# Why are US investors buying foreign dividends?*

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**Abstract**

Motivated by recent concerns of abusive practices of ADR pre-releases and illegal refunds of tax credits, we investigate institutional trading of American Depositary Receipts (ADRs) around ex-dividend dates. Using data on US stocks, foreign stocks, and ADRs from 1999 to 2014, we document abnormally large trading volumes around ex-dividend dates, especially on ADRs. Tax-exempt US institutions net sell and—contrary to common wisdom—taxable US institutions net buy ADRs before ex-dividend dates. Institutions buy more ADRs when potential tax rebates are high. We estimate that taxable US institutions potentially claim illegal tax refunds costing US and foreign tax payers more than US$150 million during our sample period.

*Keywords:* Dividend, Arbitrage, Cum-Ex, ADR, tax fraud

*JEL:* H26, G14, G15

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## 1. Introduction

Previous literature documents abnormally high trading volume in the US around ex-dividend dates for local (see, e.g., Henry and Koski, 2017) and foreign stocks (see, e.g., Callaghan and Barry, 2003). Because of their tax status and differences in taxes on capital gains and dividends, investors might want to "capture" or "avoid" the dividend, giving rise to tax arbitrage.

Arbitrage arises because the value of the dividend varies across investors. US common stocks are used for tax arbitrage because of differences in how dividends and its substitutes are taxed. Under US tax law, US corporations, in general, pay lower taxes on dividends than on capital gains from holding stocks of other domestic corporations due to Dividends Received Deductions that allow corporations to reduce their income tax. This tax benefit is opposite for individual investors, resulting in investors moving dividends to corporations.[1]

Arbitrage also arises for foreign stocks. To prevent tax evasion, countries often levy withholding taxes on dividends payable by the foreign company before any dividends are paid out to investors. To prevent double taxation, countries often have bilateral treatise to lower these withholding taxes. The remaining withholding tax paid under the treaty rate to the foreign country often allows investors to offset local taxes in the form of tax credits or deductions by filing tax form-1116 with the IRS. The difference between the withholding tax and the treaty rate is not recoverable for investors unless they file for reclaiming excess withholding taxes with the foreign country. Therefore, both foreign withholding taxes and local tax offsets have value and its value is lower for US investors (Callaghan and Barry, 2003; McDonald, 2001). Importantly, US corporations do not benefit from lower dividend tax rates for foreign dividends. Because of other frictions in receiving foreign dividends, such as exchange rate risk (Rösch, 2021), it is common to assume that investors sell foreign stocks around ex-dividend dates to avoid the dividend.

[1]For an excellent introduction into dividend taxation we refer to Hanlon and Heitzman (2010).

Recently, a third explanation for abnormal trading around foreign ex-dividend dates emerged. Instead of capturing the dividend, investors capture tax credits for taxes they never paid. Put simply and reviewed in much more details later on, investors short-sell Cum-dividend shares but deliver Ex-dividend shares (in short Cum-Ex), generating two tax credits: one for the buyer of the cum-dividend share and one for the seller or lender of the ex-dividend share. Estimated losses for the Treasury of several, mainly European, countries are around 60 billion dollars. The New York times wrote on Jan, 20th 2020 that "It May Be the Biggest Tax Heist Ever. And Europe Wants Justice." While US trading rules should prevent this from happening within the US, ADR pre-releases, as reviewed later, can create similar issues.

In summary, US dividends are worth more to US corporations than investors. One would expect US investors to "avoid" and US corporations to capture the dividend. Foreign dividends are worth more to foreign than to US investors. One would expect US investors to "avoid" and foreign investors to capture the dividend.

The purpose of this study is to document and to investigate potential motives for abnormal trading of foreign stocks within the US around ex-dividend dates. In the US foreign stocks trade either as a direct listing or as a Depositary Receipt, in particular, as an American Depositary Receipt (ADR.) The mechanism of trading foreign direct listings and ADRs is almost identical except one important difference that ADRs can be pre-released.

Pre-released ADRs are released before the foreign stock is deposited with the Deposit agent. Pre-release agreements state that the receiver of the ADR must own the foreign stock and must give up all ownership rights. Since 2014, the SEC started investigating the pre-release of ADRs and found "industry-wide abuses", especially around ex-dividend dates. In particular, pre-releases were often not backed up by foreign shares and therefore lead to an artificial increase in the supply of ADRs and tax refunds, potentially leading to an excess amount of claims for withholding tax refunds causing losses for foreign treasuries (due to withholding tax refunds that were never paid) and for the US treasury (due to a loss in taxes

that were seemingly paid to foreign treasuries.)

We distinguish between trading motivated by dividend capture, dividend avoidance, and cum-ex trading. We review all three trades in detail in Section 3. Investors often hedge capital risks for dividend capture or avoidance trades by trading one side with standard settlements and the other leg with non-standard settlements (see references in Angel, 1998). For example, investors can avoid the dividend by selling the stock cum-dividend 2-days after the ex-dividend date using same day delivery and buying the stock also 2-days after the ex-dividend date using standard delivery. This way the investor will not hold the stock on the registration date (3-days after the ex-dividend date) and not be exposed to the dividend and also does not face any risk in a capital loss because of changes in the stock price.

Using public data (CRSP), we first document abnormal trading activity around ex-dividend dates of common stocks, foreign stocks, and ADRs. Using another publicly available data source (TAQ) we also show that trading volume from trades with special settlement conditions is much higher around ex-dividend dates.

Besides our noisy classifications in the underlying motives, the other main challenge is that for every buyer there is a seller. In other words, finding that market-wide investors are engaging in dividend capture is equivalent to saying they are engaging in dividend avoidance, because for every investor "capturing" the dividend there must be a different investor "avoiding" the dividend.

To address this challenge we focus on one specific sample of investors: US institutions, for which we have client-level daily buy and sell transactions from Abel Noser Solutions (Ancerno). Focusing on US institutions should provide a clear prediction: We should find that US institutions avoid dividends for both US and foreign stocks. In other words, selling of US institutions should positively correlate with tax rates.

Ancerno provides data on institutional trades covering, on average, more than 10% of daily trading volume and is frequently used in academic papers.[2]

[2]For an excellent introduction and overview to Ancerno and answering important questions such as who

We document that institutions have particularly high abnormal trading activity around ex-dividend dates for ADRs, much higher than both for US common stocks or foreign direct listings. We confirm findings by Henry and Koski (2017) that institutions turnover on common stocks is around 14% (t-statistic of 23.62) higher around ex-dividend dates than in the benchmark period (45 to 5 days before and 5 to 45 days after the ex-dividend date), for foreign stocks turnover increases by around 43% (t-statistic of 8.49), but this is dwarfed by an increase of around 132% (t-statistic of 7.34) on ADRs (consistent with findings by Callaghan and Barry, 2003).

To understand whether turnover is driven by any stock or event characteristic we form quintile portfolios sorting all events by the USD dividend, the dividend yield, the size of the firm, and proportional effective spreads in the benchmark period. For common stocks and foreign stocks the increase in turnover is concentrated within the 20% of all events with high dividend yields, small firms, firms with a low share price, and firms with high effective spreads in the benchmark period, in which institutional turnover increases by more than 20%. For foreign stocks turnover also increases much more for stocks from countries with high withholding taxes (40% compared to 0.14%). For ADRs turnover from institutions is elevated in all portfolios with an increase in turnover by at least 25% and up to around 200%. Turnover for ADRs mainly differs by potential foreign tax refunds, when refunds are higher turnover is higher. We measure potential foreign tax refunds as the gap between the relevant withholding tax and the US treaty rate.

To distinguish between different trading motives we investigate whether institutions are buying or selling and whether they trade before or after the ex-dividend date. We find that trading significantly increases before the ex-dividend date and afterwards reverts back to levels similar to the benchmark period. Consistent with the prediction that US institutions avoid dividend payments, we find that institutions are net-selling US stocks before

provides data to Ancerno and why, we refer to the article by Hu, Jo, Wang, and Xie (2018), in short, Ancerno helps to analyze and compare transaction costs across firms.

ex-dividend dates. But surprisingly institutions are net-buying ADRs. For example, for common US stocks institutions buy, on average, 2,500 more shares (USD 90k) while they sell 5,000 more shares (USD 180k) per day for each of the five days before an ex-dividend date. But for ADRs institutions, on average, buy 3,000 (USD 120k) and sell only 2,000 more shares (USD 80k) more around ex-dividend dates.

To understand whether institutional trading is related to changes in ownership (and therefore related to changes in the eligibility for dividends) we investigate day trading and trading with special settlement conditions. Day trading is the lower of institutional buying and selling volume on the given stock-day (and therefore zero in case the institution did not both buy and sell shares.) Institutions could become eligible for dividends if they buy the stock before the ex-dividend date or when they combine buy and sell's with different settlement conditions. We find a relatively small increase in day trading and a large increase in trading with special settlement for common stocks, foreign stocks, and for ADRs. Given that special settlements are mainly used to decrease settlement period (from a standard of three business days during our sample, $T + 3$) we find an increase in trades with special settlement conditions after the ex-dividend date. While we find that overall trading significantly increases for ADRs, day trading and special settlement increases the least for ADRs. Taken together, the small increase in day-trading provides initial evidence that most of institutional trading around ex-dividend dates result in changes in ownerships and therefore the eligibility for dividend payments.

Next, we investigate whether buying and selling varies by withholding taxes and by the treaty rate. We find that trading volume for ADRs is especially high when potential foreign tax refunds are high, i.e., both the dividend yield and the gap between withholding taxes and US treaty rates. Contrary to common wisdom, we find that US institutions both excessively buy and sell ADRs around ex-dividend dates and that both buy and sell activity is higher when potential foreign tax refunds are high. If the withholding tax rate is equal to the treaty rate and therefore US institutions could not claim any tax refunds from foreign countries,

dividends lower abnormal buying and selling around ex-dividend dates. In this case, a 1% increase in the annual dividend yield lowers buying and selling by around 5,000 shares (USD 120k) and 3,000 shares (USD 70k), respectively. If the difference between the withholding tax rate and the treaty rate is high, for example, 25% (Germany in 2010), a 1% increase in the annual dividend yield increases daily buying and selling, on average, by around 1,200 shares (USD 50k) and 3,000 shares (USD 120k), respectively.

An important difference in US institutions and a potential missing co-variate that can explain why we find both an increase in buying and in selling is whether the institution is tax exempt or not. In general, tax exempt institutions cannot claim back withholding taxes or use these as US tax credits.[3]

Consistent with the impact of withholding taxes on tax exempt investors we find that they predominantly sell ADRs before ex-dividend dates, for example, they decrease buying ADRs by around 5,000 shares (USD 170k) and sell around 5,000 shares (USD 150k) more each day the five days before the ex-dividend date. But surprisingly taxable institutions increase inventories, they buy around 8,000 (USD 350k) and sell only around 1,000 (USD 70k) more ADRs each day before ex-dividend dates.

To further ensure that institutions trading results in a change in their inventory and therefore their eligibility to receive dividends, we investigate changes in portfolios for the average institution around ex-dividend dates. We find that the average tax-exempt institution decreases their inventory by, on average, around 3,000 ADRs (USD 120k) before ex-dates and keeps their inventory unchanged afterwards. Taxable institutions increase their inventories, on average, by around 8,000 ADRs (USD 200k) before the event, consistent with previous findings.

[3]Yet, tax treaties can specify withholding taxes for tax exempt foreign investors. For example, tax-exempt US pension funds can claim back all of the German withholding tax (Collier, 2020, Part I Chapter 1, footnote 25). This explains why a US pension fund filed a claim with the German Supreme Tax Court (Bundesfinanzhof) claiming that tax-refunds for taxes that were never paid were a legal trading strategy given the German law. On Feb, 2nd 2022 the Bundesfinanzhof ruled that the US pension fund can only claim tax-refunds if these taxes were actually paid before (Bundesfinanzhof, I R 22/20).

We suspect that a substantial increase in ADR trading volume around ex-dividend dates is due to an increase in the number of pre-released ADRs. Unfortunately, we do not have data for pre-released ADRs but we argue that we can estimate the amount of pre-released ADRs using the share lending market. If ADRs are available in excess supply due to pre-releases, an increase in the demand for borrowing shares should have little effect on the available supply. If investors want to borrow more shares around ex-dividend dates one would expect supply to decrease, this is exactly what Dixon, Fox, and Kelley (2021) find. But if investors can easily increase the supply of available ADRs, which they can using ADR pre-releases, the supply might not be affected. This is what we find for the ADR market.

If we explain the supply—the number of shares available to borrow—by the demand—how many shares investors borrow, we find that around ex-dividend dates an increase in the demand leads to a larger increase in the supply for ADRs than for foreign shares. Using this abnormal, excess supply we estimate that on average 0.11% of all ADRs outstanding are pre-released and therefore that investors can claim back, on average, 3.3 basis points of all dividends in taxes that were never paid from both US and foreign treasuries. We note this does not necessarily require collusion, rather all involved parties, such as investors, pre-release brokers, and depositary banks could benefit at the expense of tax-payers.

Dividend policies matter (Allen and Michaely, 2002; Baker and Wurgler, 2004). Previous literature documents abnormally high trading volume around ex-dividend dates for common stocks (see, e.g., Henry and Koski, 2017; Karpoff and Walkling, 1988, 1990); for ADRs (see, e.g., Callaghan and Barry, 2003; Gorman, Mahajan, and Weigand, 2004); and from trades with special settlement conditions (Angel, 1998). Other papers look at differences in valuation of capital and dividend gains, see, e.g., Ang, Blackwell, and Megginson (1991). The closest paper to ours is Henry and Koski (2017) which to the best of our knowledge is the only paper that also investigates trading around ex-dividend dates for institutions. But Henry and Koski (2017) only look at US common stocks and they are interested in trading skills. Compared to Henry and Koski (2017), our economic question is very different. Looking

at client level data is necessary to understand trading motivations as market-wide for each buyer there must be a seller.

To the best of our knowledge and in contrast to common understanding, this paper is the first that documents that US institutions are buying foreign dividends using a comprehensive sample of US institutional trading. So far the literature only documents certain case studies in which US tax payers are buying foreign dividends, as in Sanford H. Goldberg (1999). One potential explanation for the excess demand of ADRs around ex-dividend dates is that institutions could buy pre-released ADRs which allowed them to receive tax credits for taxes they never paid. Buying pre-released ADRs cum-dividend, results in similar issues as cum-ex deals in Europe, were investors were short-selling cum-dividend shares but delivering ex-dividend shares. In both cases investors can claim back more taxes than were paid. Our paper fits best in the newly developing field of "Forensic Finance", as described in Griffin and Kruger (2023).

The rest of the paper is structured as follows: In Section 2 we discuss data and sample construction and provide summary statistics. In Section 3 we review why trading is elevated around ex-dividend dates and three potential trading strategies of dividend avoidance, dividend capture, and cum-ex trading. Section 4 provides the results and Section 5 concludes.

## 2. Data and variable description

We use various data sources. We use CRSP Stock/Events "Distributions" to get all information on dividends. We use all events with distribution codes (1232, 1212, 1242, 1252, 1332, 1312, 1342, 1352 ), i.e., ordinary dividends, taxable at dividend rate, paid in USD at a quarterly (1232), semi-annual (1242), annual (1252), or unknown frequency (1212); as well as dividends paid in foreign currency converted to US dollars (to also capture dividends for foreign stocks 1332, 1312, 1342, 1352).

Compared to previous studies (such as Henry and Koski, 2017) we also include distri-

bution codes 1242 and 1252 to increase the number of events for ADRs, especially because foreign stocks often pay dividends semi-annually (like in the UK) or annually (like in Germany). To increase events for ADRs we also deviate from Henry and Koski (2017) in other ways, but we verified that results are not driven by any of these changes.

In particular, we can replicate their main results when following their data filters (and even when relaxing these filters as described in the following). We include events with dividends less than or equal to \$0.01 per share, we include events with more than one distribution on the ex-day, and we also do not require that the announcement day precedes the ex-day by at least five days. The last filter would significantly drop the number of events, because the declaration date is often missing especially for distributions with code 1212. To remove events that likely will not trigger any specific trading, we remove all stock-years with more than five events, reducing the number of events for common stocks, foreign stocks, and ADRs similarly by around 3%. We also drop events with a dividend yield in the top 99 percentile, i.e., events with an annualized dividend yield above 8% for US common stocks and 19% for ADRs or foreign stocks. We only use events with ex-days between April 1, 1999 and November 30, 2014 (with 2014 the last year of institutional trading data available to us).

Following Henry and Koski (2017) we compare trading activity in a benchmark period to the event period. The benchmark period are all trading days from 45 days to 5 days before any event (ex-dividend date) and from 5 to 45 days afterwards. The event period are all trading days within five days of the event. Given that investors (since 1997) need to hold shares for at least "15 days immediately preceding or following the dividend record date in order to be eligible for a foreign tax credit" (Sanford H. Goldberg, 1999), we also verify that results are robust to using 15 days before and after as the event window.

We use CRSP to get data on common US stocks (share codes 10 and 11), foreign stocks directly listed in the US (share code 12), and on American Depositary Receipts (ADRs, share codes 30 and 31). We use US stocks, foreign stocks, and ADRs listed on either the

NYSE or Nasdaq. In particular, we get the number of shares traded, closing prices, and shares outstanding.

We use Ancerno which provides data on daily transactions by institutions from 1999 to 2014.[4] To ensure that institutions do not vary across our analysis using US common stocks and foreign stocks we only keep institutions that also traded foreign stocks at any time during our sample period. Unfortunately, the information Ancerno provides varies during the sample period. For example, we have client ID's which allow us to look at changes in inventories at the institutional level only from 1999 to 2010. But we can only distinguish the client type, which allows us to distinguish between tax exempt and taxable institutions, since 2006. Hence, analysis that requires both the client type and the client ID relies on data from 2006 to 2010. For each analysis we use the longest possible time period, as indicated in the title of each Table and each Figure.

We use Markit to get data on the quantity on loan and the lendable quantity at the stock-day level for all our foreign stocks and for ADRs from 2002 to 2014. We merge CRSP on cusip8 and date with Markit data from US, Europe, Asia, and Other equity. We include non-US equity files because otherwise we can only match 8 ADRs in their US file. It seems that Markit stores data for the other ADRs and foreign stocks trading the US in files according to their home-market and not in the US equity file.

We extract both withholding taxes (WHT) for dividends and the US treaty rate per country from the Worldwide Corporate Tax Guide from Ernst & Young from 2004 to 2014. Unfortunately, we only have access to these reports starting from 2004. We use the earliest tax rate available for years before 2004. If several taxes are given, we use the highest as lower tax rates are normally only applicable for institutions which own a significant percentage of all shares.

Finally, we use the TAQ database to compute trading volume from trades with special settlement conditions. TAQ reports three distinct special settlement conditions, whether a

[4]For a comprehensive introduction to Ancerno we refer to Hu et al. (2018) and Jame (2018).

trade settles on the current day ($T + 0$), the next day ($T + 1$), or on any other than three days ($T + x$). Any trade without a special settlement condition will settle three business days after the trade ($T + 3$) during our sample period.

Table 1 reports cross-sectional summary statistics of averages estimated from days during the benchmark period. Panel A reports summary statistics across common shares. Compared to Henry and Koski (2017) our sample contains almost three times the number of events, more than sixty thousand, partly because our filters are less restrictive and because we extended the sample till 2014. Yet, the average Dividend Yield (the USD dividend divided by the cum-date share price, annualized, and in percent) is similar as in Henry and Koski (2017).

Panels B and C report summary statistics across foreign stocks and ADRs, respectively. Of interest is that average institutional trading volume is large across common US stocks, foreign stocks, and ADRs of around 140, 88, and 46 thousand shares for the average day during the *benchmark* period and for the average event, respectively. But institutional trading volume has a very large standard deviation of around 360, 274, and 168 thousand shares across for US stocks, foreign stocks, and ADRs.

Panel A of Table 2 provides evidence that trading around events is abnormally large. For each event, we calculate abnormal turnover, following Henry and Koski (2017), as the average turnover (shares traded over shares outstanding) during the event period (5-days before to 5-days after the event) dividend by the average turnover in the benchmark period (45-days before to 45-days after the event, but excluding the event period) minus one. Table 2 reports the average abnormal turnover for US common stocks, for foreign stocks, and for ADRs measured from institutional trading volume (from Ancerno), total trading volume (from CRSP), and trading volume from trades with special settlement conditions (from TAQ). We find abnormally high turnover in all categories.

For common stocks we find an abnormally high turnover across all trading of around 3% ($t$-stat of 9.67) which is somewhat lower than the 4.4% reported by (Henry and Koski,

2017, Table 2). Similar we find an abnormally high turnover from institutions of around 14% and Henry and Koski (2017) report 9%. Looking at foreign stocks shows a similar abnormal turnover across all trading but a higher turnover around ex-dividend dates from institutions (43%, t-stat of 8.49.) But these increases are dwarfed compared to the increase in institutional trading of ADRs during the event period of 132% (t-stat of 7.34.) Table 2 also shows that trading volume from trades with special settlements is especially elevated for US common stocks.[5]

To diminish the impact of extreme observations, results in Table 2 are reported after winsorizing abnormal turnover at the 99.9% level over the whole sample. If we do not winsorize results are even stronger, for example, institutional abnormal trading around ex-dividend dates on ADRs is 227% with a $t$-statistic of 3.75 (untabulated.)

Panels B and C of Table 2 report abnormal turnover for (tax exempt) plan sponsors and for (taxable) US Institutions. We also report total abnormal turnover and abnormal turnover from trades with special settlement conditions when tax exempt (Panel B) and taxable (Panel C) institutions trade. Overall, total abnormal turnover seems higher when tax-exempt institution trade (Panel A) compared to when tax-able institution trade (Panel B). Results are opposite for institutional turnover, abnormal trading volume from tax-able institutions is much higher than from tax exempt institutions.

What determines whether institutions will trade? The rest of the paper tries to explain the source and motivation for this abnormally high trading volume around ex-dividend dates. For that we first review three commonly used trading strategies around ex-dividend dates.

## 3. Trading strategies around dividends

Foreign investors of US stocks are subject to withholding taxes on dividends to avoid tax evasion. To exploit differences in taxes between actual dividends and dividend substitutes

[5]As we discuss in more details later, some of these estimates must be interpreted carefully. For example, the very large increase in trading with special settlements likely indicates that trading during the benchmark period is very low.

trading US common shares around dividends is common. For example, before 1997 foreign investors did not have to pay withholding taxes if they lend out the share and received a dividend substitute. After that and till 2008 it was still possible to avoid withholding taxes by engaging in a total return swap or a contract-for-difference CFD (a contractual agreement to exchange differences in price appreciations at a predetermined date in the future) and receive dividend equivalent payments.[6] These tax effects let to important differences in the supply and demand in the stock loan market, as investigated by Dixon et al. (2021).

Vice versa, US investors in foreign stocks face similar additional cost in terms of withholding taxes or forgoing tax credits that are normally only paid to local investors. For example, because of tax credits in Germany before 2000 a EUR 1 dividend for a foreign investor would be worth EUR 1.43 for a German, taxable investor (McDonald, 2001).

Foreign companies list their stock in the US in three different forms, either directly, as New York registry shares, or as American Depositary Receipts (ADRs). The later two were developed to fulfill NYSE rules that shares trade in registered form only (and not in bearer form, as is common in Europe) and that each share has a transfer agent located in lower Manhattan (certain countries, like the U.K., require shares to be transferred locally and therefore companies cannot directly list their shares in the US) (Brumm, 1999). In the US, foreign stocks trade mainly as a direct listing or in the form of ADRs. An ADR is a negotiable receipt for a foreign security which can be traded in the US the same way as ordinary equity. Already in 1992 companies exploited tax loopholes using ADRs to shelter profits, as elaborated later. While trading of ADRs and foreign direct listings works almost identical in the US, ADRs seem especially suitable for dividend arbitrage because ADRs can be pre-released.

Since 2014, the SEC started investigating the pre-release of ADRs and found "industry-wide abuses" fining various Depositary Banks and Brokers more than half a billion dollars.

[6] An excellent summary of the issue is provided by Prof. Avi-Yonah during a Senate Hearing (Senate-Hearing, 2008).

Pre-released ADRs are released before the foreign security was deposited with the Deposit agent. While legal, the pre-release of ADRs is strictly regulated, in particular, either the pre-release agent or its client must hold the foreign securities to avoid inflating the total number of ADRs and foreign shares available for trading. Pre-released ADRs can be closed by "delivery of ordinary shares to the Custodian (or delivery of an equivalent number of ADRs to the Depositary)." (p.5 SEC, 2018) Given the nature of pre-releasing to address potential delays in settlement of the home-market shares, one would expect that pre-release agreements close in a few days by delivery of the ordinary shares. The SEC concludes the opposite, pre-release ADR's often were outstanding for weeks and "virtually all of the pre-release transactions were closed by ... delivering ADRs" (p.6 SEC, 2018).

Further, as elaborated by the SEC, the pre-release of ADRs "inflated the total number of a foreign issuer's tradeable securities and resulted in abusive practices such as inappropriate short selling and dividend arbitrage. In certain countries, demand for ADR borrowing increased around dividend record dates, so that certain tax-advantaged borrowers could – through a series of transactions – collect dividends without any corresponding tax withholding." (https://www.sec.gov/news/press-release/2019-94)

To date, the SEC has not further investigated the potential abuse of pre-release ADRs in cum-ex deals, but a 2018 Financial Times article links these issues and quotes "a person familiar with the transaction", as "The counterparty promises [to the ADR issuer] not to claim a tax credit on those shares if they don't live up to that promise, there is the possibility that two claims are filed on the same share" FinancialTimes (2018).

Previous literature documents abnormally high trading volume around ex-dividend dates for common stocks (see, e.g., Henry and Koski, 2017; Karpoff and Walkling, 1988, 1990); for ADRs (see, e.g., Callaghan and Barry, 2003; Gorman et al., 2004); and from trades with special settlement conditions (Angel, 1998). When inferring traders motives it is common to assume that traders on common stocks are trying to "capture" the dividend because of positive ex-day returns and that traders on ADRs are trying to "dump" it because volume

is higher for stocks from countries with higher foreign withholding taxes. But given that for each seller there is a buyer looking at market-wide trading volume can be misleading as volume does not reveal the active side. To address this concern we will estimate changes in portfolios at the client level.

We investigate three different trading strategies around dividend payments, of which the first two (dividend capture and avoidance) have been extensively discussed in the literature. In the following we assume that investors setup their position the day before the ex-dividend date. But trades do not necessarily need to be executed before the ex-date. Using special settlement conditions traders (in the US) can ensure that they trade a share cum-dividend even after the ex-dividend date. What is important for all three trading strategies is the relative settlement date for both legs of the position, i.e., in both a dividend capture and avoidance strategy that one trade settles before the record date and the offsetting trade (to hedge price risk) settles after the record date. Trades that settle on or before the record date are eligible for dividend payments, given that stocks in the US settle T+3, i.e., after three business days (from June 1995 till March 2017, i.e., during our sample period), the ex-date is two days before the record date.

Given that all three positions require shorting, it is important that Ancerno, our source for institutional trades, contain short-sells (see IA.3 of Hu et al., 2018).

### *3.1. Dividend capture*

The first strategy is called "Dividend capture" in which investors try to get exposure to the dividend payment without risking capital losses [e.g., Kalay (1982) Lakonishok and Vermaelen (1986), Karpoff and Walkling (1990), or Michaely (1991).] Dividend capture involves trades with special settlement (Footnote 6, Lee and Ready, 1991). Investors can buy the stock with special settlement terms so that the trade settles before the dividend registration date. Simultaneously, investors can sell the security with regular settlement after the registration date.

This trading strategy is depicted in Figure 1. Dividend capture was used to offset capital

gains taxes and claim foreign withholding taxes, as explained in a case study in Sanford H. Goldberg (1999). On September 16, 1992 a US taxpayer bought Royal Dutch ADRs worth almost USD 900 million with next-day delivery and immediately sold these ADRs back with regular delivery. In more details, the Institute for the Study of Security Markets on September 16, 1992 reports 42 trades with next day settlement and 21 trades with "Seller's Option", i.e., settlement which occurs in general after regular settlement. Further, both these trades were in total for more than 9 million shares (for comparison there were around 400 trades with regular settlement for in total around 1 million shares.) The average price for trades with next-day delivery, sellers option, and regular settlement is 88.79, 86.85, and 86.2, respectively. The difference in prices between trades with next-day delivery (cum-dividend) and sellers option (ex-dividend) is therefore around USD 1.94, which is around 3 cents above the dividend of 2.25 (as of CRSP) less withholding taxes of 15%. In other words, the taxpayer bought the dividend net of the withholding taxes even though the taxpayer claimed foreign tax credits for the withheld taxes.

### *3.2. Dividend avoidance*

Note that the counter party to any dividend capture, as in the previous example, participates in a dividend avoidance scheme. Dividend avoidance is also often used as an explanation for finding abnormally high trading volume around ex-dividend dates. This trading strategy is depicted in Figure 2.

### *3.3. CumEx trading*

The last trading strategy we investigate is called "cum-ex" trading. The country seemingly most affected is Germany with investors exploiting the tax law in various ways for illegitimate tax refunds (Pohlmann, 2020). In Germany, short-sells before ex-dividend dates can lead to seemingly multiple owners and therefore to multiple claims for tax rebates of withholding taxes.

For this to work, it is crucial to be able to have two trades that settle on the same

day with one being cum- and the other ex-dividend. While this is possible in, for example, Germany, in the US it is not. In the US a share is cum- or ex-dividend depending on when it settles and not when the trade occurred. If both settle before the record date, both would be cum-dividend. If both settle after the record date, both would be ex-dividend.

But in Germany, and other countries, a share is cum-dividend if it is traded before the ex-dividend date, regardless of when the share settles. Note, that Germany and many other countries do not use (or did not use at the time of our sample period) the concept of a record date to determine who is eligible for dividend payments. Instead, for example, SAP (a German company) states "Shares that are purchased (shortly) before the [Ex Dividend Date] are settled at the regular stock price 'cum dividend' regardless of the settlement date." (SAP, 2022) In other words, if a trade occurs the day before the ex-dividend date, the seller will still be the registered owner of the share and therefore receive the dividend. The buyer, even though she paid for the right of the share and the dividend, is not the registered owner and therefore does not receive the dividend. To compensate the buyer, a dividend adjustment occurs in which the clearing agent transfers the dividend from the seller to the buyer.[7]

Three investors, A, B, and C collude together before the ex-dividend date $T-1$ of firm X. Investor A holds shares of firm X before the ex-dividend date and is eligible to receive dividends less mandatory withholding taxes (WHT), and a generic tax certificate for these WHT, missing any details linked to the specific transaction.

Before the ex-date $T-1$ Investor B short-sells shares of firm X cum-dividend to investor C. On date $T+1$, after the ex-date, investor B must delivery the shares to investor C. Investor B can buy the shares from Investor A with same-day delivery. While trading with special settlement conditions is common in the US, it might be less common in other countries. Alternatively, investor B could borrow the shares (as part of the short-sell) with same day delivery, i.e., $T+0$, given that stock lending transactions often settle on the same day. Either

[7] An excellent and comprehensive overview into cum-ex trading is provided by Collier (2020) and a simplified example of how to receive illegitimate tax refunds is given in ESMA (2020), Annex 1, pp. 59 - 63.

way, these shares are ex-dividend and Investor B must provide a cash compensation for the dividends less mandatory WHT. Afterwards, investor C can sell the shares back to investor A or can buy them in the open market to close-out her short-sell and return the shares to investor A.

Because according to German (and potentially other countries) tax laws, investor C is the "economic owner" on the ex-dividend date, investor C also receives a tax certificate, which allows investor C to claim back WHT that were never paid. Investor B did not pay dividends and did not pay taxes to the government, Investor B merely paid Investor C a cash compensation for the forgone dividend payment.

Figure 3 shows trading and holdings for Investor B in a cum-ex deal.

Does Investor B face a risk of a capital loss in this strategy? If Investor B would have to buy back the shares in the open market the price would be uncertain and Investor B potentially would face a loss. In general, it is assumed that Investors A, B, and C colluded in this strategy and therefore shared the profits which will exactly amount to the additional tax certificate received by Investor C. Thiess Buettner and Scholz (2020) derive a theoretical model and argue that cum-ex deals can only be profitable if all parties collude. But cum-ex trading might also arise without direct collusion, purely because of the mechanical way the dividend adjustment process works. As elaborated by Collier (2020) a stand-alone firm could profit from cum-ex deals and hedge risks using derivatives though it face significant obstacles to scale up its profits.

Above example relies on four important aspects.

First, this example requires the ability to short-sell the stock. If investor B would sell shares that she owned, the dividend adjustment process would work as intended. In particular, investor B would have gotten the dividend and would have paid the WHT while investor A would receive the dividend adjustment without WHT and a tax credit for the WHT.

Second, as mentioned before, it is crucial to be able to have two trades that settle on the same day with one being cum- and the other ex-dividend. This also requires the ability to

trade or borrow the share ex-dividend with special settlement conditions so that the shares can be delivered in time.

Third, arguably it is important that the remitter of the with-holding tax is not the same as the agency issuing the tax certificate. Otherwise, the imbalance of taxes withhold and refunded would likely be detected. For example, in Germany corporations withhold the taxes and banks were responsible for issuing tax certificates. Only after 2012 this changed and now "banks withhold and remit dividend taxes and are responsible for issuing [tax] certificates" (Thiess Buettner and Scholz, 2020, p. 1430).

Fourth, investors need to be able to claim withholding taxes. To avoid double taxation many countries entered into tax treaties that lowered withholding taxes. For example, an US investor in a German company would have a withholding tax of only 15% compared to the German WHT of around 26%. If the US investor pays taxes in the US the unclaimed WHT of 15% could be used for a tax credit or to lower the tax base. Though, tax exempt investors, such as pension funds, do not benefit from tax credits. For that reason several countries allow pension funds to claim the total WHT, for other tax exempt investors the unclaimed WHT are lost.

In summary, using US listed common shares, Cum-Ex trades seems impossible. In the US it is impossible to have two trades that settle on the same day with one cum- and the other ex-dividend.

The case is different when using ADRs. As mentioned before, ADRs can be pre-released and selling pre-released ADRs can lead to a similar situation as in traditional Cum-Ex trades. If Investor B (of previous example) sells pre-released ADRs before the ex-dividend date which are not backed up by home-market shares this creates an excess of investors holding ADRs and home-market shares. Given that pre-released ADRs are indistinguishable from "normal" ADRs holders of pre-released ADRs can claim US foreign tax credits (from the US treasury) and withholding taxes (from the foreign treasury) in excess of the total amount of taxes that were paid.

An example involving dividends and pre-release ADR's is presented in ClearyGottlieb (2019) based on SEC (2019). If an ADR is pre-released while a dividend is paid, the holder of the pre-released ADR is supposed to be the beneficiary owner of the foreign share. In this case, withholding taxes would have been subtracted from the dividend (on the foreign share) and paid directly to the foreign jurisdiction and the holder is obliged to pay a dividend substitute less WHT to the depository (p.7 SEC, 2019). But if the pre-released ADRs are not backed up by foreign shares, the holder is still obliged to pay a dividend substitute less WHT, but no dividend was paid out, and therefore no WHT. ClearyGottlieb (2019) conclude that this allows the "holder to profit from this arbitrage and obtain a larger portion of the dividend." In other words, similar to why the dividend adjustment process (in e.g., Germany) breaks down for a short-sell before the ex-dividend date, the ADR pre-release process breaks down in case the receiver of the ADRs does not own the foreign share. In this sense trading pre-released ADRs is similar to Cum-Ex deals, the pre-released ADRs are borrowed from the depository and sold cum-dividend but delivered back to the depository ex-dividend.

A hypothetical example should help to understand the issues that arise when ADRs are pre-released over ex-dividend dates: Foreign company John Doe Inc pays a dividend of EUR 10,000 on its 1,000 shares. 500 of these shares are held by a depository, which used these to issue 500 ADRs. The depository gets EUR 4,000 which is the dividend for the 500 foreign shares minus a withholding tax of, in this case, 20%. The depository then converts the EUR 4,000 into USD and distributes it among all ADR holders.Assuming that USD 1 is equal to EUR 1, each ADR receives a dividend of USD 8 (pre-US-tax).

If 100 ADRs were pre-released the broker that received the pre-released ADRs would pay USD 800 into the ADR dividend pool (the pre-release agreement states that the broker holds the foreign shares and pays the withholding tax directly.) Again each ADR would receive a dividend of USD 8.

Given that the broker of the pre-release did not pay the withholding tax, the total withholding tax paid is still just EUR 2,000. Even though now a total of 1,100 shares (600

ADRs and 500 foreign shares) have a potential claim on the tax credit of in total EUR 2,200. ADR holders can potentially file for excess withholding taxes, in case the withholding tax rate is higher than the treaty rate, potentially resulting in a loss of taxes for the foreign treasury. ADR holders can also file for a US foreign tax credit using IRS Form 1116 of the unclaimed withholding tax, potentially resulting in a loss of taxes for the US treasury.

## 4. Results

### *4.1. Turnover*

We start our investigation for underlying trading motives by first investigating whether trading is concentrated in any particular portfolio. Similar to Table 2 we start with investigating abnormal turnover across ex-dividend events, but restricted to institutional trades, the focus of the paper.

Panels A, B, and C of Table 3 report abnormal institutional turnover within various portfolios for, respectively, common stocks, foreign stocks, and ADRs. In each Panel we sort all events separately into quintile portfolios based on USD dividend, the dividend yield, market cap, and the average cum-dividend price and transaction costs (proportional effective spreads) during the benchmark period.

Panel A of Table 3 shows that abnormal institutional turnover for common stocks is concentrated in the high dividend yield portfolio (quintile 5 vs 1 has an abnormal turnover of 19% vs 14%, respectively, which is statistically different from each other) and for small firms (35% vs 8%) with a low price (24% vs 11%) and high transaction costs (33% vs 12%). These findings are similar as in Table II of Henry and Koski (2017). The pattern for abnormal turnover from foreign shares (Panel B) is similar, i.e., institutional turnover is concentrated within stocks with high dividend yields, small marketcap, low-price, and high transaction costs.

On the other hand, for ADRs we do not find statistically significant differences between the High and the Low portfolios. For ADRs we find that abnormal turnover is high in all

portfolios with an increase of at least 25% in the low-spreads portfolio.

*4.2. Taxes*

Given that the results discussed so far from Table 3 indicate that for ADRs none of the common explanatory variables seems to explain abnormal trading volume, we also sort events by withholding taxes of the home country (WHT) and by the difference between WHT and the treaty rate relevant for US investors. Given that WHT (and the difference to the treaty rate) do not differ much across countries we only sort events into two portfolios, above or below the median of 20% WHT (5%).

Both WHT and its difference to the treaty rate capture different aspects for why investors might want to avoid the dividend or for the possibility of capturing tax refunds, similar to cum-ex trading. WHT (similar the US treaty rate) capture the extend investors avoid stocks with high WHT or for investors to capture US tax refunds. The difference between WHT and the treaty rate measures the extend investors can claim tax refunds from the foreign country.

For foreign stocks, we find that, with 40% compare to 14%, abnormal turnover is much higher when WHT are above the median than below and the difference is statistical significant (t-stat of 2.51). The difference between WHT and the treaty rate does not affect turnover. On the other hand, for ADRs we find that the difference between WHT and the treaty rate affects turnover, abnormal turnover in the high portfolio is almost twice the abnormal turnover in the low portfolio. Because these results are univariate, it could be, for example, that WHT is just a proxy for liquidity of ADRs from a specific home country, we also investigate how taxes affect turnover in a panel regression. For each event, we explain abnormal turnover (as used in Tables 3) by WHT, the treaty rate, and the difference in both. Instead of controlling for potentially endogenous control variables, we use stock and year fixed effects.

We estimate the following panel regression:

$$aturnover_{s,e} = WHT_{s,e} + FE_s + FE_y + \epsilon_{s,e}.$$

Table 4 reports the results. When controlling for other event characteristics we see that the results from Table 3 change, WHT is now positively related to abnormal turnover for ADRs but not so much anymore for foreign stocks. For ADRs, this result is in-line with findings in Callaghan and Barry (2003), who also find that abnormal turnover is positively related with WHT, see their Table VI. Even though we are using institutional trading and Callaghan and Barry (2003) use overall trading volumes.

More importantly, the difference in WHT and the treaty rate still positively related to abnormal turnover for ADRs but not for foreign stocks. In other words, for institutions, it is not so much the WHT that explains trading but the difference in WHT and the treaty rate, if this difference is 10% than abnormal turnover is around, on average, 27% higher than if the difference is 0. That abnormal turnover is higher for stocks with high WHT is normally explained by certain investors avoiding and others capturing the dividend (Callaghan and Barry, 2003). It is more difficult to explain why turnover should be higher by the difference in WHT and the treaty rate. But if investors are using pre-released ADRs to capture tax refunds from the foreign country, this is exactly what one should find.

Using conventional explanations, one would also expect US institutions to sell ADRs, because dividends are always worth more for home-market investors. This is what we investigate next.

One concern with the measure of abnormal turnover is that it might be less meaningful for events with little trading in the benchmark period. For example, trades with special settlement might be rare within the benchmark period and therefore an increase of 500% or even 2,259% (as reported in Table 1) might be very large in percentage terms, but relatively small in terms of the number of shares. In the extreme, abnormal turnover is only defined

for events in which trading occurred during the benchmark period. It could be that investors only trade during the event period (though, empirically, this is rare, with only around 30 events for ADRs.)

On the other hand events without any institutional trading in the benchmark (and the event) period are common, with almost 2,000 for both ADR and foreign stocks. As reported in Table 1, for ADRs we have 5,832 events with positive total trading volume in the benchmark period and only 4,022 of these have institutional trading. To address previous concerns, we focus on explaining trading volume and not abnormal turnover in the rest of the paper. Because we focus on trading volume we can include events with zero trading volume. In Table 1 we report the number of events with positive trading volume during the benchmark period because in Tables 2 and 3 we investigate abnormal trading volume, which is undefined for events with zero trading volume during the benchmark period. In the following tables we include events with zero trading volume and therefore have more events than reported in Table 1.

*4.3. Buy and sell volume around ex-dividend dates*

In this Section we investigate why trading volume is elevated around ex-dividend dates. In particular we investigate whether trading volume increase because institutions increase buying or selling before or after ex-dividend dates. For that we estimate fixed effect panel regressions using event, stock, and day fixed effects ($FE_e$, $FE_s$, and $FE_d$). We report t-statistics based on standard errors clustered by event. We measure trading volume in terms of shares traded and in terms of USD volume by multiplying the shares traded with the CRSP closing price of the day. To ensure that trading volumes are comparable across stocks we use stock and event fixed effects.

Another important trading motive is to profit from fluctuations in the stock price, especially, the ex-dividend price drop. After all, every stock is worth buying or selling depending on its share price. We control for these profit opportunities using event fixed effects which control for the ex-dividend price drop. Alternatively, in unreported results we find that our

results are robust to controlling for the (potentially endogenous) daily stock return.

We estimate the following panel regressions explaining trading volume from 45 days before till 45 days after each ex-dividend date (event):

$$volume_{s,d} = event_{s,d} + after_{s,d} + FE_e + FE_s + FE_d + \epsilon_{s,d}. \quad (1)$$

With $event_{s,d}$ an indicator variable equal to 1 if day $d$ for stock $s$ falls within 5 days before to 5 days after each event (the event window) and 0 otherwise. $after_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window but $d$ is after the event and 0 otherwise. $FE_e$, $FE_s$, and $FE_d$ are event, stock, and day fixed effects, respectively. Using event fixed effects ensures that we can interpret $event_{s,d}$ as abnormal volume during the event period.

Panel A (Panel B) of Table 5 reports the results of regression 1 with $volume_{s,d}$ the number of shares (in USD) traded separately for when institutions buy or sell common stocks, foreign stocks, or ADRs.

We find that before the event date buying and selling significantly increases for common stocks and ADRs. For foreign stocks we do not find an significant change in trading volume before ex-dividend dates. For common stocks selling increases much more than buying both in terms of shares (Panel A: around 2,500 vs 5,000) and in USD (Panel B: around USD 90k vs USD 180k) For ADRs buying increases more than selling (around 3,000 vs 2,000 shares or USD 120k vs. USD 80k per day, on average). After the event date most of these effects revert, for example, after the event date for ADRs buying decreases by around 600 shares per day and selling decreases by 2,000 shares.

It is surprising that institutions buy more ADRs before the ex-dividend date. But the increase in buying ADRs could be unrelated to the dividend and driven by other profit motivations, not captured by event fixed effects. For example, institutions might day trade, i.e., they buy and sell ADRs at, respectively, a low and high price within the day. To

understand whether these changes in trading patterns lead to changes in ownership and therefore potential claims for withholding tax refunds we investigate day trading activity and trading with special settlements next. If institutions day-trade without special settlement conditions, ownership does not change. We define day trading activity for each stock-day-institution as the minimum of an institutions buy and sell volume for the relevant stock-day. Investors that buy shares before the ex-dividend date and therefore are registered owners on the registration date become eligible for the dividend. As reviewed in Section 3 even a day trade could result in changes in ownership if both trades have different settlement, therefore we also investigate how trades with special settlements vary around ex-dividend dates.

Columns 1 to 3 of Table 6 reports the results of estimating regression 1 explaining day trading. We find that day trading increases before the event for common stocks, foreign stocks, and ADRs by around 1,000, 500, and 400 shares, respectively. As before the increase in day trading reverts after the ex-dividend date.

Clearly, trading volume from trades with special settlement conditions should spike on days when special settlement allows to trade the stock cum-dividend even though—considering standard delivery—the stock is ex-dividend, or vice versa. In other words, trades with special settlement conditions that are shorter than the standard settlement (the vast majority of all special settlement trades) should spike after the ex-dividend date. Given that $T + x$ trades can settle $T + 2$ or after four days, we expect trading volume from these trades to spike on the ex-date and potentially days before. For common stocks and foreign stocks, this is indeed what we find.

Columns 4 to 6 of Table 6 reports the results of estimating regression 1 explaining trading with special settlement conditions. Trades with special settlement conditions of common stocks, foreign stocks, and ADRs increase by around 2,000, 3000, and 1,000 shares before the event date, respectively. After the event date they increase by another 15,000, 13,000, and 2,000 shares per day.

In summary, Table 5 indicates that regardless of whether we measure trading volume in

terms of shares (Panel A) or USD (Panel B) a lot of abnormal institutional trading of ADRs is driven by institutions buying ADRs before the ex-dividend date. Given the relatively low increase in day trading activity by institutions (see Table 6), these purchases will likely result in a change in ownership, indicating institutions capture foreign dividends. Before we investigate changes in holdings of institutions in Section 4.6 we investigate whether buying or selling is related to potential tax refunds.

*4.4. Buy and sell volume by potential tax refunds*

Table 7 reports the results of fixed-effect panel regressions, explaining stock-day trading volume around ex-dividend dates by taxes. As mentioned in Section 3.3, "cum-ex" trading requires high dividend yields combined with the potential of large tax refunds. We therefore explain trading volume by an interaction of high dividend yields and the difference between WHT and the treaty rate, with the difference a proxy for how much US investors could claim back from foreign treasuries. For comparison we estimate these regression for foreign stocks and for ADRs. We cannot estimate these regressions for common US stocks as WHT and US treaty rates are not applicable. As before, we estimate trading volume in the number of shares traded and in USD. To focus on abnormal trading volume we interact all variables by an indicator variable equal to one five days before till five days after each event and otherwise zero. The event window is, as before, from 45 days before till 45 days after each event.

Consistent with previous results we find that, on average, trading volume 5-days around ex-dividend dates is higher than in the benchmark period for ADRs but less so for foreign stocks. We find that taxes have important effects on trading volumes for ADRs. For foreign stocks, results are statistically not significant, which might be because of a lack of power from using only 193 different stocks.

As predicted, the triple interaction of high potential foreign tax refunds, high dividend yields, during the event, positively explains trading volume, especially so for ADRs. Most surprising is that these results hold for both institutions selling and also buying. The idea that institutions buy more ADRs when taxes are high is opposite to the idea that they are

trying to avoid the dividend. If the difference in the withholding tax rate and the treaty rate is high, allowing US institutions to claim large tax refunds from the foreign countries, dividends increase abnormal buying and selling around ex-dividend dates. For example, if the difference is 25% (Germany in 2010 has a withholding tax of 25% and a US treaty rate of 0%), every 1% ($x = 1$) increase in the annual dividend yield increases daily buying and selling, on average, by around 1,200 shares ($1,000 * (2,384 * (0.25 * x/100 * 1) - 111 * 0.25 - 479 * x/100 + 21) = 1,200x + c_1$) and 3,000 shares ($1,000 * (2,426 * (0.25 * x/100 * 1) - 109 * 0.25 - 306 * x/100 + 13) = 3,000x + c_2$)), respectively.

These results indicate that US institutions buy more ADRs if potential tax refunds are large. It seems surprising that US institutions would want to capture foreign dividends, given that foreign dividends are worth less to US institutions than to foreign traders (Callaghan and Barry, 2003; McDonald, 2001). One explanation is that ADRs could be pre-released and therefore investors might not capture the dividend but rather tax credits, similar as in Cum-Ex deals, see Section 3.3. If so, we would expect this pattern driven by taxable institutions. Institutions that do not pay taxes should not benefit from these tax credits. We investigate this in the next section.

*4.5. Trading of tax exempt and taxable institutions*

The impact of taxes on dividends depends on whether the institution is tax exempt and which securities are traded. For example, a tax exempt US institution would receive the full dividend from a US company, while a taxable US institution would only receive the dividend net of any taxes due. In this case, we expect that tax exempt institutions are more likely to hold US commons stocks over dividends than taxable institutions.

On the other hand, dividends on foreign stocks are subject to withholding taxes. But, in general, tax exempt institutions cannot claim refunds for withholding taxes and these taxes are therefore lost. Consistent with the literature we expect US institutions to shun dividend payments of foreign stocks, especially for tax exempt institutions.

In Table 8 we therefore estimate regression 1 as in Table 5 but we distinguish whether

institutions are taxable. Tax exempt institutions decrease buying and selling of US common shares by around 500 and almost 2,500 shares before the event, respectively. On the other hand taxable institutions increase buying and selling of US common shares by around 1,000 and 5,000 shares before the event, respectively. These results are consistent with the idea that tax exempt institutions are more likely and taxable institutions are less likely to hold stocks over ex-dividend dates.

Results are different for foreign stocks and especially for ADRs. As expected, tax exempt institutions shun foreign dividends. They decrease buying and increase selling ADRs both by around 5,000 shares. Surprisingly, taxable institutions buy around 8,000 shares more per day before ex-dividend dates while selling increases only by around 1,000 shares per day, on average.

To ensure that this increase in ADR buying results in a change in ownership, we also investigate day trading and trading with special settlement conditions by the tax status of the institution. In Table 9 we therefore estimate regression 1 as in Table 6 but we distinguish whether institutions are taxable.

For ADRs, both day trading and trading with special delivery results are not statistically significant, except a decline in day trading for taxable institutions after the event (2,500 shares with a t-stat of -2.12) and an large in magnitude increase in trading with special delivery for tax exempt institutions before the event (4,600 shares with a t-stat of 1.26).

Overall, we find that trading before ex-dividend dates is very different to trading afterwards. We also find that ADRs are very differently affected than both US common stocks and foreign stocks. The magnitude in the increase is much higher for ADRs and, surprisingly, taxable institutions significantly buy more ADRs before ex-dividend dates. As expected, tax exempt institutions decrease buying and increase selling, consistent with dividend avoidance strategies. Yet, for ADRs we do not find an consistent increase in day trading or trades with special settlement conditions.

It is also important to recall that for every buyer there is a seller. In other words, find-

ing market-wide (or even just among institutions) trading volume consistent with dividend capture (perspective of the buyer) is equivalent with finding market-wide trading volume consistent with dividend avoidance (perspective of the seller). To address this concern we estimate actual changes in portfolios for specific institutions in the following.

*4.6. Order Imbalances*

In this section we estimate trading volume based on institution-stock-day level. Previous results indicate that both buying and selling of ADRs significantly increase before ex-dividend date and that this is not driven by day trading activity or trades with special settlement conditions. Given that day trading with different delivery dates is especially important for dividend capture or avoidance strategies the increase in buying and selling seems to be driven by other motives (or these institutions do not immediately hedge their stock price risk). To understand potential motives we look at changes in the direction of individual positions and we estimate cumulative order imbalances at the institution-firm level around ex-dividend dates. Because Table 8 indicates that taxable institutions increase buying and tax-exempt institutions increase selling, we look at order imbalances around ex-dividend dates separately for tax exempt and taxable institution. Averaging over these very different trading strategies would obfuscate the magnitude in changes in inventory.

Figures 4 and 5 report the results in changes in cumulative order imbalance for tax exempt and taxable institutions. We find that tax exempt institutions sell ADRs before ex-dividend date and have little change in inventories afterwards. While trading patterns are reversed for taxable institutions, they buy before the ex-dividend date and afterwards inventories inventories change little. The increase in inventories of almost 2,000 shares one-day after the ex-dividend date might still result in a change in ownership before the registration date, due to trading with special settlement conditions. That inventories do not change afterwards could be because investors need to hold ADRs for "15 days immediately preceding or following the dividend record date in order to be eligible for a foreign tax credit" Sanford H. Goldberg (1999).

These results indicate that for the average institution day trading is only a small part of total trading, because otherwise we should not see changes in order imbalances (consistent with results in Table 6.)

More importantly, these results provide further evidence that taxable US institutions seem to capture foreign dividends, despite that foreign dividends should be worth less to US institutions than to foreign investors (Callaghan and Barry, 2003; McDonald, 2001). One explanation is that these US institutions use pre-released ADRs and therefore can capture tax credits.

*4.7. Share loans: demand and supply*

To provide an estimate for the amount of pre-released ADRs and therefore for the amount of tax refunds of taxes that were never paid, we turn to the stock loan market.

Previous literature indicates a "significant tightening of the equity lending market" (abstract Dixon et al., 2021) around ex-dividend dates. For ADRs we expect demand for stock loans to increase around ex-dividend dates as for other common shares, but given that ADRs can be pre-released we expect that supply increases even more. To investigate this we get share loan data from Markit. We get data for ADRs and foreign common stocks. We then estimate stock-day, fixed-effect, panel regressions explaining the supply of lendable shares by the change in demand to borrow shares, two indicator variables whether the share is an ADR and whether the day is 5-days around an ex-dividend date, and all interactions.

Table 10 reports the results. We find that the triple interaction is positive and economically and statistically significant regardless of whether we control for lending fees and regardless of whether we explain changes in supply, the level of supply, or the log-level of supply. In other words, around ex-dividend dates an increase in demand increases the supply of lendable ADRs.

For example, specification (1) indicates that around ex-dividend dates for every increase in 100 shares on loan the supply of lendable shares increases by around 21 ADRs ($100 * (0.369 + 0.453 - 0.259 - 0.352)$ ) and by 10 foreign common shares ($100 * (0.453 - 0.352)$.)

In all specifications, except specification (2), lendable shares increase more for ADRs than for foreign stocks when shares on loan increase.

Assuming that the stock loan market works similarly for ADRs and foreign common stocks, we attribute the difference of 11 shares to ADR pre-releases. For ADRs we estimate that shares on loan increase from around 3% of shares outstanding to around 4% (untabulated). Assuming that there are no pre-released ADRs before ex-dividend dates, we estimate that, on average, 0.11% = (4-3)*(0.21- 0.10) of all shares outstanding are pre-released ADRs during ex-dividend dates.

That means for every foreign dividends of USD 1,000,000 and a with-holding-tax of 30%, we have that the WHT is USD 300,000 but ADRs have tax credits of 300,330. In other words, the US and foreign governments lose around 3.3 = (100 * 0.30*0.11) basis points for each dividend paid. Table 1 indicates that we have 5,834 events in which ADRs paid, on average a US$ dividend of 2.72% of the market capitalization of US$2.89 billion. We hence estimate potential tax losses for US and foreign governments of around US$ 151 millions $(5834 * 2.89 * 0.0272 * 10^9 * 3.3/10000)$ over our sample period.

We estimate the incremental impact of how demand affects supply for ADRs during the event period as 0.369 with a t-statistic of 3.03. This results in a 95% confidence bands of $(0.130, 0.608)$. Hence, we expect that from 0 to 0.34% of all ADRs outstanding are pre-released around ex-dividend dates, which results into a potential tax loss from USD 0 to around USD 0.5 billion over our sample period.

Of course, this is an estimate averaging over all ADRs. Traders trying to exploit this loophole likely focus on ADRs paying high dividends and from countries with high WHT, as indicated by Table 7.

## 5. Conclusion

We document abnormally high trading volumes around ex-dividend dates for common stocks, foreign stocks, and for American Depositary Receipts (ADRs). For ADRs, we pro-

vide several novel findings that taxable US institutions capture foreign dividends, despite the common understanding that foreign dividends are worth less to US than to foreign investors (Callaghan and Barry, 2003; McDonald, 2001). First, the sheer magnitude of the increase in institutional trading volume on ADRs compared to common stocks and foreign stocks raises the question of what is different for ADRs? Second, compared to common US stocks or foreign direct listings, we find that common explanatory variables fail to explain abnormal trading volume for ADRs. Third, we find that US institutions buy more ADRs the higher potential foreign tax refunds are. Fourth, we find that the average tax exempt institution sells before and taxable institutions buys before the ex-dividend date. Fifth, we investigate changes in inventory at the institution level and confirm that tax exempt and taxable institutions, respectively, decrease and increase inventories before ex-dividend dates.

Clearly, investors could pursue dividend capture trades for both common stocks and ADRs. But ADRs are different because of withholding taxes which makes dividend avoidance more attractive to tax exempt institutions and tax capturing for taxable institutions possible. Investors could also use foreign stocks for dividend avoidance but not for tax capturing.

ADRs can be pre-released, artificially increasing the supply of ADRs and potentially increasing tax credits. ADR pre-releases therefore result in similar tax losses for US and foreign Treasuries as so-called Cum-Ex deals resulted in billions of tax losses for European Treasuries. Using the shares-lending market we proxy that around 0.11% of all ADRs outstanding are pre-released resulting in tax losses of around 3 cents for each $100 dollar dividend paid.

While our evidence for the motivation behind why US institutions buy foreign dividends is far from conclusive and rather speculative, the abusive pre-release of ADRs, the significant increase in institutional trading volume, and the billion of tax dollars lost to several, mainly European, Treasuries is a fact and requires further investigation.

**Table 1 – Cross-sectional summary statistics of time-series averages around ex-dividend dates, 1999 - 2014**

This table reports the number of ex-dividend dates (events) and cross-sectional averages, median, standard deviations, and the 5% and 95% percentile of daily time-series averages estimated from 45 days to 5 days before the event and from 5 to 45 days after event. Panels A, B, and C report summary statistics across all events on, respectively, common stocks, foreign stocks, and ADRs. The table reports statistics for the dividend yield (100 times the dividend amount divided by the cum-dividend price), the dividend amount in USD, the average stock price before the event (cum-dividend price), the size of the company in shares outstanding times share price (Market Cap) in billion USD, the total trading volume, trading volume from institutions, and trading volume with special settlement conditions. Trading volume is measured in thousands of shares. All data underlying the computations are from Ancerno, CRSP, and TAQ.

| | Events | Mean | Median | SD | 5% | 95% |
|---|---|---|---|---|---|---|
| Panel A: US commons stocks | | | | | | |
| *Dividend Yield [%]* | 64,279 | 1.53 | 1.21 | 1.28 | 0.19 | 3.81 |
| *Dividend Amount [$]* | 64,279 | 0.45 | 0.32 | 0.43 | 0.04 | 1.29 |
| *Cum-day Price [$]* | 64,279 | 33.87 | 28.06 | 27.54 | 8.75 | 75.51 |
| *Market Cap [$B]* | 64,279 | 8.71 | 1.39 | 27.69 | 0.10 | 36.11 |
| *Total Volume [000s]* | 64,279 | 1604.98 | 317.07 | 6627.85 | 10.48 | 6427.19 |
| *Institution Volume [000s]* | 60,165 | 141.75 | 34.68 | 361.65 | 1.50 | 622.77 |
| *Special Volume [000s]* | 43,685 | 40.86 | 5.42 | 224.77 | 0.30 | 153.01 |
| Panel B: Foreign | | | | | | |
| *Dividend Yield [%]* | 6,507 | 1.99 | 1.37 | 2.07 | 0.23 | 6.02 |
| *Dividend Amount [$]* | 6,507 | 0.54 | 0.34 | 0.61 | 0.05 | 1.61 |
| *Cum-day Price [$]* | 6,507 | 33.78 | 26.72 | 35.77 | 5.42 | 79.86 |
| *Market Cap [$B]* | 6,507 | 9.62 | 2.80 | 16.30 | 0.13 | 41.47 |
| *Total Volume [000s]* | 6,507 | 1129.91 | 356.86 | 2370.97 | 7.19 | 4795.49 |
| *Institution Volume [000s]* | 4,608 | 88.09 | 21.01 | 274.75 | 0.12 | 360.23 |
| *Special Volume [000s]* | 3,883 | 21.90 | 2.94 | 94.43 | 0.20 | 86.08 |
| Panel C: ADRs | | | | | | |
| *Dividend Yield [%]* | 5,834 | 2.72 | 2.15 | 2.25 | 0.42 | 6.89 |
| *Dividend Amount [$]* | 5,834 | 0.87 | 0.53 | 1.06 | 0.08 | 2.82 |
| *Cum-day Price [$]* | 5,834 | 34.95 | 26.75 | 31.45 | 5.93 | 86.71 |
| *Market Cap [$B]* | 5,834 | 2.89 | 0.46 | 7.81 | 0.01 | 13.73 |
| *Total Volume [000s]* | 5,832 | 677.84 | 116.66 | 1886.16 | 1.80 | 3039.50 |
| *Institution Volume [000s]* | 4,022 | 46.26 | 5.99 | 168.07 | 0.03 | 200.67 |
| *Special Volume [000s]* | 2,855 | 48.32 | 2.97 | 329.41 | 0.10 | 120.66 |

**Table 2 – Abnormal turnover around dividend payments, 1999 - 2014**
This table reports abnormal turnover around ex-dividend dates (the events) for common stocks, foreign stocks, and ADRs. We estimate turnover of stock $s$ on day $d$ ($TO_{s,d}$) as the number of shares traded divided by shares outstanding, we then define abnormal turnover for each event as

$$ATO_{s,e} = \frac{avg_{d \in event}(TO_{s,d})}{avg_{d \in benchmark}(TO_{s,d})} - 1$$

i.e., the average turnover during the event period (5-days before to 5-days after the event) dividend by the average turnover in the benchmark period (45-days before to 45-days after the event, but excluding the event period) minus one. Abnormal turnover is winsorized at 99.9% level. In Panel A we report the average abnormal turnover across all events and the corresponding $t$-statistic in parenthesis. In Panels B and C we only consider events during which institutions of type 1 (as identified by Ancerno, such as tax exempt plan sponsors) or type 2 (other US institutions and investment managers) traded. We estimate abnormal turnover across all institutions and across all traders. We also estimate trading volume from trades with special settlements, i.e., trades that do not settle in three business days ($T + 3$). All data underlying the computations are from Ancerno, CRSP, and TAQ.

| Panel A: All Institutions, 1999 to 2014 | | | |
|---|---|---|---|
| | Common Stocks | Foreign Stocks | ADRs |
| *Institutional abnormal volume* | 0.14 | 0.43 | 1.32 |
| | (23.62) | (8.49) | (7.34) |
| *CRSP abnormal volume* | 0.03 | 0.04 | 0.14 |
| | (9.67) | (4.71) | (8.82) |
| *TAQ abnormal special volume* | 22.59 | 4.99 | 10.86 |
| | (21.88) | (8.29) | (8.14) |
| Panel B: Plan Sponsors (tax exempt), 2006 to 2014 | | | |
| *Institutional abnormal volume* | 0.15 | 0.81 | 3.00 |
| | (10.42) | (6.69) | (6.43) |
| *CRSP abnormal volume* | 0.05 | 0.08 | 0.06 |
| | (9.61) | (4.84) | (3.10) |
| *TAQ abnormal special volume* | 0.86 | 4.14 | 2.69 |
| | (14.86) | (4.00) | (3.66) |
| Panel C: US Institutions (taxable), 2006 to 2014 | | | |
| *Institutional abnormal volume* | 1.94 | 3.63 | 6.10 |
| | (63.22) | (15.40) | (5.05) |
| *CRSP abnormal volume* | 0.01 | 0.06 | 0.03 |
| | (2.77) | (3.95) | (2.02) |
| *TAQ abnormal special volume* | 0.63 | 2.61 | 4.05 |
| | (14.05) | (5.25) | (5.34) |

**Table 3 – Institutional abnormal turnover around dividend payments by event characteristics, 1999 - 2014**

This table reports abnormal turnover around ex-dividend dates (the events) for commons stocks (Panel A), foreign stocks (Panel B), and ADRs (Panel C) by event or stock characteristics. We estimate abnormal turnover across all institutions. As in Table 2, we estimate abnormal turnover as average turnover during the event period dividend by the average turnover in the benchmark period minus one. Abnormal turnover is winsorized at 99.9% level. We report averages separately within quintile portfolios sorted by the USD dividend payment, dividend yield, size of the firm measured as the shares market capitalisation, and the average cum-dividend price and proportional effective spreads in the benchmark period. We also sort foreign stocks and ADRs into two portfolios based on the withholding taxes of the home country (WHT) and the difference between the WHT and the US treaty rate. For each sort we also report the difference between the High and the Low portfolio together with the associated t-statistic in parentheses. All data underlying the computations are from Ancerno, CRSP, Ernst & Young, and TAQ.

| | Dividend [USD] | Dividend Yield | Size | Price | Spread | WHT | WHT - Treaty |
|---|---|---|---|---|---|---|---|
| Panel A: Common Stocks | | | | | | | |
| Low | 0.20 | 0.14 | 0.35 | 0.24 | 0.12 | | |
| 2 | 0.18 | 0.18 | 0.18 | 0.17 | 0.14 | | |
| 3 | 0.20 | 0.16 | 0.13 | 0.16 | 0.13 | | |
| 4 | 0.18 | 0.14 | 0.12 | 0.13 | 0.19 | | |
| High | 0.11 | 0.19 | 0.08 | 0.11 | 0.33 | | |
| High - Low | -0.08 | 0.05 | -0.27 | -0.13 | 0.22 | | |
| | (-4.13) | (2.21) | (-10.74) | (-6.09) | (8.12) | | |
| Panel B: Foreign Stocks | | | | | | | |
| Low | 0.29 | 0.18 | 0.46 | 0.36 | 0.16 | 0.14 | 0.40 |
| 2 | 0.42 | 0.36 | 0.31 | 0.38 | 0.26 | | |
| 3 | 0.22 | 0.27 | 0.26 | 0.39 | 0.26 | | |
| 4 | 0.40 | 0.22 | 0.31 | 0.25 | 0.24 | | |
| High | 0.18 | 0.47 | 0.19 | 0.12 | 0.55 | 0.40 | 0.36 |
| High - Low | -0.11 | 0.30 | -0.27 | -0.25 | 0.39 | 0.26 | -0.03 |
| | (-0.93) | (2.20) | (-1.97) | (-2.00) | (2.53) | (2.51) | (-0.21) |
| Panel C: ADRs | | | | | | | |
| Low | 0.69 | 0.80 | 1.00 | 0.72 | 0.25 | 0.82 | 0.62 |
| 2 | 0.62 | 0.58 | 0.83 | 0.93 | 0.56 | | |
| 3 | 1.25 | 0.88 | 1.19 | 0.76 | 0.74 | | |
| 4 | 0.93 | 0.55 | 0.80 | 0.57 | 2.06 | | |
| High | 0.73 | 0.78 | 0.40 | 0.61 | 0.53 | 0.98 | 1.12 |
| High - Low | 0.04 | -0.03 | -0.60 | -0.10 | 0.28 | 0.16 | 0.51 |
| | (0.14) | (-0.08) | (-1.69) | (-0.32) | (1.69) | (0.57) | (1.75) |

**Table 4 – Institutional abnormal turnover around dividend payments by taxes of home-market, 1999 - 2014**

This table reports panel regressions explaining abnormal turnover for foreign stocks and ADRs by witholding taxes of the home country ($WHT$); the US $Treaty$ rate; and the difference between WHT and the US treaty rate.

$$aturnover_{s,e} = WHT_{s,e} + FE_s + FE_y + \epsilon_{s,e}$$

$aturnover_{s,e}$ is abnormal turnover from institutions for stock $s$ during event (ex-dividend date) $e$. We estimate abnormal turnover across all institutions. As in Table 2, we estimate abnormal turnover as average turnover during the event period dividend by the average turnover in the benchmark period minus one. $WHT_{s,y}$ ($Treaty_{s,y}$ is the average witholding taxes (US treaty rate) of the home country for stock $s$ during event $e$. In all regressions we include stock ($FE_s$) and year ($FE_y$) fixed-effects. We report corresponding $t$-statistics in parenthesis, based on standard errors clustered by year. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *. All data underlying the computations are from Ancerno, CRSP, Ernst & Young, and TAQ.

| | Foreign (1) | Foreign (2) | Foreign (3) | ADR (4) | ADR (5) | ADR (6) |
|---|---|---|---|---|---|---|
| $WHT$ | 1.30 | 0.99 | | 2.73** | 2.26 | |
| | (0.41) | (0.32) | | (2.23) | (1.69) | |
| $Treaty$ | | 3.10* | | | -4.05 | |
| | | (1.86) | | | (-1.63) | |
| $WHT - Treaty$ | | | -1.05 | | | 2.68** |
| | | | (-0.57) | | | (2.40) |
| Within $R^2$ [%] | 0.00 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 |
| #Stocks | 203 | 203 | 203 | 391 | 391 | 391 |
| Stock FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 5 – Institutional buying and selling volume around ex-dividend dates, 1999 -2014**
This table reports panel regressions explaining trading volume in shares (Panel A) and in USD (Panel B) from 45 days before to 45 days after each event (ex-dividend date).

$$volume_{s,d} = event_{s,d} + after_{s,d} + FE_e + FE_s + FE_d + \epsilon_{s,d}$$

$event_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window and 0 otherwise. As in Table 2 the event window is from 5 days before to 5 days after each event. $after_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window but $d$ is after the event and 0 otherwise. $FE_e$, $FE_s$, and $FE_d$ are, respectively, event, stock, and day fixed effects. $volume_{i,s,d}$ is the trading volume in shares (Panel A) and in USD (Panel B) separately for when institutions buy or sell commons stocks, foreign stocks, or ADRs. We report corresponding $t$-statistic in parenthesis, based on standard errors clustered by event. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *. All data underlying the computations are from Ancerno, CRSP, and TAQ.

| Panel A: | Trading volume in shares | | | | | |
|---|---|---|---|---|---|---|
| | Buy | | | Sell | | |
| | Common | Foreign | ADR | Common | Foreign | ADR |
| *Event* | 2,457*** | 236 | 2,982** | 5,053*** | 152 | 2,025 |
| | (2.83) | (0.19) | (2.23) | (3.43) | (0.10) | (1.52) |
| *after* | -2,974*** | -2,104 | -637 | -7,184*** | -2,011 | -2,142 |
| | (-2.75) | (-1.48) | (-0.42) | (-4.15) | (-1.36) | (-1.60) |
| Within $R^2$[%] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| #Events | 73,145 | 6,627 | 6,286 | 73,145 | 6,627 | 6,286 |
| #Stocks | 2,941 | 342 | 515 | 2,941 | 342 | 515 |
| Event/Stock/Day FE | Yes | | | | | |
| Panel B: | Trading volume in USD | | | | | |
| *Event* | 93,833*** | 66,536 | 121,595*** | 182,353*** | 32,402 | 79,574* |
| | (2.99) | (1.27) | (2.77) | (4.57) | (0.63) | (1.74) |
| *after* | -134,447*** | -135,417** | -60,603 | -291,964*** | -121,827** | -114,016** |
| | (-3.46) | (-2.34) | (-1.17) | (-6.25) | (-2.01) | (-2.28) |
| Within $R^2$[%] | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| #Events | 73,145 | 6,627 | 6,286 | 73,145 | 6,627 | 6,286 |
| #Stocks | 2,941 | 342 | 515 | 2,941 | 342 | 515 |
| Event/Stock/Day FE | Yes | | | | | |

**Table 6 – Institutional day trading volume around ex-dividend dates, 1999 -2014**
This table reports panel regressions explaining trading volume in shares (Panel A) and in USD (Panel B) from 45 days before to 45 days after each event (ex-dividend date).

$$volume_{s,d} = event_{s,d} + after_{s,d} + FE_e + FE_s + FE_d + \epsilon_{s,d}$$

$event_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window and 0 otherwise. As in Table 2 the event window is from 5 days before to 5 days after each event. $after_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window but $d$ is after the event and 0 otherwise. $FE_e$, $FE_s$, and $FE_d$ are, respectively, event, stock, and day fixed effects. In columns 1 to 3 of Panel A (Panel B), $volume_{s,d}$ is the number of shares day traded (in USD) by institutions on commons stocks, foreign stocks, and ADRs. We define the volume of day trades for institution $i$ as the minimum of their buy and sell volume and then sum up all day trading across all institutions, separately for each stock-day. In columns 4 to 6 of Panel A (Panel B), $volume_{s,d}$ is the sum of all shares traded (in USD) on each stock-day that do not settle in three business days (across all events in which institutions trade). We report corresponding $t$-statistic in parenthesis, based on standard errors clustered by event. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *. All data underlying the computations are from Ancerno, CRSP, and TAQ.

| | Day trading | | | Special Settlement | | |
|---|---|---|---|---|---|---|
| | Common | Foreign | ADR | Common | Foreign | ADR |
| Panel A: | | | Trading volume in shares | | | |
| *Event* | 1,020*** | 503 | 433* | 2,128* | 2,810** | 828 |
| | (3.52) | (1.59) | (1.70) | (1.77) | (1.97) | (0.65) |
| *after* | -1,271*** | -984*** | -613** | 14,920*** | 12,539 | 1,978 |
| | (-3.62) | (-2.86) | (-2.15) | (3.96) | (1.22) | (0.57) |
| Within $R^2$ [%] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| #Events | 73,145 | 6,627 | 6,286 | 73,145 | 6,627 | 6,286 |
| #Stocks | 2,941 | 342 | 515 | 2,941 | 342 | 515 |
| Event/Stock/Day FE | | | Yes | | | |
| Panel B: | | | Trading volume in USD | | | |
| *Event* | 34,419*** | 31,337** | 16,929* | 56,465 | 97,991** | -2,451 |
| | (3.61) | (2.01) | (1.87) | (1.15) | (1.98) | (-0.06) |
| *after* | -57,875*** | -54,219*** | -28,624*** | 565,366*** | 390,182 | 60,286 |
| | (-4.97) | (-3.27) | (-3.10) | (4.66) | (1.36) | (0.84) |
| Within $R^2$ [%] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| #Events | 73,145 | 6,627 | 6,286 | 73,145 | 6,627 | 6,286 |
| #Stocks | 2,941 | 342 | 515 | 2,941 | 342 | 515 |
| Event/Stock/Day FE | | | Yes | | | |

**Table 7 – Institutional trading volume around dividend payments by taxes of home-market, 1999 - 2014**

This table reports panel regressions explaining trading volume in shares (Panel A) and in USD (Panel B) for foreign stocks and ADRs by the event period; the difference between witholding taxes of the home country and the US treaty rate ($\Delta WHT$); and the dividend yield.

$$volume_{s,d} = (WHT_{s,e} * Div_{s,e} * event_{s,d}) + (WHT_{s,e} * event_{s,d}) + (Div_{s,e} * event_{s,d}) + event_{s,d} + FE_e + FE_s + FE_d + \epsilon_{s,e}$$

$volume_{s,d}$ is Buy or Sell volume in 1,000 shares (Panel A) or in 1,000 USD (Panel B) across all institutions for stock $s$ on day $d$. $WHT_{s,y}$ is the difference in the average witholding tax and the US treaty rate of the home country for stock $s$ during event $e$. And $Div_{s,e}$ is the annualized dividend yield (the USD dividend divided by the cum-dividend price) In all regressions we include event ($FE_e$), stock ($FE_s$), and year ($FE_y$) fixed-effects. We report corresponding $t$-statistic in parenthesis, based on standard errors clustered by event. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *. All data underlying the computations are from Ancerno, CRSP, Ernst & Young, and TAQ.

| | Buy | | Sell | |
|---|---|---|---|---|
| | Foreign | ADR | Foreign | ADR |
| Panel A: | Trading volume in 1,000 shares | | | |
| $\Delta WHT * Div * Event$ | 4,069 | 2,384** | 4,633 | 2,426** |
| | (1.48) | (2.11) | (1.33) | (2.08) |
| $\Delta WHT * Event$ | -144 | -111** | -138 | -109** |
| | (-1.36) | (-2.06) | (-1.06) | (-2.17) |
| $Div * Event$ | -345 | -479*** | -214 | -306** |
| | (-1.28) | (-2.80) | (-0.75) | (-2.16) |
| $Event$ | 15 | 21*** | 7 | 13** |
| | (1.28) | (2.83) | (0.56) | (2.00) |
| Within $R^2$ [%] | 0.01 | 0.03 | 0.01 | 0.01 |
| #Stocks | 193 | 395 | 193 | 395 |
| Event/Stock/Day FE | Yes | | | |
| Panel B: | Trading volume in 1,000 USD | | | |
| $\Delta WHT * Div * Event$ | 107,839 | 70,460* | 65,361 | 76,912** |
| | (1.17) | (1.85) | (0.63) | (2.36) |
| $\Delta WHT * Event$ | -3,433 | -2,514 | -1,628 | -3,845** |
| | (-0.96) | (-1.40) | (-0.41) | (-2.38) |
| $Div * Event$ | -12,379 | -12,644** | 357 | -7,196 |
| | (-1.19) | (-2.37) | (0.04) | (-1.48) |
| $Event$ | 469 | 538** | -54 | 301 |
| | (1.09) | (2.35) | (-0.13) | (1.46) |
| Within $R^2$ [%] | 0.01 | 0.01 | 0.00 | 0.01 |
| #Stocks | 193 | 395 | 193 | 395 |
| Event/Stock/Day FE | Yes | | | |

**Table 8 – Taxable institutional buying and selling volume around ex-dividend dates, 2006 -2014**
This table reports panel regressions explaining trading volume in shares (Panel A) and in USD (Panel B) from 45 days before to 45 days after each event (ex-dividend date).

$$volume_{i,s,d} = (event_{s,d} + after_{s,d}) \times taxable_{i,s,d} + FE_e + FE_s + FE_d + \epsilon_{i,s,d}$$

$event_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window and 0 otherwise. As in Table 2 the event window is from 5 days before to 5 days after each event. $after_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window but $d$ is after the event and 0 otherwise. $taxable_{i,s,d}$ is an indicator variable equal to 1 if trading volume is measured from taxable institutions (type 2) and 0 if from tax exempt institutions (type 1). $FE_e$, $FE_s$, and $FE_d$ are, respectively, event, stock, and day fixed effects. $volume_{i,s,d}$ is the trading volume in shares (Panel A) and in USD (Panel B) separately for when taxable or tax exempt institutions buy or sell commons stocks, foreign stocks, or ADRs. We report corresponding $t$-statistic in parenthesis, based on standard errors clustered by event. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *. All data underlying the computations are from Ancerno, CRSP, and TAQ.

| | Buy | | | Sell | | |
|---|---|---|---|---|---|---|
| | Common | Foreign | ADR | Common | Foreign | ADR |
| Panel A: | | | Trading volume in shares | | | |
| *Event* | -483 | 888 | -5,127* | -2,530** | 383 | 4,750* |
| | (-0.64) | (0.41) | (-1.95) | (-2.33) | (0.20) | (1.84) |
| *Event∗Taxable* | 1,466 | 3,014 | 13,090** | 7,791** | -1,197 | -3,225 |
| | (1.01) | (0.78) | (2.00) | (2.01) | (-0.40) | (-0.86) |
| *after* | 212 | -4,257 | 5,465 | 2,173 | -3,766 | 201 |
| | (0.21) | (-1.50) | (1.57) | (1.59) | (-1.33) | (0.07) |
| *After∗Taxable* | 273 | -163 | -10,094 | -6,352 | 6,614 | -4,969 |
| | (0.14) | (-0.03) | (-1.29) | (-1.53) | (1.46) | (-1.25) |
| Within $R^2$ [%] | 1.48 | 1.74 | 0.73 | 0.77 | 1.43 | 0.54 |
| #Events | 38,831 | 3,244 | 2,305 | 38,831 | 3,244 | 2,305 |
| #Stocks | 2,009 | 206 | 255 | 2,009 | 206 | 255 |
| Event/Stock/Day FE | | | Yes | | | |
| Panel B: | | | Trading volume in USD | | | |
| *Event* | -15,283 | -35,759 | -171,079* | -75,643** | -52,192 | 152,263* |
| | (-0.55) | (-0.38) | (-1.94) | (-2.33) | (-0.56) | (1.67) |
| *Event∗Taxable* | 73,656 | 147,371 | 515,560** | 210,066*** | 47,951 | -88,088 |
| | (1.31) | (0.95) | (2.20) | (2.73) | (0.35) | (-0.68) |
| *after* | 33,057 | -111,295 | 212,337* | 99,422** | -80,280 | -62,032 |
| | (0.90) | (-0.89) | (1.88) | (2.35) | (-0.63) | (-0.59) |
| *After∗Taxable* | -94,560 | -27,022 | -394,833 | -233,355*** | 118,293 | -90,217 |
| | (-1.28) | (-0.14) | (-1.55) | (-2.58) | (0.57) | (-0.61) |
| Within $R^2$ [%] | 1.64 | 1.77 | 0.94 | 1.02 | 1.48 | 0.81 |
| #Events | 38,831 | 3,244 | 2,305 | 38,831 | 3,244 | 2,305 |
| #Stocks | 2,009 | 206 | 255 | 2,009 | 206 | 255 |
| Event/Stock/Day FE | | | Yes | | | |

**Table 9 – Taxable institutional day trading volume around ex-dividend dates, 2006 -2014**
This table reports panel regressions explaining trading volume in shares (Panel A) and in USD (Panel B) from 45 days before to 45 days after each event (ex-dividend date).

$$volume_{i,s,d} = (event_{s,d} + after_{s,d}) \times taxable_{i,s,d} + FE_e + FE_s + FE_d + \epsilon_{i,s,d}$$

$event_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window and 0 otherwise. As in Table 2 the event window is from 5 days before to 5 days after each event. $after_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window but $d$ is after the event and 0 otherwise. $taxable_{i,s,d}$ is and indicator variable equal to 1 if trading volume is measured from taxable institutions (type 2) and 0 if from tax exempt institutions (type 1). $FE_e$, $FE_s$, and $FE_d$ are, respectively, event, stock, and day fixed effects. In columns 1 to 3 of Panel A (Panel B), $volume_{i,s,d}$ is the number of shares day traded (in USD) by taxable or tax exempt institutions on commons stocks, foreign stocks, and ADRs. We define the volume of day trades for institution $i$ as the minimum of their buy and sell volume and then sum up all day trading across all institutions, separately for each stock-day. In columns 4 to 6 of Panel A (Panel B), $volume_{i,s,d}$ is the sum of all shares traded (in USD) on each stock-day that do not settle in three business days (across all events in which taxable or tax exempt institutions trade). We report corresponding $t$-statistic in parenthesis, based on standard errors clustered by event. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *. All data underlying the computations are from Ancerno, CRSP, and TAQ.

| | Day trading | | | Special Settlement | | |
|---|---|---|---|---|---|---|
| | Common | Foreign | ADR | Common | Foreign | ADR |
| Panel A: | | | Trading volume in shares | | | |
| *Event* | -454** | -134 | -140 | 2,745* | 6,155 | 5,529 |
| | (-2.16) | (-0.33) | (-0.34) | (1.85) | (1.01) | (1.52) |
| *Event∗Taxable* | 1,229*** | 1,439 | 1,168 | -1,785* | -3,076 | -824 |
| | (2.69) | (1.54) | (1.09) | (-1.85) | (-1.07) | (-0.31) |
| *after* | 491* | -183 | 575 | -1,590 | 37,267 | -6,777 |
| | (1.81) | (-0.34) | (1.17) | (-0.90) | (1.03) | (-1.56) |
| *After∗Taxable* | -1,197** | -1,422 | -2,535** | 1,947* | -30,341 | 1,627 |
| | (-2.00) | (-1.38) | (-2.12) | (1.74) | (-1.01) | (0.57) |
| Within $R^2$ [%] | 1.66 | 1.90 | 1.02 | 0.00 | 0.02 | 0.00 |
| #Events | 38,831 | 3,244 | 2,305 | 38,831 | 3,244 | 2,305 |
| #Stocks | 2,009 | 206 | 255 | 2,009 | 206 | 255 |
| Event/Stock/Day FE | | | Yes | | | |
| Panel B: | | | Trading volume in USD | | | |
| *Event* | -17,982** | -22,980 | -11,092 | 99,299 | 131,427 | 124,807 |
| | (-2.15) | (-1.14) | (-0.64) | (1.51) | (0.76) | (1.06) |
| *Event∗Taxable* | 47,458** | 70,342* | 70,724 | - 56,965 | -70,479 | -47,843 |
| | (2.57) | (1.71) | (1.38) | (-1.22) | (-0.83) | (-0.56) |
| *after* | 24,791** | 3,710 | 37,657* | -98,766 | 1,125,661 | -146,653 |
| | (2.37) | (0.15) | (1.86) | (-1.48) | (1.14) | (-1.08) |
| *After∗Taxable* | -64,515*** | -66,225 | -127,374** | 93,710** | -897,048 | 66,941 |
| | (-2.84) | (-1.45) | (-2.35) | (2.10) | (-1.10) | (0.76) |
| Within $R^2$ [%] | 1.98 | 2.01 | 1.07 | 0.00 | 0.02 | 0.00 |
| #Events | 38,831 | 3,244 | 2,305 | 38,831 | 3,244 | 2,305 |
| #Stocks | 2,009 | 206 | 255 | 2,009 | 206 | 255 |
| Event/Stock/Day FE | | | Yes | | | |

**Table 10 – Lendable shares and shares on loan around ex-dividend dates, 2002 -2014**
This table reports panel regressions explaining changes, levels, and log-levels in lend-able shares (supply) from 45 days before to 45 days after each event (ex-dividend date).

$$supply_{s,d} = \Delta Demand_{s,d} \times ADR_{s,d} \times event_{s,d} + Fee_{s,d} \times ADR_{s,d} \times event_{s,d} + FE_s + FE_d + \epsilon_{s,d}$$

$\Delta Demand_{s,d}$ are changes in the number of shares on loan for stock $s$ from day $d-1$ to day $d$; $ADR_{s,d}$ is an indicator variable equal to 1 if stock $s$ is an ADR and 0 otherwise, i.e., if stock $s$ is a foreign stock. $event_{s,d}$ is an indicator variable equal to 1 if day $d$ for stock $s$ falls within the event window and 0 otherwise. As in Table 2 the event window is from 5 days before to 5 days after each event. $Fee_{s,d}$ is the indicative fee charged on a stock loan for stock $s$ from day $d$. $FE_s$, and $FE_d$ are, respectively, stock, and day fixed effects. We scale both *demand* and *supply* by the number of shares outstanding. We report corresponding $t$-statistics in parenthesis, based on standard errors clustered by day and stock. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *. All data underlying the computations are from CRSP and Markit.

| | Δ Supply (1) | Δ Supply (2) | Supply (3) | Supply (4) | log(Supply) (5) | log(Supply) (6) |
|---|---|---|---|---|---|---|
| Δ Demand * ADR * event | 0.369*** | 0.350*** | 0.343*** | 0.417*** | 1.858*** | 1.830*** |
| | (3.03) | (3.34) | (3.27) | (3.13) | (3.22) | (2.78) |
| Δ Demand | 0.453*** | 0.495*** | 0.213*** | 0.236*** | 1.848*** | 1.799*** |
| | (5.13) | (4.93) | (2.96) | (2.94) | (3.72) | (3.17) |
| Event | -0.000*** | -0.000** | -0.001 | -0.000 | 0.000 | -0.003 |
| | (-3.39) | (-2.55) | (-1.55) | (-0.70) | (0.05) | (-0.69) |
| Δ Demand * ADR | -0.259* | -0.415*** | -0.186** | -0.272*** | -1.760*** | -1.729*** |
| | (-1.69) | (-3.92) | (-2.49) | (-2.80) | (-3.52) | (-3.03) |
| Δ Demand * event | -0.352*** | -0.382*** | -0.206*** | -0.233*** | -1.456*** | -1.358** |
| | (-4.00) | (-3.85) | (-2.61) | (-2.68) | (-2.66) | (-2.19) |
| ADR * event | -0.000 | 0.000 | -0.000 | -0.001 | -0.010* | -0.009 |
| | (-1.19) | (0.20) | (-0.61) | (-0.79) | (-1.68) | (-0.85) |
| Fee | | 0.000 | | -0.075* | | -3.373** |
| | | (0.39) | | (-1.70) | | (-2.50) |
| Fee * event | | -0.001 | | 0.010 | | 0.776 |
| | | (-0.86) | | (0.61) | | (1.40) |
| Fee * ADR | | 0.004* | | -0.072 | | 1.039 |
| | | (1.69) | | (-0.36) | | (0.49) |
| Fee * ADR * event | | -0.007** | | 0.086 | | -0.134 |
| | | (-2.17) | | (0.78) | | (-0.13) |
| Within $R^2$ [%] | 3.58 | 2.20 | 0.02 | 0.08 | 0.01 | 0.78 |
| #Stocks | 598 | 598 | 598 | 598 | 598 | 598 |
| Stock FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Day FE | Yes | Yes | Yes | Yes | Yes | Yes |

**Figure 1 – Trading strategy: dividend capture**
This figure shows holdings and trading of an investor, who wants to "capture" a dividend payment, i.e., in which investors try to get exposure to the dividend payment without risking capital losses.

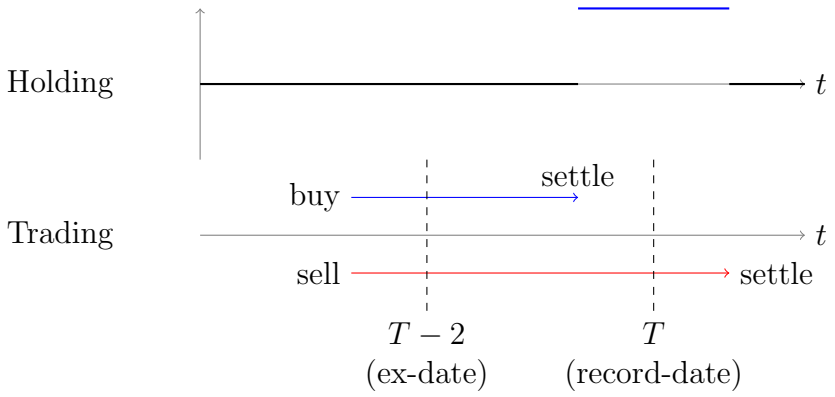


**Figure 2 – Trading strategy: dividend avoidance**
This figure shows holdings and trading of an investor, who wants to "avoide" a dividend payment, i.e., in which investors try to remove exposure to a dividend payment without risking capital losses.

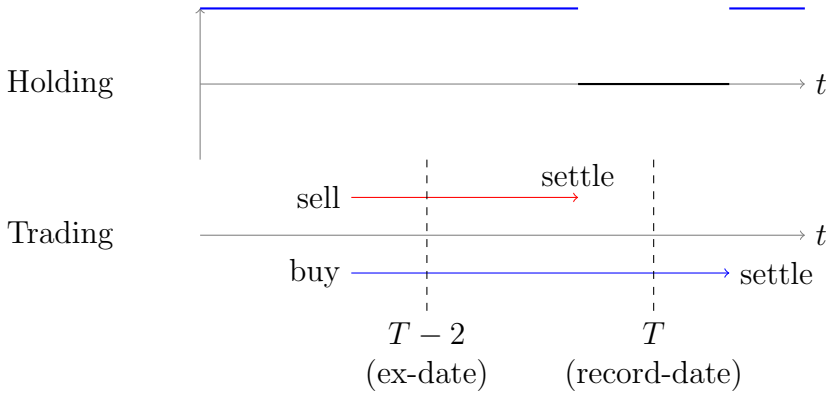


**Figure 3 – Trading strategy: dividend cum-ex**
This figure shows holdings and trading of one of three investors that conspire to gain tax refunds on a dividend payment without exposure to a dividend payment, according to ESMA (2020), Annex 1, pp. 59 - 63. The counter party to the short-sell is eligible to the dividend even though the share settles after the ex-dividend date. Note, many countries do not use the concept of a record date to determine who is eligible for dividend payments, which allows investors to short-sell and purchase a share with same delivery but one cum-dividend and the other ex-dividend.

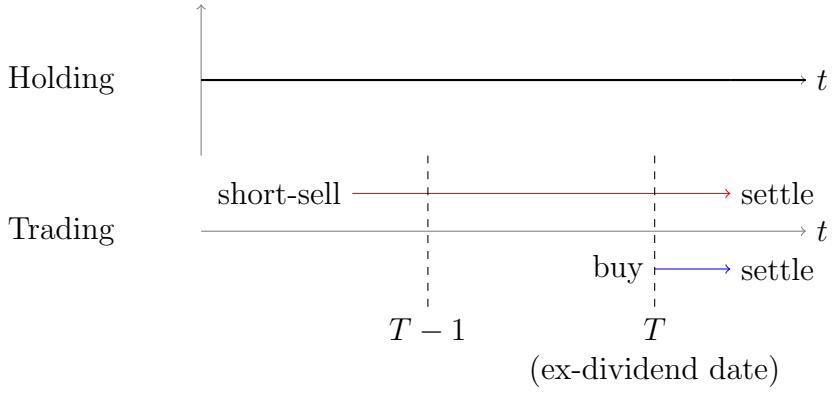


**Figure 4 – Equally-weighted average cumulative net buying of ADRs by 228 tax exempt institutions. 2006-2010**

The top (bottom) figure reports equally-weighted average net buying (in USD) from tax exempt institutions five days around ex-dividend days (the event) for all ADRs in our sample. For each stock-institution-date we substract the selling volume from buying volume to get net share buying. We then compute cumulative net buying per client per event and report equally-weighted average across all clients and events cumulative net buying. All data underlying the computations are from Ancerno, CRSP, and TAQ.

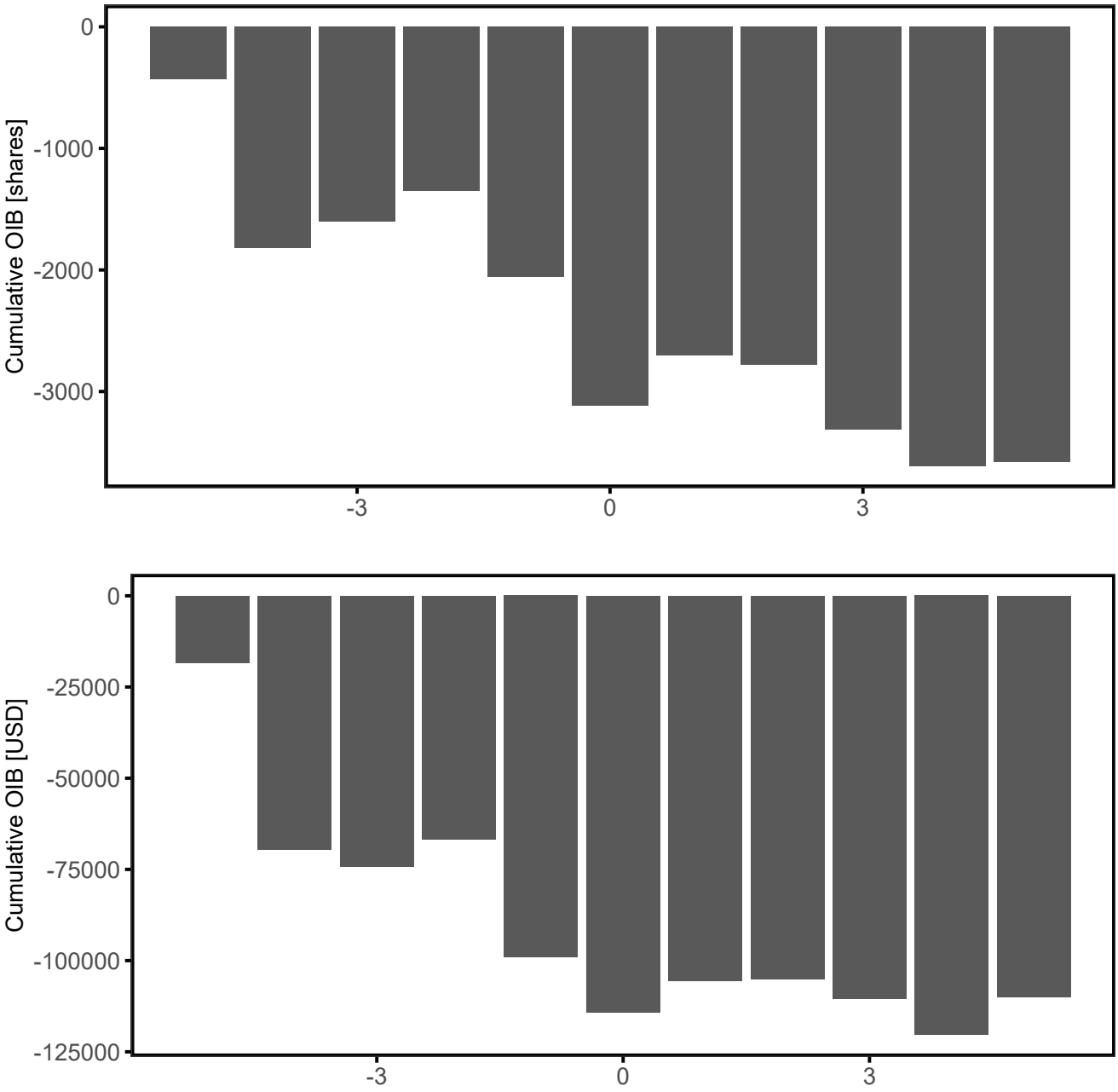
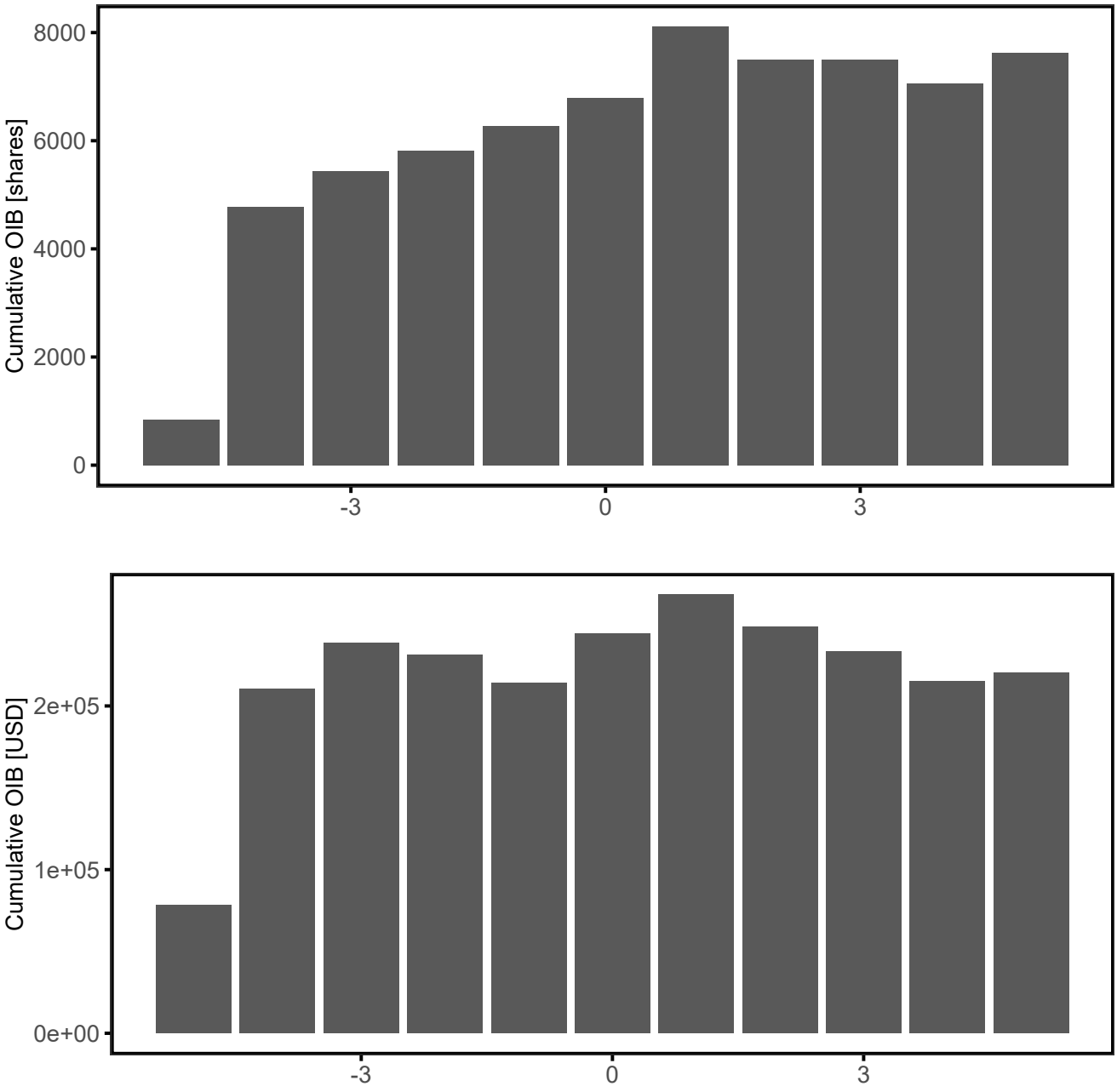


**Figure 5 – Equally-weighted average cumulative net buying of ADRs by 125 taxable institutions. 2006-2010**

The top (bottom) figure reports equally-weighted average net buying (in USD) from tax exempt institutions five days around ex-dividend days (the event) for all ADRs in our sample. For each stock-institution-date we substract the selling volume from buying volume to get net share buying. We then compute cumulative net buying per client per event and report equally-weighted average across all clients and events cumulative net buying. All data underlying the computations are from Ancerno, CRSP, and TAQ.



## References


Allen, F. and R. Michaely (2002). Payout policy. *Working paper, University of Pennsylvania.*.

Ang, J. s., D. w. Blackwell, and W. l. Megginson (1991). The effect of taxes on the relative valuation of dividends and capital gains: Evidence from dual-class british investment trusts. *Journal of Finance 46*, 383–399.

Angel, J. J. (1998). Nonstandard-Settlement Transactions. *Financial Management 27*(1), 31–46.

Baker, M. and J. Wurgler (2004). A catering theory of dividends. *Journal of Finance 59*(3), 1125–1165.

Brumm, N. D. (1999). The Daimler Chrysler revolution. *International Financial Law Review 1*, 19–23.

Callaghan, S. R. and C. B. Barry (2003). Tax Induced Trading of Equity Securities: Evidence from the ADR Market. *Journal of Finance 58*, 1583–1612.

ClearyGottlieb (2019). SEC Continues to Bring Actions Against ADR Lenders For Use of Uncovered Pre-Released ADRs. `https://www.clearygottlieb.com/news-and-insights/publication-listing/sec-continues-to-bring-actions-against-adr-lenders-for-use-of-uncovered-pre-released-` [Online; accessed 11-Oct-2022].

Collier, R. S. (2020, 08). *Cum-Ex in Concept*. Oxford University Press.

Dixon, P. N., C. A. Fox, and E. K. Kelley (2021). To own or not to own: Stock loans around dividend payments. *Journal of Financial Economics 140*(2), 539–559.

ESMA (2020). Final report on cum/ex, cum/cum and withholding tax reclaim schemes. *European Securities and Markets Authority (ESMA) 70-155-10272*, 1–71.

FinancialTimes (2018). Deutsche Bank reports suspicious tax transactions. https://www.ft.com/content/4df2ba2a-fba9-11e8-aebf-99e208d3e521 [Online; accessed 25-Feb-2020].

Gorman, L., A. Mahajan, and R. Weigand (2004). The ex-dividend day behaviour of american depositary receipts. *Journal of Multinational Financial Management 14*, 1–18.

Griffin, J. M. and S. Kruger (2023). What is forensic finance? *working paper, University of Texas at Austin 14*.

Hanlon, M. and S. Heitzman (2010). A review of tax research. *Journal of Accounting and Economics 50*(2), 127–178.

Henry, T. R. and J. L. Koski (2017). Ex-dividend profitability and institutional trading skill. *Journal of Finance 72*, 461–494.

Hu, G., K. M. Jo, Y. A. Wang, and J. Xie (2018). Institutional trading and abel noser data. *Journal of Corporate Finance 52*, 143–167.

Jame, R. (2018). Liquidity provision and the cross section of hedge fund returns. *Management Science 64*(7), 3288–3312.

Kalay, A. (1982). The ex-dividend day behavior of stock prices: A re-examination of the clientele effect. *Journal of Finance 37*, 1059–1070.

Karpoff, J. M. and R. A. Walkling (1988). Short-term trading around ex-dividend days: Additional evidence. *Journal of Financial Economics 21*(2), 291–298.

Karpoff, J. M. and R. A. Walkling (1990). Dividend capture in nasdaq stocks. *Journal of Financial Economics 28*, 39–65.

Lakonishok, J. and T. Vermaelen (1986). Tax-induced trading around ex-dividend days. *Journal of Financial Economics 16*, 287–319.

Lee, C. M. C. and M. J. Ready (1991). Inferring trade direction from intraday data. *The Journal of Finance 46*(2), 733–746.

McDonald, R. L. (2001, 06). Cross-Border Investing with Tax Arbitrage: The Case of German Dividend Tax Credits. *Review of Financial Studies 14*(3), 617–657.

Michaely, R. (1991). Ex-dividend day stock price behavior: The case of the 1986 tax reform act. *Journal of Finance 46*, 845–59.

Pohlmann, M. (2020). Organized crime in pinstripes? – The tax robbery with cum-ex and cum-cum deals. `https://heigos.hypotheses.org/10541` [Online; accessed 25-Feb-2020].

Rösch, D. (2021). The impact of arbitrage on market liquidity. *Journal of Financial Economics 142*, 195–213.

Sanford H. Goldberg, Peter A. Glicklich, A. L. (1999). U.s. court finds foreign tax credit strip does not compute. *Canadian Tax Journal*. `https://www.robertsandholland.com/publication-page?itemid=93` [Online; accessed 25-Feb-2020].

SAP (2022). SAP Dividends.

SEC (2018). SEC File No. 3-18963. `https://www.sec.gov/litigation/admin/2018/33-10600.pdf` [Online; accessed 21-Sep-2022].

SEC (2019). SEC File No. 3-19357. `https://www.sec.gov/litigation/admin/2019/33-10672.pdf` [Online; accessed 14-Oct-2022].

SenateHearing (2008). Senate Hearing 110-778: DIVIDEND TAX ABUSE: HOW OFFSHORE ENTITIES DODGE TAXES ON U.S. STOCK DIVIDENDS. `https://www.govinfo.gov/content/pkg/CHRG-110shrg45575/html/CHRG-110shrg45575.htm` [Online; accessed 25-Feb-2020].

Thiess Buettner, Carolin Holzmann, F. K. and H. Scholz (2020). Withholding-tax non-compliance: the case of cum-ex stock-market transactions. *Int Tax Public Finance 27*, 1425–1452.