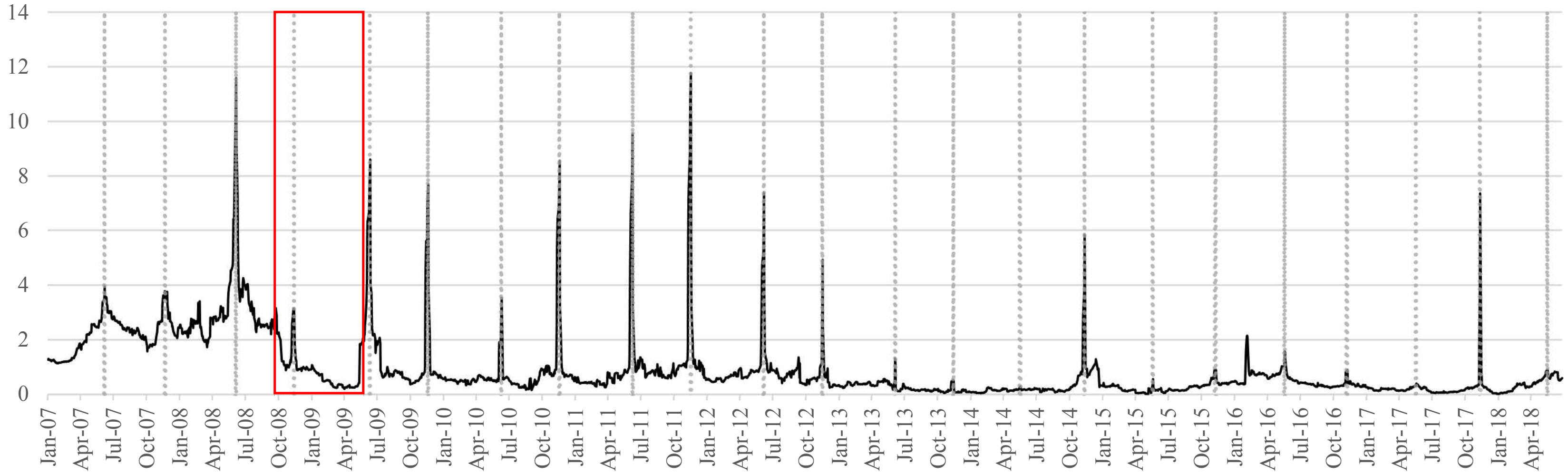


Figure 1. Equity loan of National Australia Bank (NAB). This figure plots the equity loan scaled by market capitalization of NAB from 1 January 2007 to 30 June 2018. The grey dotted lines denote dividend record dates. The red box shows the short selling ban period in Australia from 22 Sep 2008 to 22 May 2009.

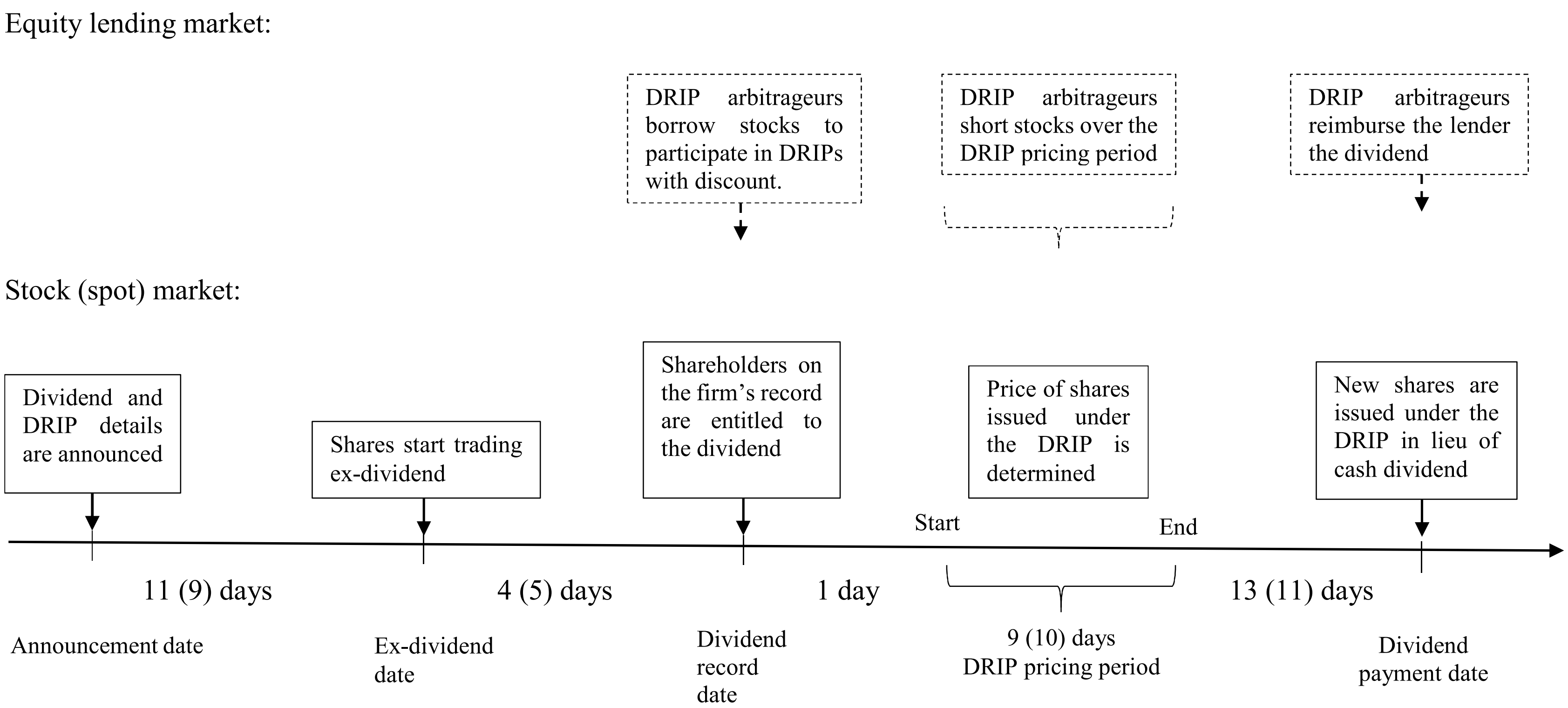
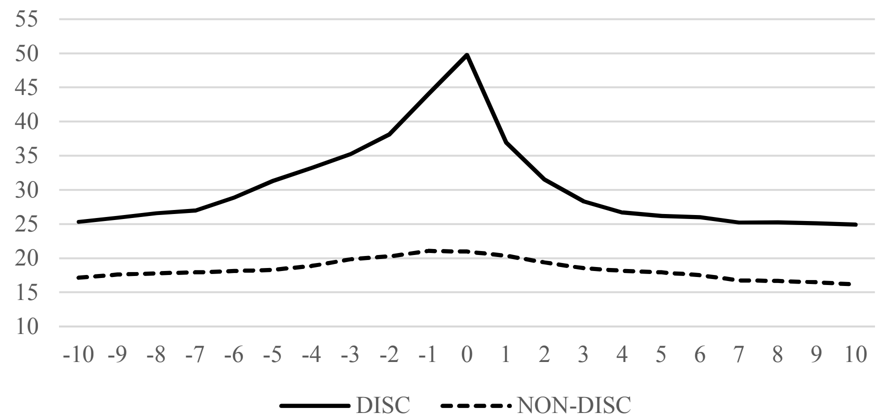


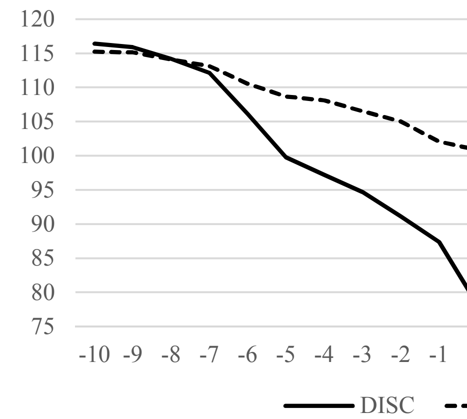
Figure 2. Dividend dates. This figure shows DRIP arbitrageurs' trading strategy and plots the important dates in a dividend reinvestment plan (DRIP) and shows the mean (median) days between two dates in our sample.

Figure 3. Evidence of DRIP arbitrage. Panels A to D plot the average active utilization rate (*UTIL*), tenure of equity l
value scaled by market capitalization (*ELoan%*), and active lendable equity loan value scaled by market capitalizatio
DRIP discount around the dividend record date (t = 0). All variables are defined in Table 2.

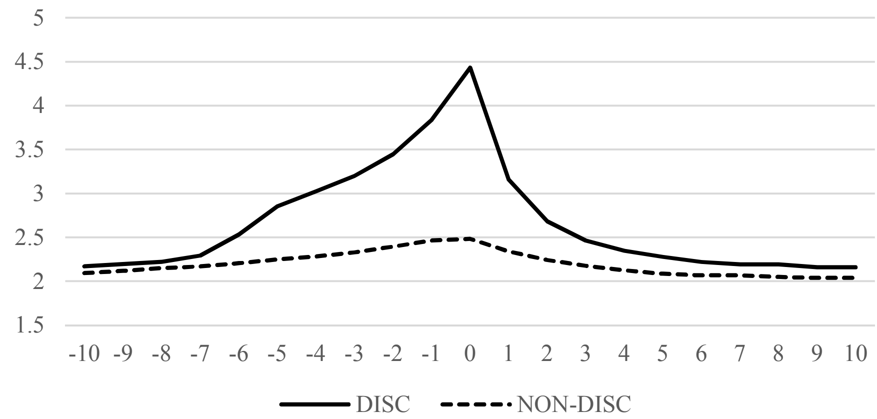
Panel A: *UTIL*



Panel B: *ETenure*



Panel C: *ELoan%*



Panel D: *ELend%*

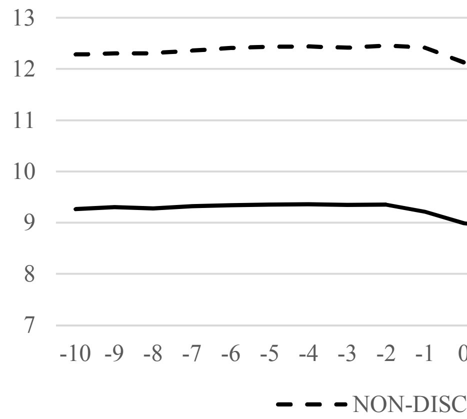
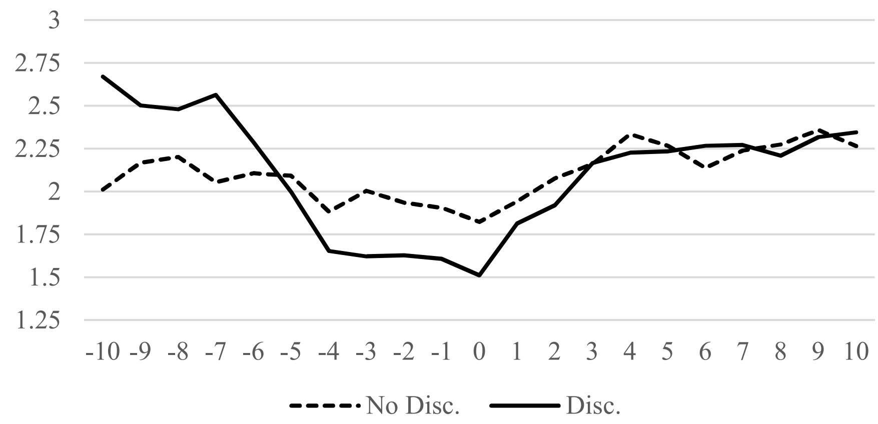
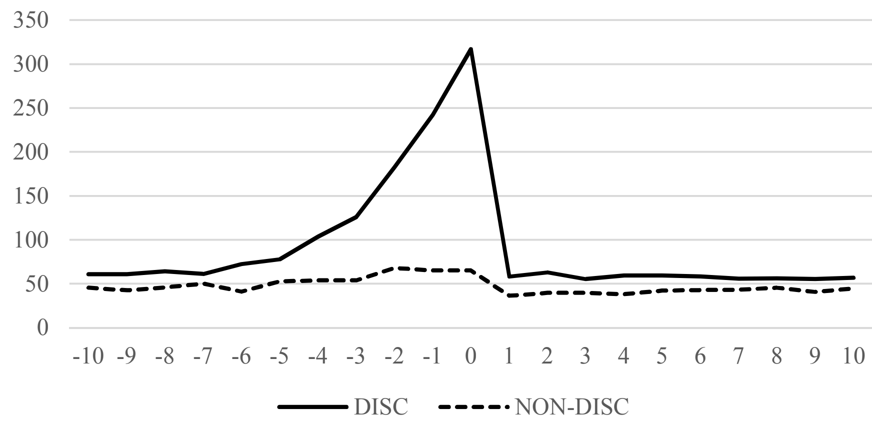


Figure 4. On-lending ratio, and loan fees. Panels A to D plot the average on-lending ratio (*OnLending*), loan fee (*LoanFee*), loan fee spread (*Feespread*), and total return to equity lending (*LendRev*) of firms with and without DRIP discount around the dividend record date (t = 0). All variables are defined in Table 3.

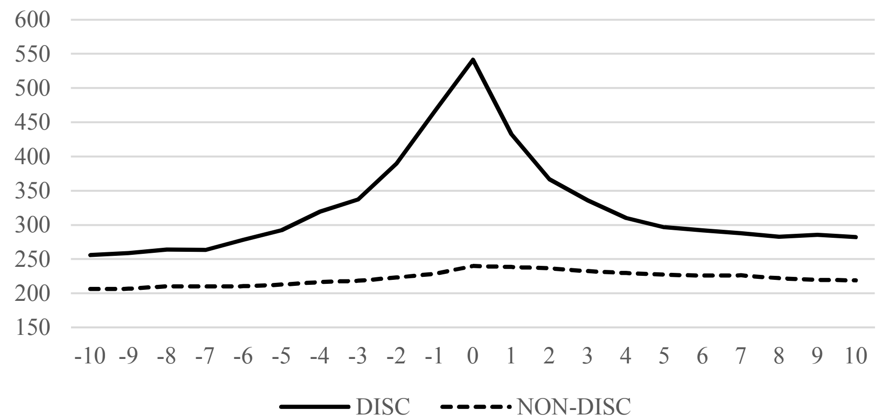
Panel A: *OnLending*



Panel B: *LoanFee*



Panel C: *Feespread*



Panel D: *LendRev*

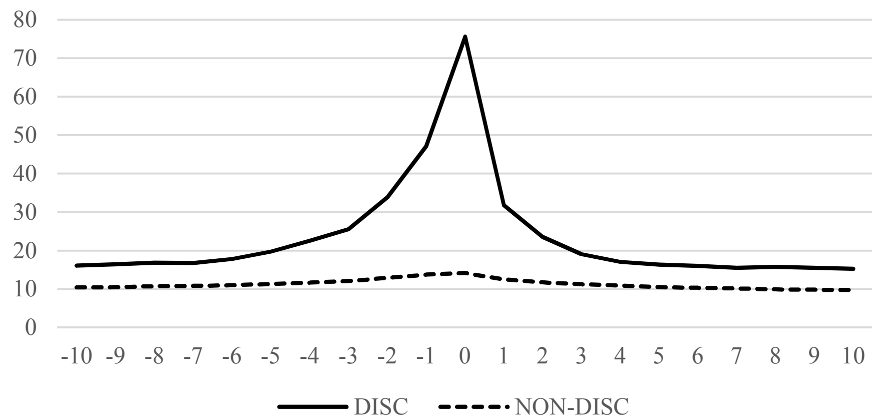
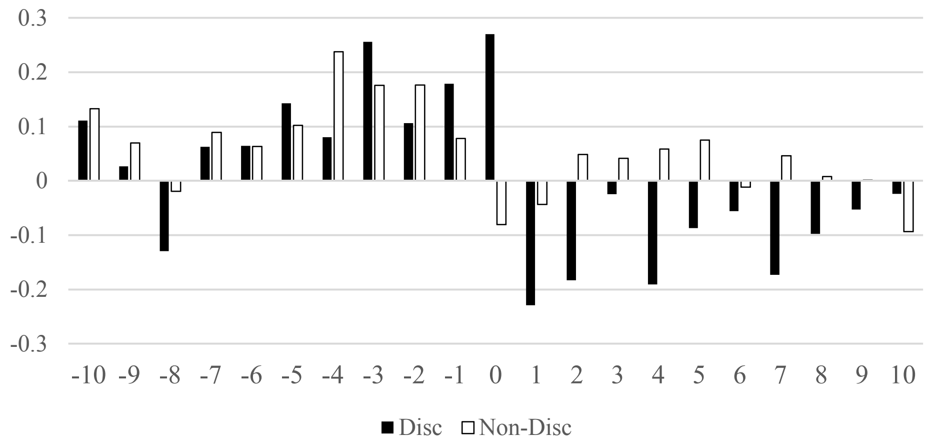
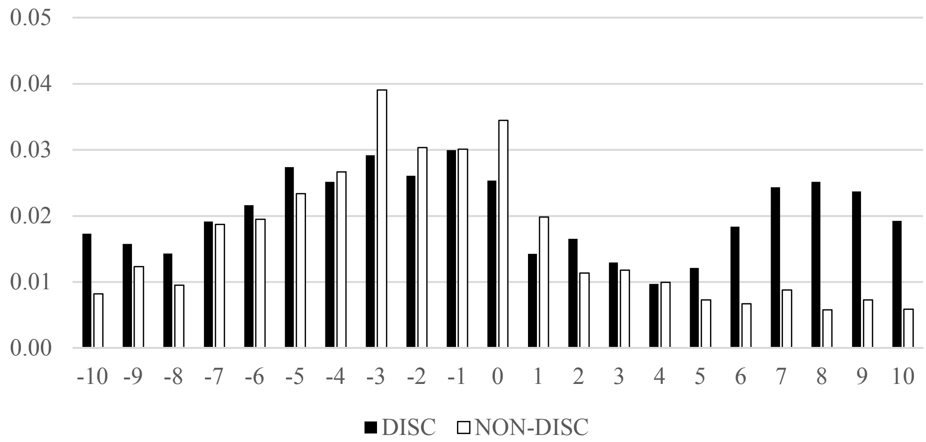


Figure 5. Around the ex-dividend date. Panels A to C plot the daily excess return, short flow, and order imbalance of firms with and without DRIP discount around the ex-dividend date (t = 0). *AbRet* is daily excess market returns. *AbShort* is daily short-selling flow minus the expected short-selling flow. Daily short-selling flow is daily short-selling volume scaled by total shares outstanding. Expected short-selling flow is the average daily short-selling flow in the previous year. *OI* is the difference between buyer-initiated volume and seller-initiated volume as a percentage of the sum of buyer-and seller-initiated volume.

Panel A: *AbRet*



Panel B: *AbShort*



Panel C: *OI*

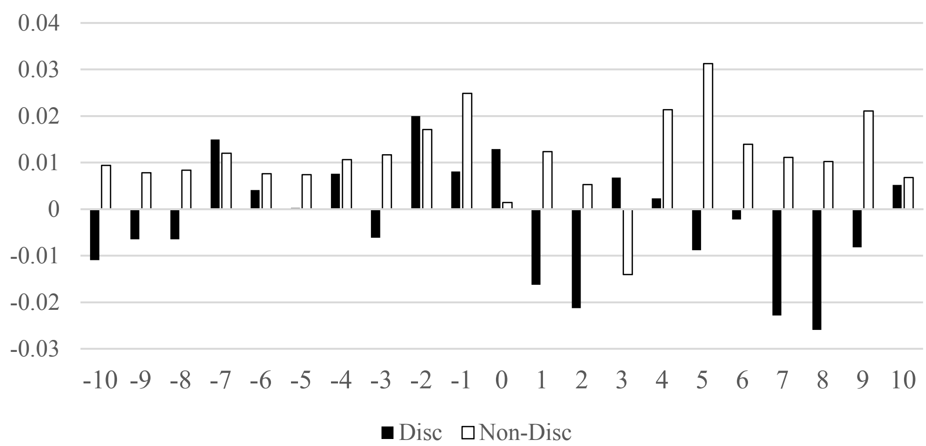
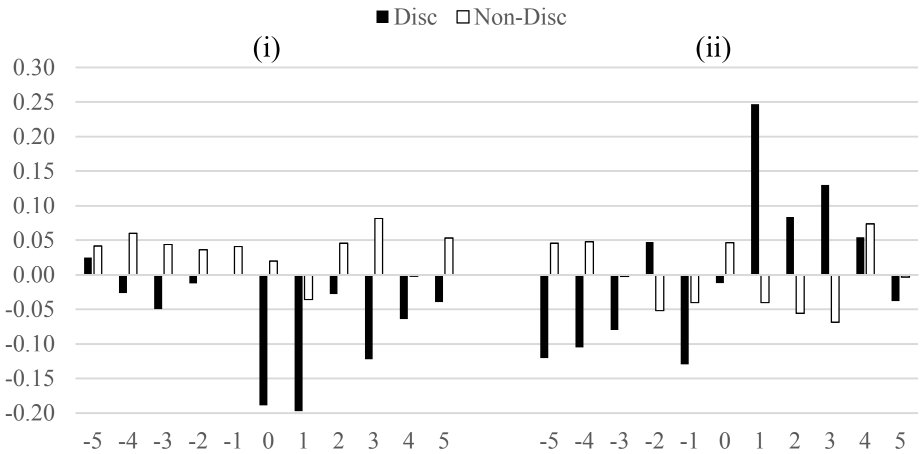
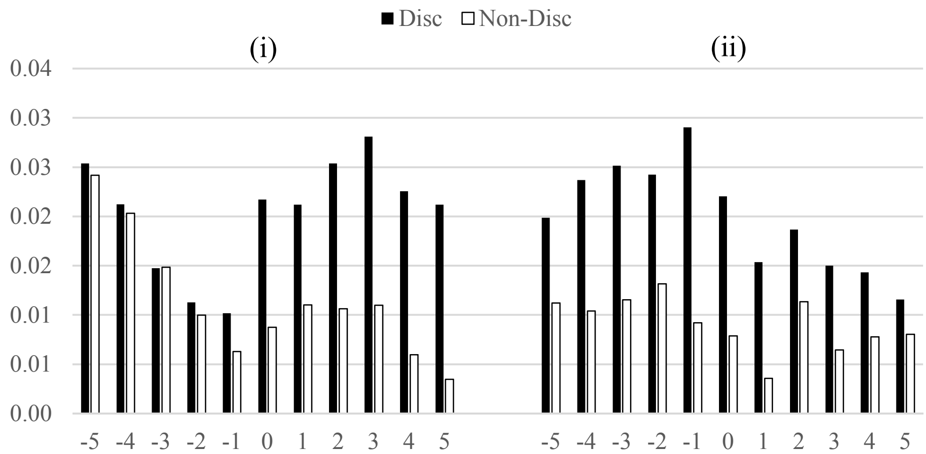


Figure 6. DRIP pricing period. Panels A to C plot the excess return, short flow, and order imbalance of firms with and without DRIP discount over the DRIP pricing period. *AbRet* is daily excess market returns. *AbShort* is daily short-selling flow minus the expected short-selling flow. *OI* is the difference between buyer-initiated volume and seller-initiated volume as a percentage of the sum of buyer-and seller-initiated volume.

Panel A: *AbRet*



Panel B: *AbShort*



Panel C: *OI*

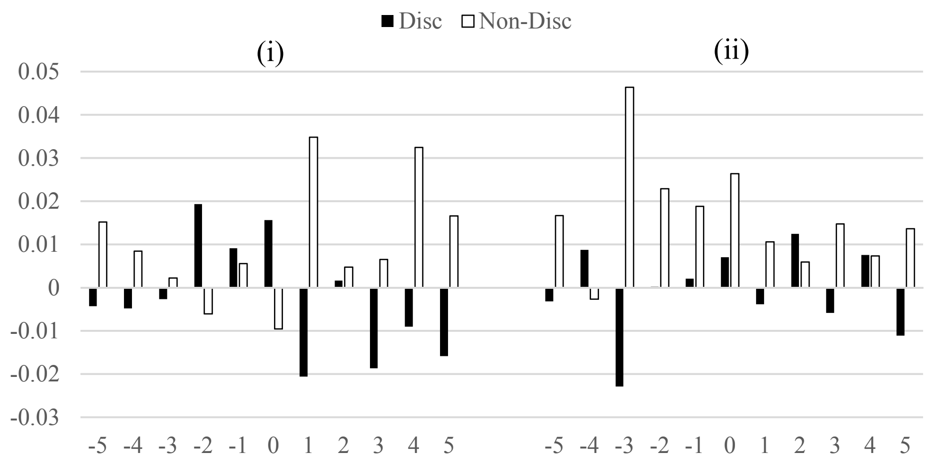


Figure 7. Trading strategy. This figure plots the daily long-short (hedge) returns and the cumulative returns of the trading strategy that exploits the negative price pressure over the DRIP pricing period. On every calendar day in our sample period, we identify all firms with DRIP discount that will be within the DRIP pricing period in the following trading day (day *t*). We form a short position in a value-weighted portfolio with these firms on day *t*-1 and hold it for a trading day. We then create a long position in a portfolio that mimics the S&P/ASX200 index return.

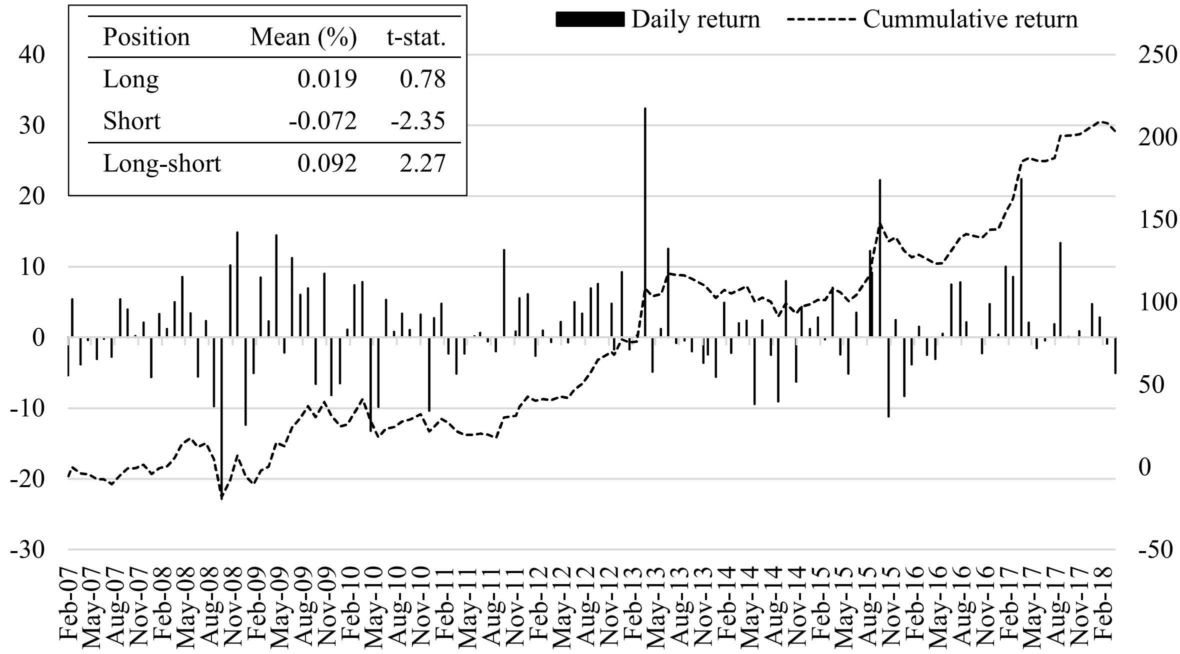


Table 1
Descriptive statistics

This table presents the descriptive statistics of firms with and without DRIP discount. The sample period is from January 2007 to June 2018. Panel A reports the yearly frequency of DRIPs and issue size. Panel B reports the summary statistics of firms with and without DRIP discount. *Ln(MktCap)* is the log of market capitalization. *MB* is the ratio of market equity to book equity. *DYield* is dividend per share scaled by stock price. *Leverage* is debt divided by debt and equity. *PRet* is the 60-day buy-and-hold return ending 20 days prior to the ex-dividend date. *Illiquidity* is Amihud's price impact measure, computed as the yearly average of daily absolute return scaled by daily dollar turnover. *Turnover* is daily traded volume divided by number of shares outstanding. *Bid-Ask* is the difference between the daily closing ask and bid prices scaled by the daily closing price. *IntraVol* is intraday volatility, measured as the log of the ratio of the highest price in the day to the lowest price in the day. *STD(return)* is the standard deviation of the daily stock return over the previous year. *PRate* measures the proportion of a dividend payment that is issued as new shares (in lieu of cash dividends) in a DRIP. *IssueSize* measures the new share issuance in a DRIP as a percentage of total shares outstanding. *Underwriter* indicates whether a DRIP is underwritten. *Disc%* is the percentage discount applied in the pricing of the new shares in a DRIP. *PP_Length* measures the number of trading days in the pricing period.

Panel A: Frequency of DRIPs and issue size

	Frequency of DRIPs				Issue size (billion)			
Year	Disc.	Non-Disc.	Total	% with Disc.	Disc.	Non-Disc.	Total	% with Disc.
2007	130	81	211	62%	4.81	4.34	9.15	53%
2008	115	75	190	61%	8.18	3.28	11.46	71%
2009	130	45	175	74%	7.30	1.82	9.12	80%
2010	104	67	171	61%	4.95	1.89	6.84	72%
2011	87	59	146	60%	6.39	2.81	9.21	69%
2012	75	74	149	50%	3.62	3.98	7.60	48%
2013	62	84	146	42%	1.53	1.87	3.40	45%
2014	66	83	149	44%	3.39	2.48	5.86	58%
2015	54	99	153	35%	3.19	3.22	6.40	50%
2016	50	103	153	33%	2.04	3.31	5.35	38%
2017	49	105	154	32%	4.51	1.61	6.12	74%
2018 till June	15	50	65	23%	0.45	1.26	1.71	27%
Total	937	925	1862		50.37	31.86	82.23	
%	50%	50%	100%		61%	39%	100%	

Panel B: Summary Statistics						
	Non-Disc.		Disc.		Difference	
	Mean	Median	Mean	Median	Mean	Median
Firm characteristics						
Ln(MktCap)	8.42	8.51	7.50	7.32	0.93***	1.19***
MB	2.75	1.87	2.23	1.58	0.52***	0.28***
DYield	2.27	2.16	2.42	2.19	-0.15**	-0.03
Leverage	0.42	0.38	0.39	0.35	0.03***	0.03***
PRet	0.67	0.80	1.10	1.20	-0.43	-0.40
Liquidity						
Turnover	0.12	0.10	0.12	0.09	-0.00	0.00*
Bid-Ask	1.17	0.80	1.54	1.00	-0.37***	-0.20***
IntraVol	1.68	1.43	2.22	1.72	-0.54***	-0.29***
STD(return)	1.75	1.58	2.24	1.97	-0.49***	-0.39***
Illiquidity	0.02	0.00	0.29	0.00	-0.27***	-0.00***
DRIP details						
Disc%	0.00	0.00	2.56	2.50	-2.56***	-2.50***
Underwriter	0.02	0.00	0.16	0.00	-0.14***	0.00***
PartiRate (%)	9.24	7.90	32.57	32.13	-23.34***	-24.22***
IssueSize (mil.)	0.22	0.12	0.97	0.77	-0.75***	-0.65***
PP_Length	9.02	10.00	9.15	10.00	-0.13	0.00

Table 2
Evidence of DRIP arbitrage

Panel A reports the regression results of equity lending statistics over the dividend record date. *UTIL* is total equity loan value scaled by market capitalization. *ETenure* is the average equity loan tenure. *ELoan%* is total equity loan value scaled by market capitalization. *ELend%* is the value of actively lendable securities divided by market capitalization. *Rec* is the dummy variable that indicates the [-2 day, +2 day] window around the dividend record date. *Disc_D* is the dummy variable that indicates DRIPs with discount. All other variables are defined in Table 1. Panel B to D show the results for sub-sample analysis. For brevity, we only report the coefficient on *Rec* × *Disc_D*. All regressions include both firm and year fixed effects. Robust standard errors are clustered at the firm level and *t*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Evidence of DRIP arbitrage around the dividend record date								
	Model							
	1	2	3	4	5	6	7	8
Variables	*UTIL*	*UTIL*	*ETenure*	*ETenure*	*ELoan%*	*ELoan%*	*ESupply%*	*ESupply%*
Rec	2.891***	4.837***	-7.601***	-11.344***	0.319***	0.560***	-0.183**	-0.286**
	(9.1)	(10.0)	(-6.6)	(-8.6)	(6.3)	(8.7)	(-2.2)	(-2.5)
Disc_D	4.657**		-4.570		0.618***		-0.227	
	(2.2)		(-0.9)		(2.7)		(-0.6)	
Rec × *Disc_D*	10.989***		-14.208***		0.991***		-0.270	
	(11.4)		(-7.4)		(8.1)		(-1.3)	
Disc%		2.402**		-1.788		0.201**		-0.367**
		(2.5)		(-0.8)		(2.2)		(-2.4)
Rec × *Disc%*		2.838***		-2.735***		0.206***		-0.031
		(6.7)		(-3.6)		(5.0)		(-0.3)
Underwriter	-0.255	-0.669	-9.490*	-9.711*	-0.018	0.004	0.363	0.564
	(-0.1)	(-0.4)	(-1.9)	(-1.9)	(-0.1)	(0.0)	(0.7)	(1.1)
PP_Length	-0.073	-0.111	0.340	0.356	-0.008	-0.007	0.006	0.018
	(-0.3)	(-0.4)	(0.5)	(0.5)	(-0.3)	(-0.2)	(0.1)	(0.4)
Ln(MktCap)	-5.067	-4.727	-0.109	-0.295	0.497*	0.535*	2.110***	2.082***
	(-1.5)	(-1.4)	(-0.0)	(-0.0)	(1.7)	(1.8)	(4.1)	(4.2)
MB	-0.924	-0.920	-3.657**	-3.641**	-0.084	-0.086	-0.037	-0.042
	(-1.0)	(-1.0)	(-2.2)	(-2.2)	(-1.2)	(-1.2)	(-0.2)	(-0.3)

DYield	0.910	0.901	1.105	1.139	0.191**	0.186*	-0.112	-0.121
	(0.9)	(0.9)	(0.4)	(0.4)	(2.0)	(2.0)	(-0.9)	(-1.0)
Leverage	13.435	13.660	56.362**	55.074**	0.075	0.242	-1.051	-0.797
	(1.2)	(1.2)	(2.4)	(2.3)	(0.1)	(0.2)	(-0.4)	(-0.3)
PRet	-0.074	-0.074	-0.047	-0.050	-0.008	-0.008	0.006	0.006
	(-1.4)	(-1.4)	(-0.3)	(-0.4)	(-1.5)	(-1.5)	(1.0)	(1.0)
Turnover	8.365	8.487	26.752	26.340	3.809***	3.853***	2.511**	2.543**
	(1.0)	(1.0)	(1.0)	(0.9)	(3.9)	(3.9)	(2.1)	(2.1)
Illiquidity	0.188	0.199	-1.205**	-1.244**	-0.046**	-0.041*	-0.079**	-0.071**
	(0.4)	(0.5)	(-2.3)	(-2.4)	(-2.1)	(-1.9)	(-2.6)	(-2.3)
STD(return)	0.850	1.009	5.189	4.969	0.339*	0.380*	0.288	0.326
	(0.4)	(0.5)	(1.0)	(0.9)	(1.7)	(1.9)	(1.1)	(1.2)
Constant	52.708*	49.057	83.840	86.016	-3.228	-3.622	-6.148	-5.796
	(1.8)	(1.6)	(1.6)	(1.6)	(-1.2)	(-1.3)	(-1.2)	(-1.2)
Obs.	47,982	47,982	45,991	45,991	47,982	47,982	47,982	47,982
Adj. R^2	0.43	0.43	0.28	0.28	0.47	0.47	0.74	0.74

Panel B: The role of dividend yield (*DYield*)								
	UTIL		*ETenure*		*ELoan%*		*ESupply%*	
	High	Low	High	Low	High	Low	High	Low
Rec × Disc_D	12.799***	9.518***	-18.795***	-10.253***	0.877***	1.082***	-0.555**	-0.113
	(8.4)	(8.9)	(-6.2)	(-4.4)	(4.9)	(8.0)	(-2.3)	(-0.5)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	24,527	23,455	24,184	21,807	24,527	23,455	24,527	23,455
Adj. R^2	0.44	0.51	0.33	0.32	0.49	0.52	0.71	0.81

Panel C: The role of firm size ((*Ln(MktCap)*))								
	UTIL		*ETenure*		*ELoan%*		*ESupply%*	
	Large	Small	Large	Small	Large	Small	Large	Small
Rec × Disc_D	16.255***	5.446***	-21.694***	-10.822***	1.669***	0.327***	-0.549**	-0.257
	(11.1)	(4.9)	(-7.3)	(-3.6)	(10.4)	(2.8)	(-2.3)	(-1.3)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	27,260	20,722	27,258	18,733	27,260	20,722	27,260	20,722
Adj. R^2	0.51	0.39	0.27	0.35	0.47	0.59	0.70	0.71

Panel D: The role of liquidity (*Illiquidity*)								
	UTIL		*ETenure*		*ELoan%*		*ESupply%*	
	Illiquid	Liquid	Illiquid	Liquid	Illiquid	Liquid	Illiquid	Liquid
Rec × Disc_D	6.690***	15.674***	-8.514***	-23.163***	0.389***	1.733***	-0.269	-0.608**
	(5.9)	(9.3)	(-3.7)	(-7.1)	(4.9)	(10.2)	(-1.5)	(-2.4)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	20,760	27,222	18,771	27,220	20,760	27,222	20,760	27,222
Adj. R^2	0.39	0.54	0.32	0.28	0.56	0.48	0.71	0.66

Table 3
DRIP arbitrage and its impact on the equity lending market

In Panel A, Models 1 and 2 report the results from a logit model of fees that are on special and Models 3 and 4 report the ordinary least squares (OLS) regression results. P(*Special*) is the probability that loan fee is above 250 bps within the [-1 day, +1 day] period around the dividend record date. *LendRev* is the percentage of annual equity lending revenue earned within the [-2 day, +2 day] period around the dividend record date. *Disc_D* is the dummy variable that indicates DRIPs with discount. *Disc%* is the percentage discount applied in the pricing of the new shares in a DRIP. All other variables are defined in Table 1. Panel B reports the regression results of equity loan fees and revenue around the dividend record date. *LoanFee* is the value-weighted average fee for all new equity loans in the day. *FeeSpread* is the difference between a stock's maximum and minimum daily equity loan fees. *LendRev* is the revenue from equity lending and reinvestments scaled by lendable assets in basis points. *Rec* is the dummy variable that indicates the [-2 day, +2 day] window around the dividend record date. Panel C to E show the results for sub-sample analysis. For brevity, we only report the coefficient on *Disc_D* and *Rec* × *Disc_D*. All regressions include both firm and year fixed effects. Robust standard errors are clustered at the firm level and *t*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Lending revenue and fee spike around the dividend record date

	Model			
	1	2	3	4
Variables	P(*Special*)	P(*Special*)	*LendRev%*	*LendRev%*
Disc_D	2.859***		16.555***	
	(8.4)		(8.8)	
Disc%		0.994***		5.110***
		(5.8)		(6.6)
Underwriter	0.544	0.552	0.209	0.990
	(1.4)	(1.3)	(0.1)	(0.6)
PP_Length	0.058	0.042	0.187	0.166
	(1.6)	(1.1)	(1.0)	(0.9)
Ln(MktCap)	-0.943***	-0.935***	2.174**	2.775***
	(-3.1)	(-3.1)	(2.2)	(2.7)
MB	-0.128	-0.101	0.099	0.075
	(-1.0)	(-1.1)	(0.4)	(0.4)
DYield	0.181	0.163	0.975**	0.885*
	(1.5)	(1.3)	(2.3)	(2.0)
Leverage	0.897	1.415	-9.379**	-6.635
	(0.7)	(1.1)	(-2.4)	(-1.6)
PRet	-0.010*	-0.011*	0.031	0.035*
	(-1.8)	(-1.8)	(1.6)	(1.7)
Turnover	-2.523**	-2.504**	-0.970	-0.029
	(-2.0)	(-2.0)	(-0.2)	(-0.0)
Illiquidity	-0.027***	-0.021**	-0.334***	-0.230***
	(-2.6)	(-2.0)	(-6.4)	(-4.1)
STD(return)	-0.025	0.023	-0.863	-0.267
	(-0.1)	(0.1)	(-0.8)	(-0.2)
Constant	1.613	-0.797	-16.562*	-21.540**
	(0.8)	(-0.4)	(-1.7)	(-2.2)
Obs.	1,323	1,323	1,481	1,481
Adj. R^2 (Pseudo R^2)	0.338	0.320	0.45	0.37

Panel B: Equity loan fees around the dividend record date						
	Model					
	1	2	3	4	5	6
Variables	*LoanFee*	*LoanFee*	*FeeSpread*	*FeeSpread*	*LendRev*	*LendRev*
Disc_D	14.636***		52.998***		6.254**	
	(3.4)		(2.7)		(2.3)	
Disc%		10.979***		30.932***		3.203**
		(4.8)		(3.5)		(2.6)
Rec	6.007***	14.652***	17.206***	42.002***	3.025***	6.238***
	(3.5)	(5.0)	(2.7)	(5.3)	(3.8)	(6.4)
Rec × Disc_D	48.234***		142.699***		23.329***	
	(8.4)		(9.8)		(11.9)	
Rec × Disc%		12.427***		37.305***		6.741***
		(3.6)		(5.9)		(7.3)
Underwriter	-7.910	-11.131*	-14.133	-20.229	-0.979	-1.274
	(-1.4)	(-1.9)	(-0.7)	(-0.9)	(-0.4)	(-0.5)
PP_Length	0.614	0.299	-3.250	-3.977*	0.258	0.182
	(0.9)	(0.4)	(-1.4)	(-1.8)	(0.9)	(0.6)
Ln(MktCap)	-74.789***	-74.187***	-6.272	-4.182	-9.294*	-9.081*
	(-4.8)	(-4.9)	(-0.3)	(-0.2)	(-1.8)	(-1.8)
MB	0.767	0.864	-1.862	-1.744	-0.563	-0.572
	(0.3)	(0.4)	(-0.3)	(-0.3)	(-0.7)	(-0.7)
DYield	-5.286	-5.236	16.485**	16.428**	-1.164	-1.199
	(-1.5)	(-1.5)	(2.0)	(2.0)	(-0.6)	(-0.7)
Leverage	5.459	3.097	173.964	174.828	14.870	15.523
	(0.1)	(0.1)	(1.5)	(1.5)	(1.3)	(1.4)
PRet	-0.157	-0.150	-0.944**	-0.919**	-0.192**	-0.189**
	(-0.8)	(-0.8)	(-2.2)	(-2.1)	(-2.0)	(-2.0)
Turnover	-22.379	-21.575	109.704	113.098	21.168	21.552
	(-1.0)	(-0.9)	(1.3)	(1.3)	(1.4)	(1.4)
Illiquidity	-0.223	-0.298	-3.165***	-3.176***	-0.540***	-0.524***
	(-0.3)	(-0.5)	(-3.8)	(-4.0)	(-4.5)	(-4.4)
STD(return)	-6.911	-7.754	22.975	21.959	4.083	4.061
	(-1.5)	(-1.6)	(1.6)	(1.6)	(1.6)	(1.6)
Constant	662.836***	656.385***	137.840	116.363	69.512	67.489
	(4.9)	(5.0)	(0.7)	(0.6)	(1.6)	(1.5)
Obs.	45,991	45,991	45,991	45,991	45,530	45,530
Adj. R^2	0.45	0.45	0.27	0.27	0.36	0.36

Panel C: The role of dividend yield (*DYield*)								
	P(*Special*)		*LoanFee*		*FeeSpread*		*LendRev*	
Variables	High	Low	High	Low	High	Low	High	Low
Disc_D	5.037***	1.960***						
	(6.3)	(4.2)						
Rec × *Disc_D*			72.969***	29.479***	191.870***	105.813***	31.954***	16.510***
			(9.0)	(5.4)	(7.6)	(8.3)	(9.0)	(10.6)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	602	553	24,184	21,807	24,184	21,807	24,146	21,384
Pseudo R^2/Adj. R^2	0.461	0.274	0.49	0.51	0.32	0.31	0.39	0.53

Panel D: The role of firm size (*Ln(MktCap)*)								
	P(*Special*)		*LoanFee*		*FeeSpread*		*LendRev*	
Variables	Large	Small	Large	Small	Large	Small	Large	Small
Disc_D	4.403***	1.710***						
	(6.7)	(4.8)						
Rec × *Disc_D*			68.244***	27.796***	236.814***	30.156*	30.246***	13.818***
			(10.9)	(3.4)	(11.9)	(1.8)	(11.8)	(4.0)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	603	662	27,258	18,733	27,258	18,733	27,239	18,291
Pseudo R^2/Adj. R^2	0.441	0.267	0.32	0.48	0.29	0.29	0.36	0.39

Panel E: The role of liquidity (*Illiquidity*)								
	P(*Special*)		*LoanFee*		*FeeSpread*		*LendRev*	
Variables	Illiquid	Liquid	Illiquid	Liquid	Illiquid	Liquid	Illiquid	Liquid
Disc_D	1.912***	4.439***						
	(5.2)	(6.3)						
Rec × *Disc_D*			34.842***	64.635***	50.671***	230.325***	17.205***	28.960***
			(4.5)	(9.5)	(3.1)	(10.5)	(6.7)	(9.6)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	671	598	18,771	27,220	18,771	27,220	18,327	27,203
Pseudo R^2/Adj. R^2	0.274	0.464	0.45	0.34	0.29	0.30	0.38	0.39

Table 4
Stock returns, short flow, and order imbalance around the ex-dividend date

This table reports the regression results of stock returns, short flow, and order imbalance around the ex-dividend date. *AbRet* is daily excess market returns. *AbShort* is daily short-selling flow minus the expected short-selling flow. Daily short-selling flow is daily short-selling volume scaled by total shares outstanding. Expected short-selling flow is the average daily short-selling flow in the previous year. *OI* is the difference between buyer-initiated volume and seller-initiated volume as a percentage of the sum of buyer-and seller-initiated volume. *Disc_D* is the dummy variable that indicates DRIPs with discount. *PP_D* is the dummy variable that indicates the DRIP pricing period. *Disc%* is the percentage discount applied in the pricing of the new shares in a DRIP. *PreEx_D* is the dummy variable that indicates the five-day period before the ex-dividend date. All other variables are defined in Table 1. All regressions include both firm and year fixed effects. Robust standard errors are clustered at the firm level and *t*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Model		
	1	2	3
Variables	*AbRet*	*AbShort*	*OI*
Disc_D	-0.043	0.021*	-0.011
	(-0.6)	(1.9)	(-0.7)
PP_D	-0.049	-0.007***	-0.000
	(-1.3)	(-3.2)	(-0.0)
Disc_D × *PP_D*	-0.087*	0.016***	-0.007
	(-1.9)	(4.9)	(-0.8)
Disc%	0.005	-0.007	0.002
	(0.2)	(-1.4)	(0.3)
PreEx_D	0.123***	0.015***	0.012***
	(3.6)	(6.7)	(2.9)
Underwriter	-0.164***	0.018*	-0.002
	(-2.8)	(1.8)	(-0.2)
PP_Length	0.001	-0.001	0.000
	(0.2)	(-0.8)	(0.1)
Ln(MktCap)	-0.141***	0.017**	0.007
	(-3.3)	(2.0)	(0.7)
MB	-0.004	-0.003**	0.003
	(-0.5)	(-2.6)	(1.1)
DYield	-0.021	0.011***	-0.005*
	(-0.8)	(4.4)	(-1.7)
Leverage	-0.197	0.050*	-0.041
	(-1.4)	(1.8)	(-1.3)
PRet	-0.001	-0.000***	0.000
	(-1.2)	(-3.4)	(1.1)
Turnover	-0.472	0.103***	-0.009
	(-1.6)	(3.5)	(-0.3)
Illiquidity	-0.001	-0.001**	0.001
	(-0.4)	(-2.1)	(1.5)
STD(return)	-0.007	0.010**	-0.018***
	(-0.2)	(2.3)	(-2.7)
Constant	1.371***	-0.108	0.012
	(3.6)	(-1.4)	(0.2)
Obs.	32,550	25,167	22,045
Adj. R^2	0.01	0.34	0.02

Table 5
Stock behaviour around the DRIP pricing period

This table reports the regression results of the stock returns, short flow, and order imbalance in the period around the DRIP pricing period. Panel A covers the [-10 day, +10 day] period around the DRIP pricing period. Panels B to E covers the DRIP pricing period. Panels C to E report the results for sub-sample analysis. For brevity, we only report the coefficient on *ELoan%*. *AbRet* is daily excess market returns. *AbShort* is daily short-selling flow minus the expected short-selling flow. Daily short-selling flow is daily short-selling volume scaled by total shares outstanding. Expected short-selling flow is the average daily short-selling flow in the previous year. *OI* is the difference between buyer-initiated volume and seller-initiated volume as a percentage of the sum of buyer-and seller-initiated volume. *Disc_D* is the dummy variable that indicates DRIPs with discount. *PP_D* is the dummy variable that indicates the DRIP pricing period. *Post_PP_D* is the dummy variable that indicates the five-period following the DRIP pricing period. *Disc%* is the percentage discount applied in the pricing of the new shares in a DRIP. All other variables are defined in Table 1. All regressions include both firm and year fixed effects. Robust standard errors are clustered at the firm level and *t*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Stock behavior around the DRIP pricing period						
	Model					
	1	2	3	4	5	6
Variables	*AbRet*	*AbShort*	*OI*	*AbRet*	*AbShort*	*OI*
Disc_D	0.100	0.024**	-0.004	0.019	0.029***	-0.012
	(1.6)	(2.3)	(-0.2)	(0.3)	(2.8)	(-0.5)
PP_D	-0.018	0.003	0.011**			
	(-0.6)	(1.4)	(2.2)			
Disc_D × *PP_D*	-0.085*	0.011***	-0.016**			
	(-1.9)	(3.5)	(-2.1)			
Post_PP_D				-0.030	-0.003	0.002
				(-0.9)	(-1.5)	(0.3)
Disc_D × *Post_PP_D*				0.181***	-0.001	0.001
				(3.6)	(-0.3)	(0.2)
Disc%	0.006	-0.007*	0.004	0.007	-0.007*	0.005
	(0.3)	(-1.7)	(0.5)	(0.4)	(-1.8)	(0.5)
Underwriter	-0.091*	0.037***	-0.008	-0.092*	0.037***	-0.008
	(-1.7)	(3.6)	(-0.9)	(-1.8)	(3.6)	(-0.9)
PP_Length	0.010*	-0.000	0.001	0.008	-0.000	0.001
	(1.8)	(-0.2)	(1.0)	(1.5)	(-0.0)	(1.0)
Ln(MktCap)	-0.089**	0.021**	0.008	-0.090**	0.021**	0.008
	(-2.3)	(2.3)	(0.8)	(-2.3)	(2.3)	(0.8)
MB	0.023*	-0.003**	0.001	0.023*	-0.003**	0.001
	(1.9)	(-2.0)	(0.4)	(1.9)	(-2.0)	(0.4)
DYield	0.009	0.011***	-0.002	0.009	0.011***	-0.002
	(0.4)	(3.9)	(-0.4)	(0.4)	(3.9)	(-0.4)
Leverage	-0.320**	0.029	-0.054	-0.319**	0.029	-0.053
	(-2.4)	(1.1)	(-1.4)	(-2.4)	(1.1)	(-1.4)
PRet	-0.001	-0.000	0.000	-0.001	-0.000	0.000
	(-0.9)	(-1.5)	(1.5)	(-0.9)	(-1.5)	(1.5)
Turnover	-0.456	0.102***	-0.019	-0.453	0.102***	-0.019
	(-1.2)	(3.2)	(-0.6)	(-1.2)	(3.2)	(-0.6)
Illiquidity	-0.008*	-0.001	0.001	-0.008*	-0.001	0.001
	(-1.7)	(-1.3)	(1.1)	(-1.7)	(-1.3)	(1.1)
STD(return)	-0.018	0.009**	-0.012	-0.018	0.009**	-0.012
	(-0.5)	(2.3)	(-1.3)	(-0.5)	(2.4)	(-1.3)
Constant	0.734**	-0.145*	-0.020	0.755**	-0.146*	-0.016
	(2.2)	(-1.9)	(-0.3)	(2.3)	(-1.9)	(-0.2)
Obs.	32,436	25,133	22,183	32,436	25,133	22,183
Adj. R^2	0.00	0.34	0.02	0.00	0.34	0.01

Panel B: Stock behavior over the DRIP pricing period				
	Model			
	1	2	3	4
Variables	*AbRet*	*CumuRet*	*AbShort*	*OI*
ELoan%	-0.020**	-0.188***	0.003***	0.001
	(-2.4)	(-2.6)	(2.8)	(0.8)
Disc_D	0.036	0.188	-0.005	-0.026
	(0.3)	(0.2)	(-0.5)	(-1.0)
Disc%	0.016	0.198	0.005	0.008
	(0.3)	(0.5)	(1.1)	(0.8)
Underwriter	-0.210**	-2.374***	0.057***	-0.003
	(-2.6)	(-3.0)	(4.8)	(-0.2)
PP_Length	0.008	0.045	-0.001	-0.001
	(1.1)	(0.5)	(-0.8)	(-0.5)
Ln(MktCap)	-0.042	-0.578	0.012	0.002
	(-0.8)	(-1.3)	(1.6)	(0.1)
MB	0.013	0.130	0.001	0.003
	(0.9)	(1.1)	(0.7)	(0.9)
DYield	0.055**	0.549**	0.011***	-0.002
	(2.2)	(2.2)	(3.6)	(-0.4)
Leverage	-0.709***	-6.405***	-0.050	-0.014
	(-2.9)	(-3.0)	(-1.4)	(-0.4)
PRet	-0.000	-0.002	-0.000	-0.000
	(-0.3)	(-0.2)	(-0.6)	(-0.3)
Turnover	-0.111	-0.955	0.032	0.010
	(-0.2)	(-0.3)	(0.9)	(0.2)
Illiquidity	-0.006**	-0.056**	0.000	0.002**
	(-2.1)	(-2.3)	(0.9)	(2.1)
STD(return)	0.058	0.493	-0.016***	-0.013
	(1.3)	(1.3)	(-2.9)	(-1.3)
Constant	0.305	4.495	-0.074	0.026
	(0.6)	(1.2)	(-1.0)	(0.2)
Obs.	13,388	1,484	10,636	9,091
Adj. R^2	0.01	0.06	0.20	0.02

Panel C: The role of issue size (*IssueSize*)						
	CumuRet		*AbShort*		*OI*	
	Large	Small	Large	Small	Large	Small
ELoan%	-0.290**	-0.101	0.003**	0.002	-0.001	-0.001
	(-2.5)	(-1.1)	(2.2)	(1.3)	(-0.3)	(-0.5)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	723	724	4,941	5,694	5,299	3,792
Adj. R^2	0.12	0.09	0.28	0.22	0.02	0.03

Panel D: The role of dividend yield (*DYield*)						
	CumuRet		*AbShort*		*OI*	
	High	Low	High	Low	High	Low
ELoan%	-0.219*	-0.087	0.003**	0.002*	0.001	0.002
	(-1.9)	(-0.9)	(2.1)	(1.8)	(0.3)	(0.9)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	715	721	5,467	5,168	4,658	4,433
Adj. R^2	0.09	0.03	0.25	0.24	0.02	0.03

Panel E: The role of liquidity (*Illiquidity*)						
	CumuRet		*AbShort*		*OI*	
	Illiquid	Liquid	Illiquid	Liquid	Illiquid	Liquid
ELoan%	-0.366***	-0.152**	0.003**	0.001	0.001	-0.001
	(-2.7)	(-2.0)	(2.1)	(1.0)	(0.6)	(-0.7)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	733	738	5,229	5,407	4,722	4,369
Adj. R^2	0.06	0.11	0.20	0.27	0.01	0.04

Table 6
DRIP arbitrage and the success of equity issuance

Panel A reports the regression results of the participation rate (*PRate*) and issuance size (*IssueSize*) of DRIPs. Panel B to D show the results for sub-sample analysis. For brevity, we only report the coefficient on *Disc_D*. *ELoan%* is total equity loan value scaled by market capitalization. *Disc_D* is the dummy variable that indicates DRIPs with discount. *Disc%* is the percentage discount applied in the pricing of the new shares in a DRIP. *ShortBan* is the dummy variable that indicates the short selling ban period. All other variables are defined in Table 1. All regressions include both firm and year fixed effects. Robust standard errors are clustered at the firm level and *t*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Participation rate (*PRate*) and issue size (*IssueSize*)								
	Model							
	1	2	3	4	5	6	7	8
Variables	*PRate*	*IssueSize*	*PRate*	*IssueSize*	*PRate*	*IssueSize*	*PRate*	*IssueSize*
ELoan%	0.813***	0.023***	1.269***	0.036***	0.806***	0.020***	-0.928	-0.080
	(5.5)	(4.1)	(8.6)	(6.7)	(5.4)	(3.8)	(-1.7)	(-1.7)
Disc_D	19.394***	0.534***			17.152***	0.588***	3.042	0.497
	(10.2)	(8.6)			(6.3)	(5.2)	(0.5)	(1.1)
Disc%			6.365***	0.162***	1.085	-0.019	1.759	-0.064
			(8.1)	(6.7)	(1.2)	(-0.5)	(0.9)	(-0.4)
Underwriter	3.620**	0.863***	3.571**	0.870***	3.448**	0.865***	3.797	1.045**
	(2.2)	(9.2)	(2.0)	(9.0)	(2.1)	(9.2)	(1.4)	(2.2)
ShortBan					-3.999**	-0.156		
					(-2.3)	(-1.3)		
PP_Length	-0.100	-0.002	-0.150	-0.002	-0.123	-0.002	-0.295	-0.011
	(-0.4)	(-0.1)	(-0.6)	(-0.2)	(-0.5)	(-0.1)	(-0.5)	(-0.2)
Ln(MktCap)	0.960	0.016	1.385	0.026	1.147	0.018	3.702	0.168*
	(0.9)	(0.4)	(1.2)	(0.5)	(1.1)	(0.4)	(1.7)	(1.9)
MB	-0.205	-0.012	-0.181	-0.011	-0.218	-0.013	0.030	0.065
	(-0.7)	(-1.0)	(-0.6)	(-0.9)	(-0.8)	(-1.0)	(0.0)	(0.8)
DYield	0.245	0.285***	0.042	0.279***	0.307	0.289***	1.377	0.325**
	(0.7)	(12.1)	(0.1)	(11.7)	(0.9)	(12.2)	(0.6)	(2.4)
Leverage	4.610	0.155	6.915	0.229	4.699	0.153	-10.934	0.102
	(1.1)	(0.9)	(1.5)	(1.2)	(1.1)	(0.9)	(-0.8)	(0.2)
PRet	0.024	0.001*	0.027	0.001*	0.021	0.001*	0.019	0.000
	(1.5)	(1.9)	(1.5)	(2.0)	(1.3)	(1.8)	(0.3)	(0.0)
Turnover	3.612	0.035	2.193	-0.007	3.561	0.040	-55.280**	-2.457
	(0.7)	(0.2)	(0.4)	(-0.0)	(0.7)	(0.2)	(-2.3)	(-1.7)
Illiquidity	0.177***	0.002	0.295***	0.006**	0.177***	0.002	1.352	0.031
	(3.6)	(0.8)	(5.6)	(2.0)	(3.5)	(0.7)	(0.5)	(0.2)
STD(return)	-0.362	-0.038	0.220	-0.020	-0.203	-0.034	1.826	-0.062
	(-0.4)	(-1.2)	(0.3)	(-0.6)	(-0.2)	(-1.0)	(0.8)	(-0.5)
Constant	-0.184	-0.574	-4.640	-0.679	-2.043	-0.595	-3.327	-1.185
	(-0.0)	(-1.3)	(-0.4)	(-1.4)	(-0.2)	(-1.4)	(-0.2)	(-1.3)
Obs.	1,489	1,489	1,489	1,489	1,489	1,489	43	43
Adj. R^2	0.75	0.78	0.73	0.76	0.75	0.78	0.22	0.41

Panel B: The role of equity lending (*ELoan%*)				
	PRate		*IssueSize*	
	High	Low	High	Low
Disc_D	16.546***	10.267	0.628***	0.113
	(5.7)	(1.6)	(4.8)	(0.5)
Controls	Yes	Yes	Yes	Yes
Obs.	725	730	725	730
Adj. R^2	0.73	0.79	0.77	0.81

Panel C: The role of illiquidity (*Illiquidity*)				
	PRate		*IssueSize*	
	Liquid	Illiquid	Liquid	Illiquid
Disc_D	17.036***	14.669***	0.686***	0.458***
	(7.8)	(3.0)	(4.4)	(2.7)
Controls	Yes	Yes	Yes	Yes
Obs.	740	736	740	736
Adj. R^2	0.80	0.71	0.76	0.79

Panel D: The role of firm size (*Ln(MktCap)*)				
	PRate		*IssueSize*	
	Large	Small	Large	Small
Disc_D	17.900***	15.236***	0.758***	0.495***
	(6.1)	(3.3)	(3.8)	(3.1)
Controls	Yes	Yes	Yes	Yes
Obs.	743	740	743	740
Adj. R^2	0.80	0.72	0.77	0.79

Appendix A

A. DRIP arbitrage: Excepts from industry articles

The following excerpts from JPMorgan newsletters provide some anecdotal evidence on DRIP arbitrage.

A1. The evidence of DRIP arbitrage

"… we had some Australian dividend activity. ANZ Banking Group, Westpac Banking Corp and NAB Ltd were the most notable trades as borrowers traded the arbitrage opportunity on the dividend reinvestment plan (DRIP). Securities Lending Quarterly, Q4 2009.

"On-loan balances in the main Asian markets continued at record highs, with Australia the best-performing market ... This was driven … by borrowing demand for shares of companies paying a DRIP (dividend reinvestment plan), where there's an arbitrage between the market price of the stock and the price at which stock is allocated through the DRIP (stock allocated at a discount to the market)." Securities Lending Quarterly, Q3 2006.

"J.P.Morgan also lent shares for the drip dividend arbitrage including Tatts, AGL Energy, Qube and Mermaid." Securities Lending Quarterly, Q3 2013.

A2. The importance of DRIP discount in DRIP arbitrage

"First quarter saw strong demand for dividend trades, with borrowers trading the arbitrage created by the stock discount on dividend reinvestment."

"We had dividend activity in Australia with borrowers taking shares for the arbitrage trade on the drip (dividend reinvestment plan). The biggest revenue generating trade was in ANZ Bank Grp, but another potential big earner NAB cancelled their drip." July 2010.

A3. Lenders elect cash dividend, borrower elect new shares

"This often causes a squeeze in some of the more heavily borrowed companies, such as Rio Tinto. Fees spike for short-duration loans over record date. There's also an arbitrage on the dividend reinvestment stocks; however, other than for Woolworths Ltd and QBE Insurance

Group Ltd, we saw less value in the trade as more clients took the stock election and companies placed restrictions on the plan or reduced the discount." Securities Lending Quarterly 2006 Q1. Securities Lending Quarterly Q1 2009.

In general, 2009 DRIP trading returns were consistent with 2008 as clients had a preference for the cash option (election that enables the arbitrage) and demand was strong from borrowers." Securities Lending Quarterly Q4 2009.

Internet Appendix

Table IA1.
Summary statistics of the full sample

This table reports the summary statistics of the full sample. All variables are defined in Table 1.

	Mean	STD	Median	p25	p75	Min	Max	p1	p99
Firm characteristics									
Ln(MktCap)	7.94	1.44	7.70	6.87	9.04	2.95	10.49	4.76	10.49
MB	2.48	2.31	1.73	1.20	2.87	0.26	16.12	0.54	14.49
DYield	2.35	1.15	2.17	1.62	2.87	0.15	13.20	0.36	6.33
Leverage	0.40	0.22	0.37	0.26	0.53	0.00	0.94	0.00	0.86
PRet	0.90	15.05	0.97	-6.91	8.00	-51.09	82.01	-43.73	46.02
Liquidity									
Turnover	0.12	0.10	0.09	0.06	0.14	0.00	1.66	0.00	0.45
Bid-Ask	1.36	1.51	0.90	0.49	1.76	0.00	14.29	0.03	7.63
IntraVol	1.96	1.54	1.56	1.09	2.28	0.00	14.49	0.33	8.78
STD(return)	2.01	0.89	1.76	1.37	2.41	0.71	5.76	0.85	5.01
Illiquidity	0.16	2.04	0.00	0.00	0.01	0.00	49.49	0.00	2.86
DRIP details									
PartiRate (%)	21.43	16.87	19.22	7.94	33.85	0.00	90.91	0.00	69.22
IssueSize (mil.)	0.61	0.71	0.39	0.12	0.86	0.00	5.80	0.00	3.14
Underwriter	0.09	0.29	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Disc%	1.34	1.50	1.00	0.00	2.50	0.00	7.50	0.00	5.00
PP_Length	9.09	3.49	10.00	5.00	10.00	3.00	22.00	5.00	20.00

Table IA2.
Industry distribution of DRIPs

This table reports the industry distribution of dividend reinvestment plans (DRIPs) according to the Global Industry Classification Standard (GICS) codes.

GICS industries	NON-Disc.	Discount	Total		
	N	N	N	%	%With Disc.
Automobiles & Components	0	15	15	1%	100%
Banks	77	70	147	8%	48%
Capital Goods	80	58	138	7%	42%
Classification Pending	0	3	3	0%	100%
Commercial & Professional Services	53	35	88	5%	40%
Consumer Discretionary	0	6	6	0%	100%
Consumer Durables & Apparel	4	12	16	1%	75%
Consumer Services	82	80	162	9%	49%
Consumer Staples	1	8	9	0%	89%
Diversified Financials	52	14	66	4%	21%
Energy	26	66	92	5%	72%
Financials	3	6	9	0%	67%
Food & Staples Retailing	36	11	47	3%	23%
Food Beverage & Tobacco	29	29	58	3%	50%
Health Care Equipment & Services	35	35	70	4%	50%
Industrials	5	0	5	0%	0%
Insurance	68	31	99	5%	31%
Materials	147	98	245	13%	40%
Media	13	19	32	2%	59%
Real Estate	80	159	239	13%	67%
Retailing	36	9	45	2%	20%
Software & Services	21	0	21	1%	0%
Telecommunication Services	24	20	44	2%	45%
Transportation	32	64	96	5%	67%
Utilities	21	89	110	6%	81%
Total	925	937	1862	100%	50%

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