Tax heist using American Depositary Receipts ⋆

Jonathan Brogaard[a], Dominik Rösch[b,*]

[a] *University of Utah*
[b] *University at Buffalo*

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Abstract

We investigate institutional trading of American Depositary Receipts (ADRs) around ex-dividend dates motivated by recent concerns of abusive practices of ADR pre-releases and illegal refunds of dividend withholding taxes. 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. The average institution sells ADRs before ex-dates and buys afterwards, exacerbating price impact. Only taxable institutions increase both buying and selling before ex-dividend dates and only on ADRs. Taxable institutions are net buyers and tax exempt institutions are net sellers. Trading increases more for ADRs than for foreign stocks, but market quality is lower and institutions have higher price impact on ADRs. These findings are consistent with dividend avoidance and cum-ex trading and suggest that these strategies negatively affect market quality. We estimate that around ex-dividend dates, on average, 0.11% of all ADRs outstanding are pre-released, resulting in tax losses for the US and foreign governments of around 3.3 basis points of all dividends paid.

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

JEL: H26, G14, G15

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*Corresponding author

Email addresses: brogaardj@eccles.utah.edu (Jonathan Brogaard), drosch@buffalo.edu (Dominik Rösch)

1. Introduction

Investors seeking tax shelter or even committing tax fraud, more friendly called tax arbitrage or "dividend enhancing" strategies, is nothing new. 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.

US investors also use foreign stocks. To prevent tax evasion, countries often levy withholding taxes on dividends payable by the local 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 to the foreign country often allows investors to offset local taxes in the form of tax credits or deductions. Therefore, both foreign withholding taxes and local tax offsets have value and its value differs across investors (Callaghan and Barry, 2003; McDonald, 2001). Even though trading motivated by tax reasons is common, trades without any economic motivation and purely for tax reasons are subject to potential penalties (Sanford H. Goldberg, 1999). For an excellent introduction into dividend taxation we refer to Hanlon and Heitzman (2010).

Recently, tax arbitrage has reached a new dimension in which investors not only avoid paying the taxes that they owe, but actively request tax refunds for taxes that 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 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".

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. We can distinguish cum-ex trading from both dividend capture and avoidance trading because cum-ex trading does not involve buying and selling the same security on the same day. 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. We can distinguish dividend capture and avoidance trading because one leg should be cum-dividend and the other leg should be ex-dividend, resulting in large price differences for buy and sell transactions within the same day.

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 much of this abnormal trading volume is coming from

trades with special settlement conditions.

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, on average.

To address this challenge we focus on one specific sample of all investors: institutions, for which we have client-level daily buy and sell transactions from Abel Noser Solutions (AbelNoser). We know that at least a subset of US institutions participated in Cum-Ex deals. 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).

AbelNoser provides data on institutional trades (such as from pension funds) covering, on average, more than 10% of daily trading volume and is frequently used in recent academic papers. For an excellent introduction and overview to AbelNoser and answering important questions such as who provides data to AbelNoser and why, we refer to the article by Hu, Jo, Wang, and Xie (2018).

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.

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 ADRs turnover from institutions is elevated in all portfolios with an increase in turnover by at least 40% and up to around 200%.

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.

To distinguish between different trading motives we first 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. For common stocks and foreign stocks selling

increases more than buying, but for ADRs selling and buying seems similarly affected. For example, for foreign stocks institutions buy, on average, just 236 more shares while they sell 1,725 more shares per day for each of the five days before an ex-dividend date. But for ADRs institutions buy and sell around 3,500 more shares, on average.

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 an increase in day trading and 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 increases the most for ADRs, day trading and special settlement increases the least for ADRs. Of course, these trades using special settlements might also come from other traders, though given the very large, contemporaneous increase in institutional trading it seems unlikely that special settlements did not also increase for institutional trading.

Next, we distinguish between institutions that are tax exempt such as plan sponsors and other institutions and investors. To avoid tax evasion most countries levy dividend withholding taxes, which must be paid by the firm before paying out dividends. To avoid double taxation the US has agreements with several countries that allow investors to claim back part or all of the withholding taxes. The unclaimed withholding taxes can be used to lower taxable income or as a tax credit for US taxes. But this only works for institutions that pay taxes in the US, withholding taxes above the treaty rate are lost for tax exempt institutions. 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).

Consistent with the impact of withholding taxes on tax exempt investors we find that they predominantly sell foreign securities before ex-dividend dates, for example, they decrease buying ADRs by around 4500 shares and sell around 5,000 shares more each day the five days before the ex-dividend date. On the other hand, taxable investors buy around 8,000 more shares each day.

We then investigate changes in portfolios for the average institution around the ex-dividend date. We find that the average institution sells ADRs before ex-dates of around USD 50k and buys around USD 100k afterwards, for the average event. When distinguishing between taxable and tax exempt institutions we find that tax exempt institutions sell ADRs before the ex-dividend date and buy afterwards, while taxable institutions are net buyers before and net sellers after the ex-dividend date.

Next, we investigate whether these institutional trading strategies affect market quality. We document that around ex-dividend dates proportional effective and quoted spreads are alleviated for ADRs compared to foreign stocks. Proportional and effective spreads are around 0.5 to 1 basis point higher during the event period for ADRs than for foreign stocks, even if we include event, stock, and day fixed effects to control for unobserved heterogeneity betweens ADR and foreign stocks. We further document that around ex-dates institutions have higher price impact for ADRs compared to foreign stocks and compared to the benchmark period, in particular, institutions have higher price impact from selling ADRs.

We therefore conclude that the increase in institutional trading volume around ex-dividend dates comes to a large extent from dividend avoidance and cum-ex deals. And that these trades affect market quality and prices.

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). 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. Looking at client level data is necessary to understand motivations as market-wide for each buyer there must be a seller. 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. We investigate tax fraud and cum-ex deals for foreign securities, which also requires us to look at cross-border securities (e.g., ADRs) instead of US common stocks.

This paper is structured in the following way. 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, or 1242), i.e., ordinary dividends paid in USD at a quarterly (1232), semi-annual (1242), or unknown frequency (1212).

Compared to previous studies (such as Henry and Koski, 2017) we also include distribution codes 1212 and 1242 to increase the number of events for ADRs, especially because foreign stocks often pay dividends annually (like Germany) or semi-annually (like the UK). 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. Especially, the last filter would drop the number of events from more than 2,000 to less than 200, because the declaration date is often missing especially for distributions with code 1212. But 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.

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 also 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. For a comprehensive introduction to Ancerno we refer to Hu et al. (2018) and Jame (2018). 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 allows 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. For each analysis we use the longest possible time period.

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.

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 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 per cent) 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. Of main interest in our paper, is

explaining trading volume around *event* dates.

Panel A of Table 2 provides evidence that trading around events is abnormally large. For each event, we calculate abnormal turnover 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 9.90) which is somewhat lower than 4.4% as reported by (Henry and Koski, 2017, Table 2). Similar we find an abnormally high turnover from institutions of around 15% 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 (30%, t-stat of 7.07.) But these increases are dwarfed compared to the increase in institutional trading of ADRs during the event period of 122% (t-stat of 6.11.) Table 2 also shows that volume from trades with special settlements is elevated especially for US common stocks.

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 does not significantly vary depending whether we use all events (Panel A) or restrict when specific institutions trade (Panels B and C.) This indicates that institutions do target specific events. On the other hand, institutional turnover depends on whether the institution is taxable, in which case abnormal trading volume is much higher than if the institution is tax exempt.

One concern with the measure of abnormal turnover is that it is maybe less meaningful for events with little trading in the benchamrk period. For example, trades with special settlement might be rare within the benchmark period and therefore an increase of 500% or even 1,000% 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. But empirically, this is rare, with only around 30 events for ADRs. But on the other hand events without any institutional trading are common, with more than 1,000 for both ADR and foreign stocks (as reported in Table 1 for ADRs we have 4,316 events in total and only 3,119 of these have institutional trading.)

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

holding 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" sentencing various Depositary Banks and Brokers for fees of more than half a billion dollars. 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 normally close in a few days by delivery of the ordinary shares. But 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)

So far, the SEC did not further investigate 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 Abel Noser, 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).] 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, 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. It also involves trades with special settlement (Footnote 6, Lee and Ready, 1991).

According to ESMA (2020) and Sanford H. Goldberg (1999), a common way for tax-arbitrage is that (short) sell transactions are executed before the ex-dividend date with ordinary settlement terms (in our sample three business days after the transaction, or T+3) and (re-)purchase trades are executed with special settlement conditions terms after the ex-dividend date. This way, for example, US investors can shift ownership of German shares back to taxable German investors who at least from 1994 to 1998 were eligible for a tax credit of 42.86% of the dividend (McDonald, 2001).

In terms of pre-release ADRs, the holder of the pre-release ADR could sell the ADR cum-dividend (with special settlement), simultaneously buy the ADR ex-dividend and then pay the dividend minus the withholding tax to the depository. Given that the dividend minus the withholding tax should be less than the cum-dividend price minus the ex-dividend price, the investor makes a profit.

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.

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. 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 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.

A hypothetical example should help to understand the issues that arise when ADRs are pre-released over ex-dividend dates: Foreign company XXX 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 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.

But given that the broker of the pre-release did not pay the withholding tax, the total withholding tax paid is still just EUR 1,000. But now 600 ADRs (and 500 foreign shares) can claim back the withholding tax of (e.g.) EUR 1 per ADR, potentially resulting in a loss

of taxes for the Foreign treasury of EUR 100. ADR holders can also file for a US foreign tax credit of the unclaimed withholding tax of EUR 1 per ADR, 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 we restrict us to investigate trading from institutions, 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 23% vs 13%, respectively, which is statistically different from each other) and for small firms (36% vs 9%) with a low price (24% vs 11%) and high transaction costs (34% 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 almost identical.

On the other hand, for ADRs we do not find statistically significant differences between the High and the Low portfolios. For US common stocks and foreign stocks we find that institutional trading around ex-dividends is concentrated in the extreme portfolios. For ADRs we find that abnormal turnover is high in all portfolios with an increase of at least 46% in the large-cap portfolio.

An important question is whether investors seek high USD dividend or high dividend yield

events, in other words how important is the stock price? For example, the less investors are budget-constrained the less important the dividend yield might be. If investors have access to infinite shares (both in terms of capital and shares outstanding), investors might not worry about the yield at all, but rather focus on USD amount per event. Interestingly, this seems the case for ADRs for which abnormal turnover is in general higher in portfolios with higher USD dividend (except for the highest portfolio), whereas abnormal turnover does not vary much for common and foreign stocks. Investors on common and foreign stocks might face much more restrictions, e.g., given the number of outstanding shares and available shares for shorting. The number of ADRs was artificially increased due to pre-releases, i.e., brokers allowed trading of ADRs that were not backed up by home-market shares. As mentioned already in Section 3 according to 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)

Ideally, we would have stock-day level data on the amount of pre-released ADRs. Knowingly the amount of pre-released ADRs would provide an estimate for the amount of tax refunds of taxes that were never paid. Unfortunately, we do not have this data but we argue we can get an estimate for the amount of pre-released ADRs from the stock loan market.

4.2. 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 4 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 ($100 * (0.453 - 0.352)$.)

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.

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. Something we explore in the next section.

4.3. Taxes

We start with estimating fixed-effect panel regressions at the stock-day-client level to get a better idea of which of variables explain abnormal trading activity (when controlling for others). Given that for ADRs none seem to explain abnormal trading volume, rather Table 3 shows that turnover for ADRs is high in all portfolios, we also include variables related to the possibility of cum-ex trading. As mentioned in Section 3.3, cum-ex trading requires high dividend yields combined with high withholding taxes (WHT) and large tax refunds. We therefore explain trading volume by an indicator variable equal to one for countries with high WHT (above 20%) and countries that allow pension funds to claim back all of the WHT. Unfortunately, we do not have a time-series of these two tax related variables and depend on 2022 data from spglobal.com and taxsummaries.pwc.com. We then interact these two tax related variables with the dividend yield of the event. For comparison we estimate these regression for common US stocks, foreign stocks, and ADRs.

Table 5 reports the results. 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 US common stocks and for ADRs but not for foreign stocks. We find that taxes have important effects on trading volumes for foreign stocks and for ADRs.

As predicted, for ADRs, the triple interaction of high WHT, large refunds, and high dividend yields is positively (economically large, but statistically only significant when using stock fixed effects) correlated with trading volume. An increase of the dividend yield by 1% results in an increase of around 15,000 ADRs traded on each of the 90-days around the ex-dividend date. For foreign stocks we cannot estimate this effect, because the countries with high WHT and large tax refunds overlap. But interestingly we estimate that for foreign stocks an increase in the dividend yield for countries with high WHT reduces trading volume (as one would expect, given that investors should try to avoid high taxes) while for ADRs it increases trading volume.

These results indicate that ADR investors seem to trade more if the potential tax refunds

are large, consistent with the idea of cum-ex trading or tax refunds on pre-released ADRs.

4.4. Buy and sell volume around ex-dividend dates

The rest of the paper investigates 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.

$$volume_{s,d} = event_{s,d} + after_{s,d} + FE_e + FE_s + FE_d + \epsilon_{s,d} \tag{1}$$

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.

Table 6 reports the results of regression 1 with $volume_{s,d}$ the number of shares traded separately for when institutions buy or sell commons stocks, foreign stocks, or ADRs.

We find that before the event date buying and selling increases (statistically significantly) for commons stocks and ADRs. For common stocks and foreign stocks selling increases much more than buying, while for ADRs buying and selling increases similarly by around 3,500 shares per day, on average. After the event date most of these effects revert, for example, after the event date for ADRs buying increases by around 1,500 shares per day and selling increases by 400 shares.

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 next. We define day trading activity for each stock-day by summing up the minimum of an institutions buy and sell volume for each institution. 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.

Panel A of Table 7 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, 700, and 600 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.

Panel B of Table 7 reports the results of estimating regression 1 explaining trading with special settlement conditions. Trades with special settlement conditions increase by around 2,000 and 4,000 shares before the event date, but by 17,000 and 21,000 shares after the event date. For ADRs trades with special settlement only increase by around 1,500 before and 2,300 shares after the event date.

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 6 but we distinguish whether institutions are taxable. Tax exempt institutions decrease buying and selling of US common shares by around 1,000 and almost 3,000 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 to hold stocks over ex-dividend dates.

Results are different for foreign stocks and especially for ADRs. Tax exempt institutions decrease buying and increase selling ADRs both by around 5,000 shares. Surprisingly, taxable institutions increase both buying and increase selling ADRs by around 8,000 shares.

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 7 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 (2,600 shares with a t-stat of -1.71) 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, for taxable institutions the increase is balanced between buy and sells. 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, finding 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.

Figure 4 report the results for ADRs. The average institution sells common stock worth around USD 50k before the ex-dividend date and afterwards buys shares at a similar magnitude. The cumulative net position of the average institution on the ex-dividend date is around negative USD 20k. Two days before and one day after the ex-dividend date the average institution has positive net position on ADRs of around USD 25k.

The pattern for ADRs clearly indicates that the average institution sells just before the ex-dividend date and buys back just after it. These trading patterns are consistent with one of the traders in a cum-ex as depicted in Figure 3. Institutions (short) sell ADRs before the ex-dividend and buy them back potentially with special settlement conditions afterwards. This result also indicates 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 7.)

Interestingly, order imbalance drop again two days after the ex-dividend date. One potential explanation and one complication when investigating trading volume on ADRs is that a nearly perfect substitute for the ADR exists: the respective home-market share. This would allow to swap the ADR with the home-market share in either the short or the long position required to establish the required exposure to the dividend. A further complication is that the ex-date for the ADR is often different from the ex-date of the home-market stock (Rösch, 2021), which might make it more difficult to exchange one for the other but might also create spikes in abnormal trading volume on the ADR unrelated to the ex-date of the ADR (but relative to the ex-date of the home-market share).

Next we again distinguish between the tax status of institutions and report changes in cumulative order imbalance separately for tax exempt (Figure 5) and taxable institutions (Figure 6). We find that tax exempt institutions sell ADRs before the ex-dividend date and buy them after the ex-dividend date. While trading patterns are reversed for taxable institutions, they buy up to two days before the ex-dividend date and afterwards sell ADRs.

4.7. Price impact

Institutions sell and buy ADRs before the ex-dividend date, seemingly motivated by tax concerns. Do institutions affect market quality and prices by doing so? For example, if institutions trade more aggressively one should see an increase in inventory holding costs and therefore an increase in spreads and an increase in their price impact. Table 10 provides evidence that this is indeed the case.

One concern is that market quality might be affected for other reasons. Previous literature argues that around ex-dividend dates liquidity for ADRs is lower because of a lack of cross-market arbitrage (Rösch, 2021). We therefore use foreign stocks as control stocks as these should not be affected by the same lack of cross-market arbitrage.

We first investigate whether proportional effective ($PESPR$) or quoted spreads ($PQSPR$) are larger around ex-dividend dates for ADRs than for foreign stocks. For that we estimate fixed panel regressions as following:

$$Spreads_{s,d} = Event_{s,d} \times ADR_{s,d} + Event_{s,d} + ADR_{s,d} + FE_e + FE_s + FE_d + \epsilon_{i,s,d} \quad (2)$$

with $Event_{s,d}$ defined as before and $ADR_{s,d}$ an indicator variable equal to 1 if stock s is an ADR and equal to 0 if it is a foreign stock. $Spreads_{s,d}$ is $PESPR$ or $PQSPR$ measured in basis points. And we cross-sectionally winsorize both $PESPR$ and $PQSPR$ each day separately for ADRs and foreign stocks at the 2.5% and 97.5% level.

When we only include event fixed effects we find that $PESPR$ is higher by around 0.8 basis points (t-stat 2.20) around ex-dividend dates than for foreign shares. To control for other unobserved heterogeneity we also include day and stock fixed effects and find an increase of 0.5 basis points (t-stat 1.60.) Similar we find an increase in $PQSPR$ of around 0.9 (t-stat 2.54) and 0.6 (t-stat 1.97) basis points for ADRs around ex-dividend dates.

Next, we investigate the price impact of institutional trading. For that we estimate fixed effect panel regression as following:

$$Return_{s,d} = Event_{s,d} \times ADR_{s,d} \times (Buy_{i,s,d} + Sell_{i,s,d}) + Controls_{s,d} + FE_e + FE_s + FE_d + \epsilon_{s,d} \quad (3)$$

with $Buy_{s,d}$ and $Sell_{i,s,d}$ the USD trading volume of ADR s, respectively, bought and sold by all institutions on day d. We measure trading volume in million of USD and we measure the $Return_{s,d}$ in basis points. Given that we are explaining returns, day fixed effects seem especially important because this allows us to control for ADR wide effects and therefore allows us to interpret returns as "market" adjusted, abnormal returns.

We estimate that if institutions sell ADRs for a million USD on a given day outside of ex-dividend dates returns decrease by around 0.4% $(0.42 - 0.82)$. During the five days around the ex-date, price impact from selling is much stronger by almost an additional percentage point (t-stat -2.22.) On average, a one million USD sell during the event period is associated

with a return decrease by around 1.2% $0.42 - 0.82 - 0.82$.)

These results suggest that trading by institutions around ex-dividend dates affects market quality and prices.

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 provide several findings that are consistent with explaining this increase in volume by dividend avoidance and cum-ex deals. First, the sheer magnitude of the increase in institutional trading volume on ADRs compared to common stocks and foreign stocks raises the question what is different between both securities. Clearly, investors could pursue dividend capture trades for both common stocks and ADRs. ADRs are different because of withholding taxes which make dividend avoidance more attractive and cum-ex deals possible. But investors could also use foreign stocks for both dividend avoidance and cum-ex deals. One reason why ADRs might be more attractive is that they could be pre-released artifically increasing the supply of ADRs. Second, consistent with cum-ex deals we find that the average institution sells before the ex-dividend date and buys after the ex-dividend date. Third, given the peak in trades with special settlement conditions with no corresponding peak in day trading activity after the ex-dividend date, it seems likely that institutions buy back the shares to close down existing short positions over the ex-dividend date.

While our evidence for the motivation behind why institutions trade around ex-dividend dates 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 minimum and maximum 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, dividend amount in USD, the stock price before and after the event (cum- and ex-day 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	Min	Max
Panel A: US commons stocks						
Dividend Yield	64,279	1.53	1.21	1.28	0.00	106.27
Dividend Amount ($)	64,279	0.45	0.32	0.43	0.00	9.15
Cum-day Price ($)	64,279	33.87	28.06	27.54	0.72	1043.68
Ex-day Price ($)	64,279	34.00	28.14	27.86	0.62	1078.05
Market Cap ($B)	64,279	8.7126	1.3941	27.6949	0.0055	589.5328
Total Volume (000s)	64,279	1,605	317.0744	6,628	0.1000	470,534
Institution Volume (000s)	60,165	141.7452	34.6789	361.6523	0.0004	16,815
Special Volume (000s)	43,685	40.8598	5.4210	224.7738	0.0020	20,865
Panel B: Foreign						
Dividend Yield	6,507	1.99	1.37	2.07	0.01	20.14
Dividend Amount ($)	6,507	0.54	0.34	0.61	0.00	8.00
Cum-day Price ($)	6,507	33.78	26.72	35.77	0.53	661.12
Ex-day Price ($)	6,507	33.83	26.71	35.55	0.38	638.65
Market Cap ($B)	6,507	9.6201	2.8019	16.3047	0.0042	211.6872
Total Volume (000s)	6,507	1,129.9096	356.8629	2,370.9670	0.1711	55,763.1467
Institution Volume (000s)	4,608	88.0869	21.0148	274.7461	0.0000	8,630.3552
Special Volume (000s)	3,883	21.9033	2.9367	94.4269	0.0010	2,949.1000
Panel C: ADRs						
Dividend Yield	5,834	2.72	2.15	2.25	0.01	22.17
Dividend Amount ($)	5,834	0.87	0.53	1.06	0.00	14.85
Cum-day Price ($)	5,834	34.95	26.75	31.45	0.68	438.89
Ex-day Price ($)	5,834	34.69	26.50	31.31	0.54	501.43
Market Cap ($B)	5,834	2.8860	0.4577	7.8127	0.0001	85.7608
Total Volume (000s)	5,832	677.8394	116.6587	1,886.1633	0.0286	61,696.1367
Institution Volume (000s)	4,022	46.2593	5.9877	168.0725	0.0000	5,640.9699
Special Volume (000s)	2,855	48.3207	2.9660	329.4059	0.0020	9,187.4915

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.

	Common Stocks	Foreign Stocks	ADRs
Panel A: All Institutions, 1999 to 2014			
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. 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, and TAQ.

	Dividend [USD]	Dividend Yield	Size	Price	Spread
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
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
High - Low	-0.11	0.30	-0.27	-0.25	0.39
	(-0.93)	(2.20)	(-1.97)	(-2.00)	(2.53)
Panel C: ADRs					
Low	0.69	0.80	1.00	0.72	0.25
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
High - Low	0.04	-0.03	-0.60	-0.10	0.28
	(0.14)	(-0.08)	(-1.69)	(-0.32)	(1.69)

Table 4 – 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. 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

Table 5 – Share volume around events by event and tax characteristics
This table reports panel regressions explaining share volume from 45 days before to 45 days after each event (ex-dividend date).

$$volume_{c,s,d} = event_{s,d} + Pension_s * WHT_s * dividend_{s,e} + controls_{s,d} + FE_c + FE_s + FE_d + \epsilon_{c,s,d}$$

$event_{s,d}$ 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. $Pension_s$ is an indicator variable equal to 1 if stock s is from a country which allows pension funds to claim back the whole withholding taxes and 0 otherwise. WHT_s is an indicator variable equal to 1 if stock s is from a country with high withholding taxes (above 20%) and 0 otherwise. $dividend_{s,e}$ or div is the dividend yield (USD dividend divided by the cum-dividend price) of event e. FE_c, FE_s, and FE_d are, respectively, client, stock, and day fixed effects. $volume_{c,s,d}$ is the number of shares traded by client c of stock s on day d. We report corresponding t-statistic in parenthesis, based on standard errors clustered by client and by by client and stock when also using stock fixed effects. All data underlying the computations are from Ancerno, CRSP, and TAQ.

	Common (1)	Common (2)	Foreign (3)	Foreign (4)	ADR (5)	ADR (6)
$Event$	832***	733***	-425	-1,172	1,676*	1,712**
	(3.36)	(2.33)	(-0.49)	(-1.19)	(1.77)	(2.20)
$WHT * Div$			-8,057**	-6,333***	2,178***	960
			(-2.14)	(-2.87)	(3.21)	(0.90)
$Pension * Div$			17,961***	10,022***	1,759***	-104
			(3.29)	(3.27)	(2.91)	(-0.10)
$WHT * Pension * Div$					13,767	16,280***
					(0.85)	(8.52)
$Pension * WHT$					13,660	
					(0.40)	
Div	-1,504***	-2,226***	-4,514***	-226	-1,703***	-325
	(-3.66)	(-2.07)	(-3.74)	(-0.19)	(-3.57)	(-0.54)
$Pension$			-60,393***		-8,658***	
			(-3.13)		(-3.13)	
WHT			22,256***	-6,333***	-3,580**	
			(3.09)	(-2.26)	(-2.27)	
$Price$	-359***	-317***	-382***	-141***	-351***	-219***
	(-9.55)	(-6.31)	(-6.44)	(-4.45)	(-4.94)	(-4.01)
$Mktcap$	276***	-99*	445***	79	592***	19
	(4.38)	(-1.65)	(2.79)	(0.97)	(3.74)	(0.11)
$PESPR$	-239***	8	220	772**	257***	14
	(-3.20)	(0.20)	(0.89)	(2.20)	(-2.74)	(0.14)
Within R^2 [%]	0.70	0.07	0.59	0.08	0.96	0.11
#Stocks	3,107	3,107	264	264	425	425
#Clients	989	989	940	940	866	866
Stock FE	No	Yes	No	Yes	No	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes
Client FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 – Institutional buying and selling volume around ex-dividend dates, 1999 -2013
This table reports panel regressions explaining share volume 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 number of shares traded 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. All data underlying the computations are from Ancerno, CRSP, and TAQ.

	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 FE	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 – Institutional day trading volume around ex-dividend dates, 1999 -2013
This table reports panel regressions explaining share volume 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 Panel A, $volume_{s,d}$ is the number of shares day traded 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 Panel B, $volume_{s,d}$ is the sum of all shares traded 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. All data underlying the computations are from Ancerno, CRSP, and TAQ.

	Panel A: Day trading			Panel B: Special Settlement		
	Common	Foreign	ADR	Common	Foreign	ADR
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 FE	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 – Taxable institutional buying and selling volume around ex-dividend dates, 2006 -2013
This table reports panel regressions explaining share volume 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. $volume_{i,s,d}$ is the number of shares traded 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. All data underlying the computations are from Ancerno, CRSP, and TAQ.

	Buy			Sell		
	Common	Foreign	ADR	Common	Foreign	ADR
$Event$	-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 FE	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 9 – Taxable institutional day trading volume around ex-dividend dates, 2006 -2013
This table reports panel regressions explaining share volume 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 Panel A, $volume_{i,s,d}$ is the number of shares day traded 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 Panel B, $volume_{i,s,d}$ is the sum of all shares traded 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. All data underlying the computations are from Ancerno, CRSP, and TAQ.

	Panel A: Day trading			Panel B: Special Settlement		
	Common	Foreign	ADR	Common	Foreign	ADR
$Event$	-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 FE	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 10 – Illiquidity differences between foreign stocks and ADRs around ex-dividend dates, 1999 - 2013

This table reports panel regressions explaining proportional effective spreads, proportional quoted spreads, and returns around ex-dividend dates.

$$Spreads_{s,d} = Event_{s,d} \times ADR_{s,d} + Event_{s,d} + ADR_{s,d} + FE_e + FE_s + FE_d + \epsilon_{i,s,d}$$

$$Return_{s,d} = Event_{s,d} \times ADR_{s,d} \times (Buy_{i,s,d} + Sell_{i,s,d}) + Controls_{s,d} + FE_e + FE_s + FE_d + \epsilon_{s,d}$$

$event_{s,d}$ 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 5 days before to 5 days after each event (ex-dividend date). $ADR_{s,d}$ is an indicator variable if stock s is an ADR and 0 if it is a foreign stock. $Buy_{s,d}$ ($Sell_{i,s,d}$) USD trading volume of ADR s bought (sold) by all institutions on day d. We report corresponding t-statistic in parenthesis based on standard errors clustered by stock. All data underlying the computations are from Ancerno, CRSP, and TAQ.

	PESPR (1)	PESPR (2)	PQSPR (3)	PQSPR (4)	Return (5)	Return (6)
$Event \times Sell \times ADR$					-0.7049**	-0.7684**
					(-2.05)	(-2.14)
$Event \times Buy \times ADR$					-0.2229	-0.0560
					(-1.52)	(-0.34)
$Event \times ADR$	0.7810***	0.5534**	0.7484**	0.4259*	6.2196***	5.9374***
	(2.63)	(2.05)	(2.48)	(1.70)	(3.92)	(4.27)
$Event$	0.3142*	0.0303	0.2121	-0.1021	0.4717	0.8262
	(1.72)	(0.18)	(1.10)	(-0.64)	(0.44)	(0.90)
ADR	16.2678***		21.3439***		-0.2949	
	(8.80)		(9.19)		(-0.51)	
Buy					0.4137***	0.3978***
					(5.09)	(5.46)
$Sell$					-0.7772***	-0.8556***
					(-3.98)	(-4.27)
$Event \times Sell$					0.5545***	0.5475**
					(2.61)	(2.22)
$Event \times Buy$					0.0473	-0.0368
					(0.37)	(-0.28)
$ADR \times Sell$					0.3110	0.3974*
					(1.29)	(1.66)
$ADR \times Buy$					0.0191	-0.0343
					(0.15)	(-0.29)
Within R^2 [%]	2.36	0.00	3.76	0.00	0.06	0.08
#Days	3,961	3,961	3,961	3,961	3,961	3,961
#Stocks	846	846	846	846	846	846
Event FE	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	No	Yes	No	Yes	No	Yes
Day FE	No	Yes	No	Yes	No	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.

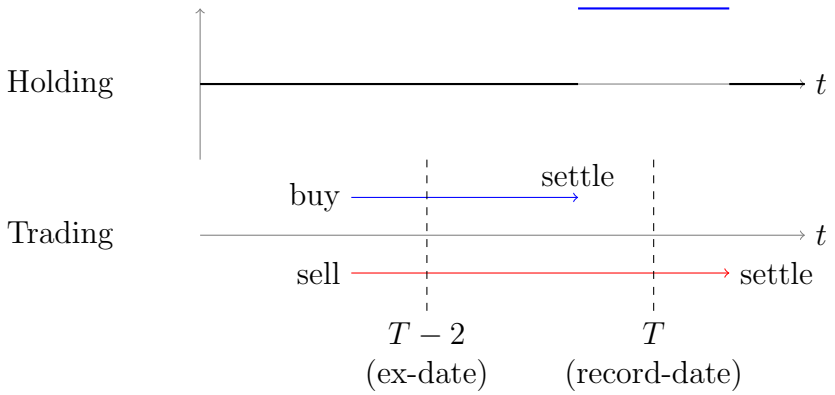


Figure 2 – Trading strategy: dividend avoidance
This figure shows holdings and trading of an investor, who wants to "avoide" a dividend payment, i.e., in which investors try to remove exposure to a dividend payment without risking capital losses.

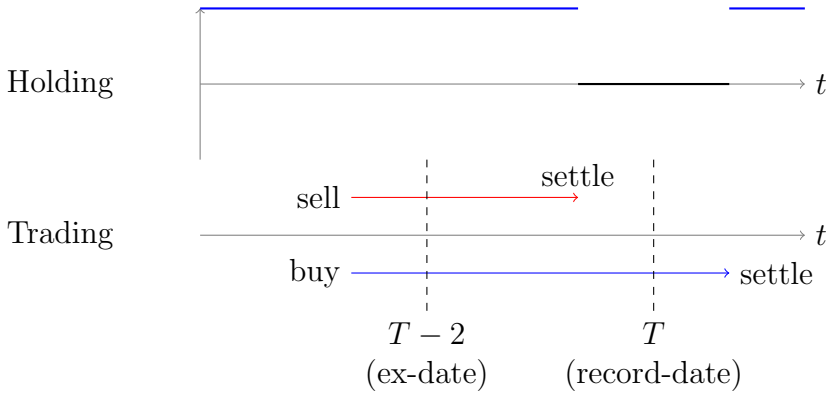


Figure 3 – Trading strategy: dividend cum-ex
This figure shows holdings and trading of one of three investors that conspire to gain tax refunds on a dividend payment without exposure to a dividend payment, according to ESMA (2020), Annex 1, pp. 59 - 63. The counter party to the short-sell is eligible 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.

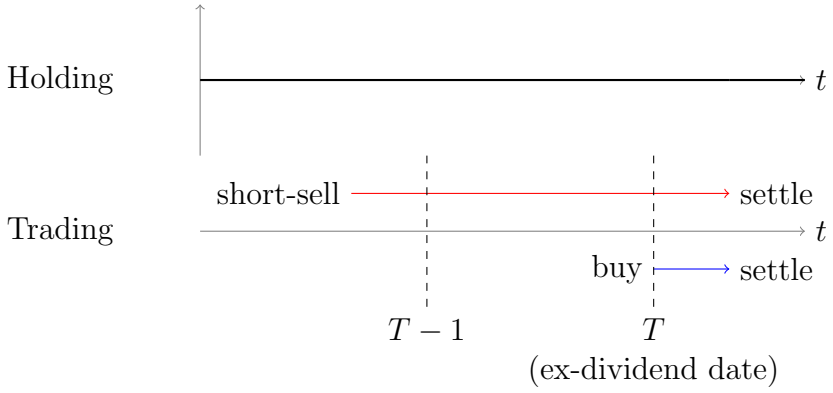


Figure 4 – Equally-weighted average cumulative net buying of ADRs by institutions. 1999 -2010
This figure reports equally-weighted average net USD buying from institutions five days around ex-dividend days (the event) for all ADRs in our sample. For each stock-institution-date we substract USD selling volume from USD buying volume to get net USD buying. We then cross-sectionally winsorize net USD buying at the 2.5% and 97.5% level every day. We then compute cumulative net USD buying per client per event and report equally-weighted average across all clients and events cumulative net USD buying. All data underlying the computations are from Ancerno, CRSP, and TAQ.

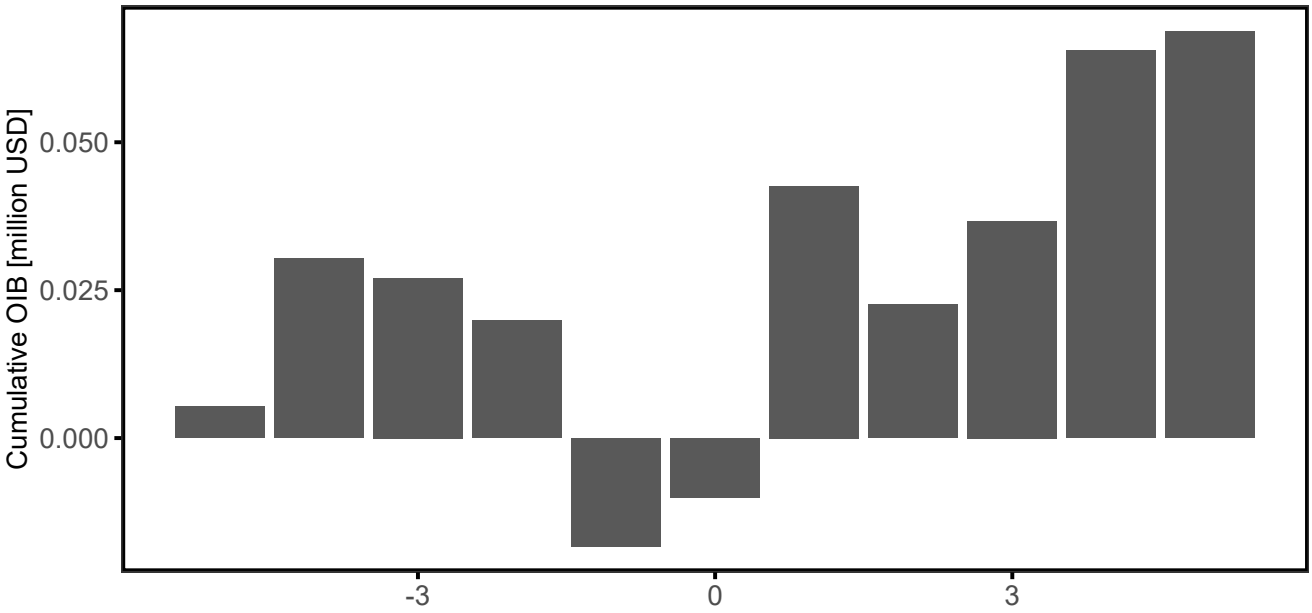


Figure 5 – Equally-weighted average cumulative net buying of ADRs by tax exempt institutions. 2006 -2013

This figure reports equally-weighted average net USD buying from institutions five days around ex-dividend days (the event) for all ADRs in our sample. For each stock-institution-date we substract USD selling volume from USD buying volume to get net USD buying. We then cross-sectionally winsorize net USD buying at the 2.5% and 97.5% level every day. We then compute cumulative net USD buying per client per event and report equally-weighted average across all clients and events cumulative net USD buying. All data underlying the computations are from Ancerno, CRSP, and TAQ.

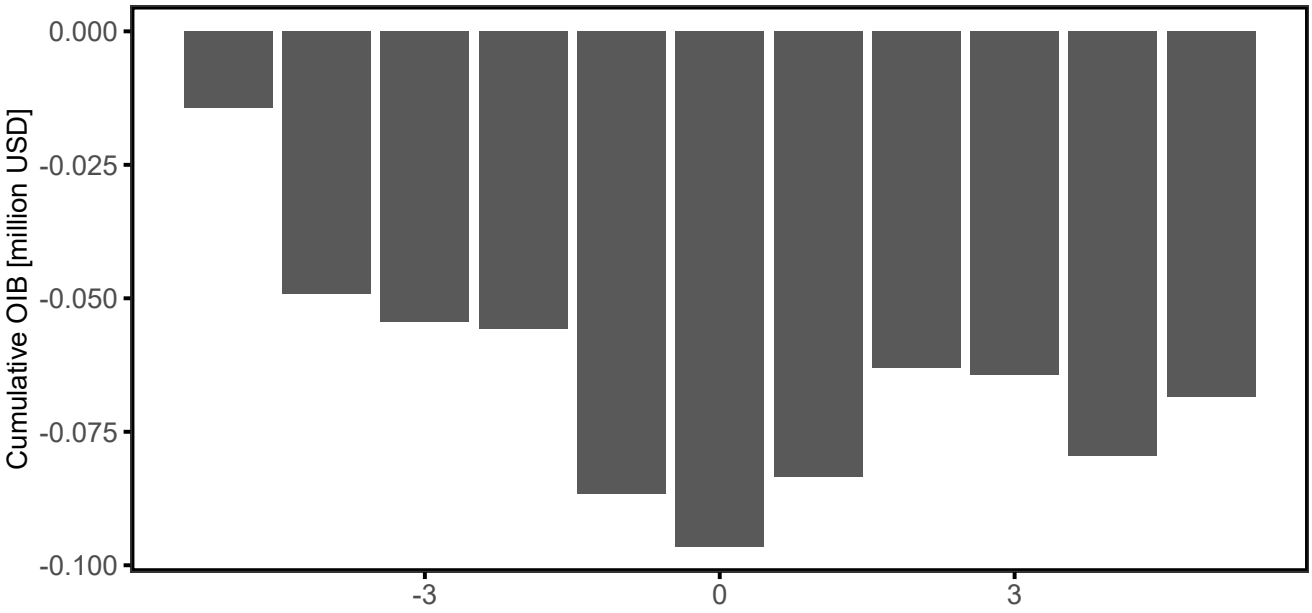
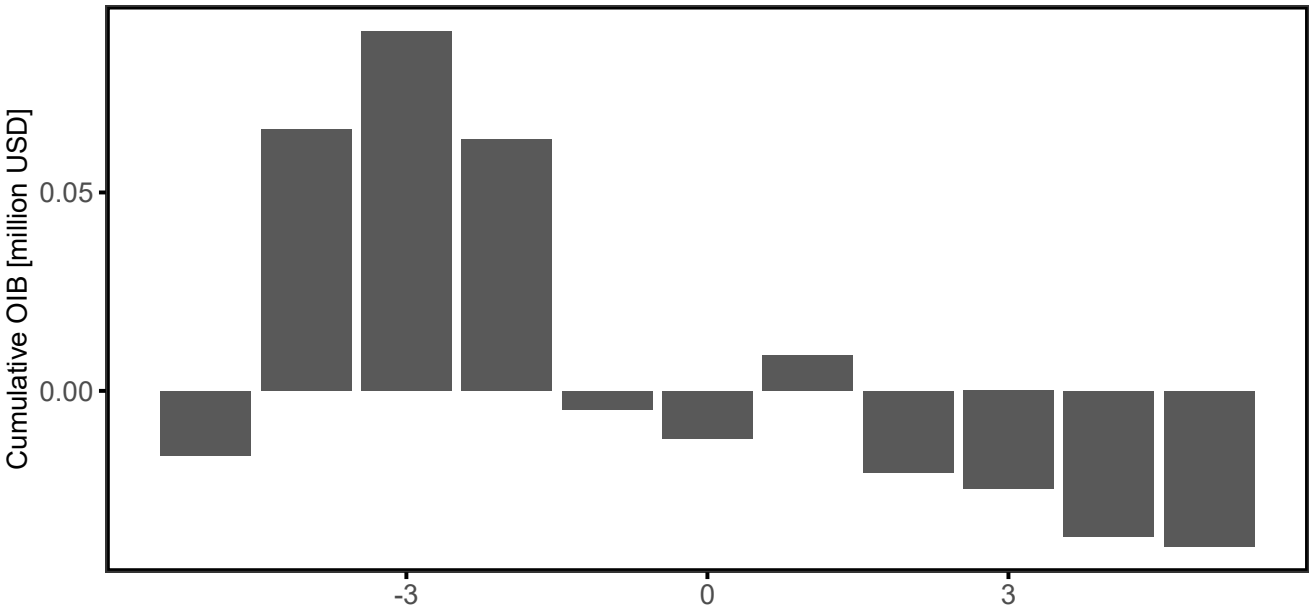


Figure 6 – Equally-weighted average cumulative net buying of ADRs by taxable institutions. 2006 -2013

This figure reports equally-weighted average net USD buying from institutions five days around ex-dividend days (the event) for all ADRs in our sample. For each stock-institution-date we substract USD selling volume from USD buying volume to get net USD buying. We then cross-sectionally winsorize net USD buying at the 2.5% and 97.5% level every day. We then compute cumulative net USD buying per client per event and report equally-weighted average across all clients and events cumulative net USD buying. All data underlying the computations are from Ancerno, CRSP, and TAQ.



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