Norwegian School of Economics

Bergen, Autumn 2022

Are Dividend Arbitrage Strategies Present in Asia?

An empirical study on cum-cum and cum-ex transactions in Asian markets

Rasmus Formo & Emi Mataev

Supervisor: Evelina Gavrilova-Zoutman

Master of Science in Economics and Business Administration

Major: Business Analysis and Performance Management, Financial Economics

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Abstract

This thesis investigates whether dividend arbitrage strategies are present in Asian markets. The term refers to trading schemes where investors collude to exploit loopholes related to dividend withholding taxes. We focus on two variations of these strategies, known as cum-cum and cum-ex transactions, which have caused substantial tax losses in Europe. Our sample consists of the ten largest stock exchanges in Asia, spread across a total of nine countries. We conduct a review of dividend taxation in these countries and determine that the tax laws in four of them provide incentives for investors to engage in dividend arbitrage strategies.

We use an event study methodology to analyse whether abnormalities in share turnover and short sales occur around ex-dividend dates for the 25 largest companies on each stock exchange during the period from 2012 to 2022. Our findings indicate that dividend arbitrage strategies are mostly absent in Asian markets. However, we find indications that they may be present in Taiwan and Japan. For Taiwan, we find that share turnover increases by 48% immediately before the ex-dividend date. Similarly, we find that short selling in Japan increases by 72.5%, but the evidence is inconsistent on a yearly basis.

In contrast to that of Europe, it appears that legislations in most Asian countries are effective in preventing exploitation of dividend withholding taxes. Nonetheless, our findings suggest that Taiwan and Japan might be an exception.

Keywords – Dividend Arbitrage Strategies, Cum-cum and Cum-ex Transactions, Tax Refunds, Withholding Taxes, Ex-dividend Date

Acknowledgements

This thesis marks the completion of our Master of Science in Economics and Business administration at the Norwegian School of Economics (NHH). Through the writing of this thesis, we have gained valuable insight into the field of academic research. Although challenging, the process proved to be an exciting endeavour.

We would like to express our gratitude to our supervisor, Evelina Gavrilova-Zoutman, who introduced us to the topic of dividend arbitrage strategies. We are especially grateful for her invaluable guidance and constructive feedback along the way. We would also like to thank our family and friends for their continued support and encouragement during this process.

Norwegian School of Economics

Bergen, December 2022

Rasmus Formo

Emi Mataev

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1. Introduction

This thesis explores whether trading strategies that exploit the use of dividend withholding taxes (DWTs) may be present in Asian markets. In Europe, so-called *cum-cum* and *cum-ex* transactions have been estimated to cause tax losses upwards of 145 billion euros during the period of 2000 to 2020 (Correctiv, 2021a). Our analysis of share turnover and short sales in relation to dividend payments indicate that unlike in Europe, these strategies are not a widespread problem in Asia.

The intention of levying withholding taxes is to ensure that some minimum of tax accrues to the country of source and can be regarded as a mean of combating tax evasion (Collier, 2020). As evident by the enormous tax losses, however, many jurisdictions have been unsuccessful in achieving the desired outcome. Loopholes related to differences in withholding rates and tax refunds have enabled savvy investors and financial institutions to profit at the expense of taxpayers. These various arrangements, wherein participants collude to exploit DWTs, have been labelled *dividend arbitrage strategies* (Financial Conduct Authority, 2017).

The purpose of cum-cum transactions is to redirect the dividend payment to a recipient who is subject to a more beneficial DWT-treatment (ESMA, 2020). By arranging for a temporary transfer of shares, the original owner can enjoy a lower taxation of dividends by routing the payment through a tax-beneficiary counterpart. The purpose of cum-ex transactions differs, as the objective of these arrangements is to generate multiple refunds for a tax which has been withheld only once, or never at all. This is achieved through a series of transfers designed to deceive the system by creating the appearance that multiple shareholders have paid the tax. Whereas each strategy may vary in terms of scope and complexity, a shared characteristic is that transfers take place in proximity to the ex-dividend date, resulting in abnormal increases in transaction volumes.

The scope of our analysis is limited to the ten largest exchanges in Asia, spread across a total of nine countries. For each country, a review of dividend taxation is conducted to determine whether investors on the correspondent exchanges have incentives to engage in dividend arbitrage strategies. Based on these predictions, we study the movement in share turnover and short sales for large, dividend-paying companies during the period of 2012 to 2022 by using data from Bloomberg and Compustat.

To examine whether dividend arbitrage strategies are present in our sample countries, we conduct an event study where the ex-dividend dates of securities acts as the event. We develop a regression model that compares the average transaction volumes in a 31-day window centred around the ex-dividend date to that of days outside the window. To isolate the effect of dividend arbitrage strategies, we exclude all events where *dividend reinvestment plans* (DRIPs) are present as they may generate similar variation (Ang et al., 2019).

Our analysis mainly consists of two parts. First, we use statistical evidence to access the presence of abnormal transaction volumes in the days leading up to the ex-dividend date for all stock exchanges in our sample. In line with the findings of previous literature, we expect to observe abnormal increases 1 or 2 days before the ex-dividend day in countries where we find incentives for dividend arbitrage strategies. Second, we use graphical evidence to analyse the time pattern of abnormal transaction volumes during the 31-day event window. Based on the characteristic pattern of dividend arbitrage strategies, we expect abnormalities found in the first part to occur as distinct spikes compared to the overall development in the window.

Overall, our study finds that dividend arbitrage strategies are mostly absent in Asian markets. Although somewhat inconsistent with our expectations, as we determine that incentives are present in four out of nine countries, it appears that legislations in Asia are effective in preventing the exploitation of DWTs. Nonetheless, our findings in Taiwan and Japan deviate from the norm. For Taiwan, we find a spike in share turnover on the day prior to and on the ex-dividend date across several years. For Japan, we find a spike in short sales on the day before the ex-dividend date, although the evidence is inconsistent on a yearly basis. In sum, our findings suggests that dividend arbitrage strategies may be present in two out of the nine Asian countries included in our sample.

The remainder of this thesis proceeds as follows. Section 2 reviews related literature, provides an institutional background on DWT, trading strategies related to dividends, and examines country-specific dividend tax regimes. Section 3 describes the data and presents descriptive statistics. Section 4 develops the empirical methodology. Section 5 presents the results and Section 6 concludes.

2. Theory

2.1 Literature Review

Early evidence of dividend arbitrage strategies in Europe is provided by McDonald (2001) and Liljeblom (2001). Academic interest in the subject was renewed following the investigative report published by Correctiv (2018), which revealed the enormous tax losses inflicted upon European governments by cum-cum and cum-ex transactions. In recent years, a series of studies have examined the presence of these strategies in western markets.

Buettner et al. (2020) provide an initial study on non-compliance of withholding taxes by studying the effect of a German reform targeted towards cum-ex trades in 2012, where they document a significant reduction in abnormal spikes in subsequent periods. Dixon et al. (2021) examines the U.S. stock market during the period of 2009 to 2016 and finds abnormal increases in securities lending which they attribute to dividend arbitrage strategies.

Casi et al. (2022) combines these approaches by examining both share turnover and securities lending across several Nordic countries during the period of 2010 to 2019. They find abnormalities around the dividend dates similar to that of Buettner et al. (2020) and Dixon et al. (2021), and further document that it disappears in Denmark following a targeted reform, whereas abnormalities continue to be prevalent in other Nordic countries.

Laturnus et al. (2022) examine the use of single stock futures (SSF) to structure cum-cum and cum-ex transactions and document a spillover effect into other countries following tax reforms. They further find that participants in dividend arbitrage strategies distribute the tax savings through SSF mispricing. Finally, Wagner and Wei (2022) contribute by providing a broader overview of cum-ex transactions in Europe.

To the best of our knowledge, no equivalent studies have been conducted in other regions. Our main contribution to the existing literature is thus to provide a preliminary review of the presence of these strategies in Asian markets by examining share turnover and short sales. Furthermore, we contribute to the literature on tax reforms by conducting an event study on India to examine whether the implementation of a dividend withholding tax in 2020 affected share turnover in proximity to the ex-dividend date.

2.2 Institutional Setting

2.2.1 Dividend Withholding Tax

Where a dividend withholding tax (DWT) is levied, tax is withheld from the dividend payment and remitted to the tax authorities by the dividend-paying company or the custodian bank of the shareholder (Collier, 2020). This ensures immediate collection of tax on dividends, thereby combating tax evasion. The applicable rate typically differs between shareholders of the same company, as it is often contingent on individual characteristics such as ownership percentage, holding period, and country of residence.

The process of withholding the correct amount of tax is not straightforward as rates vary across investors (Institute for Fiscal Studies, 2010). Tax authorities may therefore either seek to apply accurate liability at source by providing withholding agents with detailed instructions or rely on adjusting inaccuracies in the final tax return of the recipients. Hence, any withheld tax may still be of value to the shareholders if they are granted a tax certificate that entitles them to a correspondent tax credit, reimbursement, or both (Collier, 2020). For domestic shareholders, withholding tax may be considered a prepayment of income tax on dividends, for which credit is granted to offset the final tax liability. Alternatively, if the recipient is exempt from taxation, as is often the case for pension funds, any withheld tax may be reimbursed. For foreign shareholders, withholding taxes constitutes an issue of double taxation as they are often also liable to pay tax on foreign-sourced income to their residential tax authorities.

To facilitate for international trade and movement of capital, foreign shareholders are thus often relieved of double taxation through bilateral tax treaties (OECD, 2017). Most treaties are based on the OECD Model Tax Convention (Arnold, n.d.), wherein relief is granted through reduced withholding tax rates at source, and through exemption or credit by tax authorities in their country of residence[1] (OECD, 2017). Hence, bilateral treaties "effectively create a single taxation regime" (Reverre, 2001, p. 79) to reduce the tax burden on cross-border investments.

[1] In accordance with the model, contracting states may choose either exemption or credit, where the fundamental difference is that the former is income-oriented whereas the latter is tax-oriented (OECD, 2017). Furthermore, they may subsequently choose whether the full or partial income (tax) shall be exempt (credited).

In practice, however, the process of receiving the appropriate tax treatment is often not frictionless for foreign investors. Dependent on the jurisdiction, extensive documentation may be required to receive dividends net of a reduced treaty-rate[2]. Consequently, if such requirements are not fulfilled beforehand, tax is typically withheld at the non-treaty rate[3]. The relief from the domestic tax authorities of the shareholder, however, remains limited to the treaty rate, which can result in an overpayment of withholding tax that the individual investor must reclaim from foreign tax authorities (Jacob & Todtenhaupt, 2022). The process of filing such reclaims involve high compliance costs, which may discourage investors from doing so.

2.2.2 Components of a Dividend Payment

This section provides an overview of the components of a dividend payment and relevant market functionalities to provide a foundation for our discussion on dividend arbitrage strategies. A timeline that summarizes the components is provided in Figure 1 below, followed by a more detailed explanation of the process.

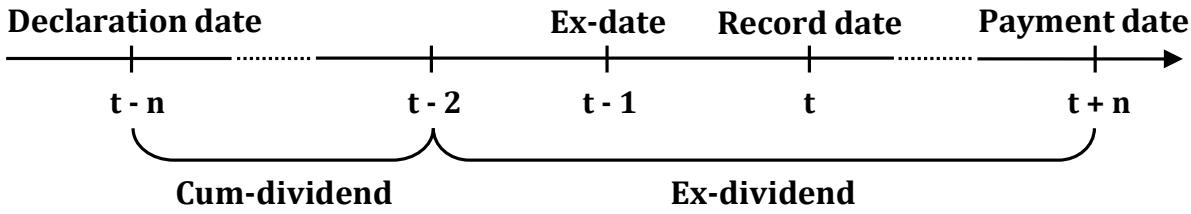


Figure 1: Timeline of the components of a dividend payment in a T+2 settlement cycle.
Source: Own contribution

On the *declaration date*, the board of a company announces to the public that a dividend payment has been authorised and shall be made at a future *payment date* (Berk & DeMarzo, 2020). To be eligible to receive dividends on this date, however, an investor must be included in the shareholder register on the preliminary *record date*. Dependent on the settlement cycle of the market, an investor may need to purchase shares some business days prior to the record date for the trade to be settled in time for the registration of shareholders (Kagan, 2020; U.S.

[2] E.g., To receive a reduced withholding tax at source on future dividends from Norwegian companies through a treaty, The Norwegian Tax Administration (2022) requires either a decision letter or pre-approval of the reduction, as well as a certificate of residence and a confirmation that the shareholder is the final dividend recipient. This process may take up to 8 weeks.

[3] For example, in Japan, an "Application Form for Income Tax Convention" must be submitted prior to the payment to be granted their eligible rate. If not submitted in time, tax will instead be withheld at the rate prescribed in Japanese laws (National Tax Agency Japan, n.d.).

Securities and Exchange Comission, 2022). The date on which buyers will no longer be entitled to receive dividends due to settlement delay is known as the *ex-date*. As most financial markets currently employ a T+2 settlement cycle, the ex-date typically falls on the business day prior to the record date[4]. Leading up to the ex-date, shares are said to be traded *cum-dividend*, meaning that the transfer of shares include the rights to the dividend payment (Collier, 2020). Similarly, trades occurring on or after the ex-date are said to be *ex-dividend* as the right to a dividend payment remains with the seller.

The same terms apply to security lending agreements, wherein shares are transferred either cum- or ex-dividend to the borrower. However, as the transfer of borrowed shares is generally subject to a shorter settlement cycle, this enables shares to be transferred cum-dividend as late as on the record day itself (Collier, 2020). Nonetheless, the *economic ownership* of shares is not transferred under such agreements, requiring that dividends received by the borrower of cum-dividend shares shall be passed along to the lender as so-called *manufactured dividends* (Feinberg, 2003). Dependent on the jurisdiction, manufactured dividends may be treated differently than dividend income for tax purposes (Casi et al., 2022).

2.2.3 Dividend Reinvestment Plans (DRIPs)

When a firm provide its investors with a dividend reinvestment plan (DRIP), shareholders are given the opportunity to reinvest their cash dividend into shares (Bierman, 1997). A firm can offer a DRIP through either issuing new shares or through buying shares directly from the market. When new shares are offered through DRIPs, shareholders are typically able to purchase them at a discount (Casi et al, 2022). Ang et al. (2019) finds that this incentivises arbitrageurs to borrow shares around the dividend dates to participate in the discounted offering. They further document that in Australia, spikes in lending appears only in relation to DRIP-events. Furthermore, Berkman & Koch (2017) find that firms who offer DRIPs tend to have larger market capitalizations[5]. As our sample consist s of large market cap firms, the presence of DRIP-events and related arbitrage activities is a potential source of variation in our dependent variables which we account for in our analysis.

[4] For information about the settlement cycles in specific countries, see the overview provided by Clearstream (2022).

[5] Berkman & Koch (2017) find that in the U.S., 43% of dividend-paying firms have company-sponsored DRIPs and that these firms constitute 75% of the total market capitalization of dividend-paying firms.

2.2.4 Dividend Stripping and Dividend Capture

This section discusses the incentives for investors to temporarily dispose of or obtain share ownership in proximity to the ex-date, respectively known as *dividend stripping* and *dividend capture*. These concepts are of importance to the interpretation of our results, as they are related to the strategies within the scope of this thesis and is likely to generate relevant variation in the dependent variables. Consequently, since a distinction between the source of abnormalities cannot be made with certainty, an understanding of these concepts is required.

Empirical research has shown that the price drop in stocks on the ex-date is significantly lower than the dividend amount. In their influential study, Elton & Gruber (1970) developed the "tax-effect hypothesis" and documented that the relative price drop tends to be lower for stocks paying relatively higher dividends. Whitworth & Ramesh (2010) further documented that this relationship strengthens as the gap between taxes on dividends and capital gains increase. These findings are consistent with the *clientele effect* proposed by Miller & Modigliani (1961), stating that investors who are subject to low taxation prefer high yield stocks, and vice-versa.

The forementioned relationship between price drops and the dividend yield indicates a preference for receiving capital gains in lieu of dividend income for investors who are subject to a relatively higher taxation of dividends (Elton & Gruber, 1970; Whitworth & Rao, 2010). Investors can act upon this preference by engaging in *dividend stripping*, which is "the practice of selling shares shortly prior to dividend payments and buying them again afterwards" (Cambridge Dictionary, n.d.). While the terms are often used interchangeably, *dividend capture* refers to the reverse scenario, where shares are purchased shortly prior to the dividend payment and subsequently disposed of (Henry & Koski, 2016). The latter strategy is commonly used by short-term traders seeking to profit from insufficient price drops on the ex-date. Lakonishok & Vermaelen (1986) further suggests that the presence of these short-term traders "drives stock prices above their fundamental value, thus providing a profitable trading opportunity for short sellers" (Blau et al., 2011, p. 628).

Consequently, the forementioned strategies could generate relevant variation in transaction volumes, short interest, and short-sell volume around the ex-dividend date. Discretion is therefore required when interpreting the source of abnormalities in our dependent variables, as the resulting variation from these strategies are not distinct from those stemming from related dividend arbitrage strategies.

2.2.5 Dividend Arbitrage Strategies

Dividend arbitrage strategies refer to trading schemes that exploits different DWT-treatments of shareholders and can be considered a variation of dividend stripping and capturing (ESMA, 2020; Financial Conduct Authority, 2017; Schaffelhuber, 2021). *Cum-cum* and *cum-ex* transactions are specific forms of dividend arbitrage strategies, wherein participants of the respective schemes collude to avoid taxation or to generate reimbursements for withholding tax which has not been paid (Laturnus et al., 2022). During the period of 2000 to 2020, these strategies are estimated to have inflicted tax losses upwards of 150 billion euros onto tax authorities, primarily in Europe (Correctiv, 2021a).

Cum-cum transactions

In a *cum-cum transaction*, shares are temporarily transferred to a counterparty subject to a more beneficial DWT-treatment to avoid taxation (ESMA, 2020). The term generally refers to arrangements between domestic and foreign participants[6], but incentives to engage in these schemes may arise wherever a lower taxation can be achieved through a change of ownership. The scheme may be structured in various ways, such as through securities lending, repurchase agreements, futures, and spot transactions (Allen & Overy, 2021; Laturnus et al. 2022). Nonetheless, the predominant structure has been securities lending (Casi et al. 2022).

The initial transfer occurs cum-dividend shortly prior to the ex-date or record date, depending on whether a lending agreement is used, ensuring that settlement is finalized prior to the registration of shareholders (ESMA, 2020). Shortly after the shares begin to trade ex-dividend, they are returned to the original owner, whereas the dividends now accrue to the tax-beneficial recipient. The dividends are subsequently returned after the payment date, and the tax savings generated from the temporary transfer is shared between the colluding parties (Hoffman, n.d.). In Figure 2, an illustration of a cum-cum transaction structured as a share loan is provided.

[6] Several sources define cum-cum transactions as occurring between resident and non-resident investors, see e.g., (Spengel, 2021; Casi et al., 2022; Laturnus et al., 2022). The definition provided by ESMA (2020) is broader, wherein the source of differences is not strictly limited to those between residents and non-residents.

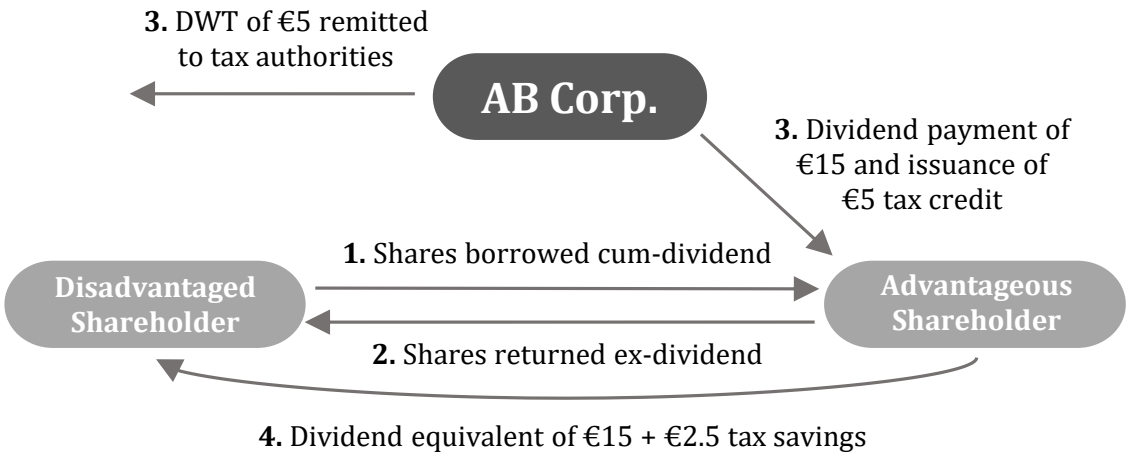


Figure 2: Simplified illustration of a cum-cum transaction using a lending agreement. (1) The disadvantaged shareholder lends shares cum-dividend to the advantageous shareholder. (2) The shares are returned to the original owner shortly after the record date. (3) The advantageous shareholder receives a dividend payment of €15 net of a DWT of €5 which is remitted to the tax authorities. Importantly, the advantageous shareholder also receives a tax credit of €5 which the original owner is not entitled to. (4) The original owner receives the dividend payment of €15 and the colluding parties share the tax savings as both profit €2.5 from participating in the scheme. Source: Own contribution inspired by Collier *(2020)*

In markets where investors have incentives to engage in cum-cum transactions, we would expect to observe an increase in share turnover and securities lending in proximity to the dividend dates. However, our data on securities lending is limited to short sales. Therefore, to the extent that cum-cum transactions structured through securities lending do not involve a short sale, they will not generate variation in our dependent variables.

Furthermore, the interpretation of variation in our variables require discretion, as we cannot directly infer the source of potential abnormalities. It is particularly important to acknowledge that cum-cum transactions are "in some respects indistinguishable from dividend stripping activities" (Banham, 2020). As dividend stripping and capture concerns the sale and purchase of securities leading up to the ex-date[7], the effect on share turnover would be identical to that of cum-cum transactions structured through e.g., repurchase agreements. Whereas Laturnus et al. (2022) here makes a distinction regarding the collusion between participants, such a distinction cannot be made in our data[8].

[7] Per Cambridge Disctionary (n.d.). Furthermore, Dixon et al. (2021) use the same distinction by attributing abnormalities in security lending to dividend arbitrage, while stating that dividend capture occurs "three and two days before the record date" due to the settlement delay of stock transactions.

[8] Laturnus et al. (2022) study the use of single stock futures to structure dividend arbitrage strategies. They are able to infer the collusion of investors by documenting misprising of these instruments as a mean of distributing the tax savings.

Cum-ex transactions

In a *cum-ex transaction*, shares are strategically transferred around the dividend dates with the intention of generating multiple certificates for tax which has been paid only once or never at all (ESMA, 2020; Correctiv, 2021b). These arrangements have been found to exploit an anomaly in the clearance and settlement process related to shares that are sold short cum-dividend, but borrowed, and subsequently delivered, ex-dividend (Collier, 2021).

The *dividend adjustment mechanism* intends to redirect the dividend payment to the entitled recipient (Collier, 2020). This may be necessary in the clearing and settlement process if a buyer has agreed to purchase cum-dividend shares *immediately* prior to the ex-date, but where delayed settlement causes the seller to remain the registered owner at the time of the record date. Thereby, the dividend payment, which by law belongs to the buyer, incorrectly accrues to the seller. In such instances, the system in most markets is configured to redirect the net dividend to the buyer by charging the seller, in addition to issuing a corresponding tax certificate to the buyer. An illustration of this mechanism is provided in Figure 3.

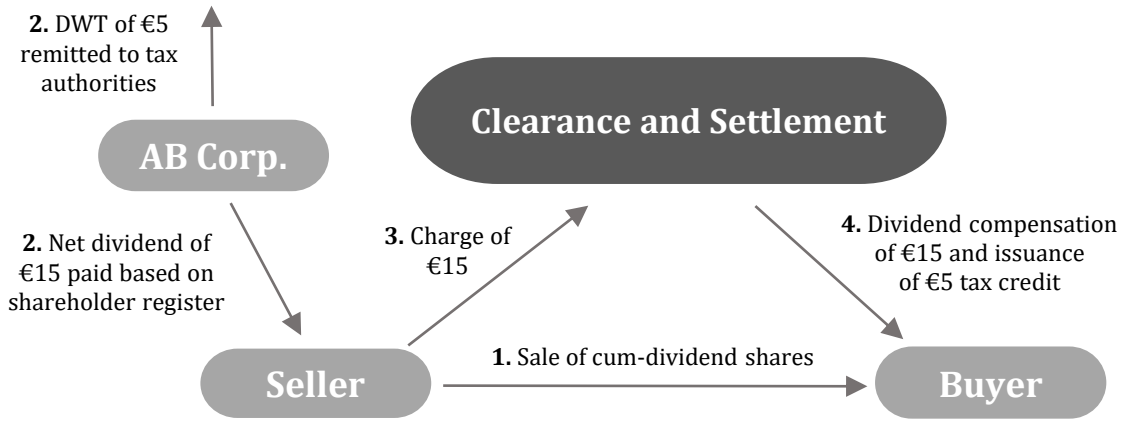


Figure 3: Illustration of the dividend adjustment mechanism. *Notes:* (1) The buyer agrees to purchase shares cum-dividend immediately prior to the ex-dividend date. (2) Due to a delay in the settlement of the transaction, the seller remains in the shareholder register on the record date and therefore receives a net dividend of €15 while €5 is remitted to the tax authorities. (3) As the buyer by law is entitled to the dividend payment, the clearance and settlement system charge the seller for the €15 received in dividends. (4) The buyer receives a dividend compensation of €15 and a tax credit of €5 for the DWT. Source: Own contribution inspired by Collier *(2020)*

The cum-ex scheme exploits instances where the adjustment mechanism is indifferent between "whether a seller is selling shares short or selling shares it already owns" (Collier, 2020, p. 32). Since settlement of borrowed shares may occur at a shorter delay than share purchases, it is possible to conduct a short-sale cum-dividend and subsequently borrow and deliver the

shares ex-dividend[9] (Collier, 2020). In this case, the lender holds the shares over the record date and receives the dividend payment and a corresponding tax certificate. However, when the short seller borrows these shares ex-dividend for deliverance to the buyer, an anomaly occurs within the dividend adjustment mechanism. Since the buyer agreed to a purchase of cum-dividend shares, the clearance and settlement system will compensate the buyer for the dividend payment and issue a *second* tax certificate for the withholding tax. Hence, the system fails to recognize that the dividend payment accrued to the lender, and falsely assumes that tax was withheld when dividends were paid to the short seller – a payment which never occurred.

The cum-ex scheme may be structured in various ways with regard to e.g., the instruments used, the number of participants involved, and the number of generated certificates (ESMA, 2020). An illustration of the basic cum-ex scheme described above is provided in Figure 4.

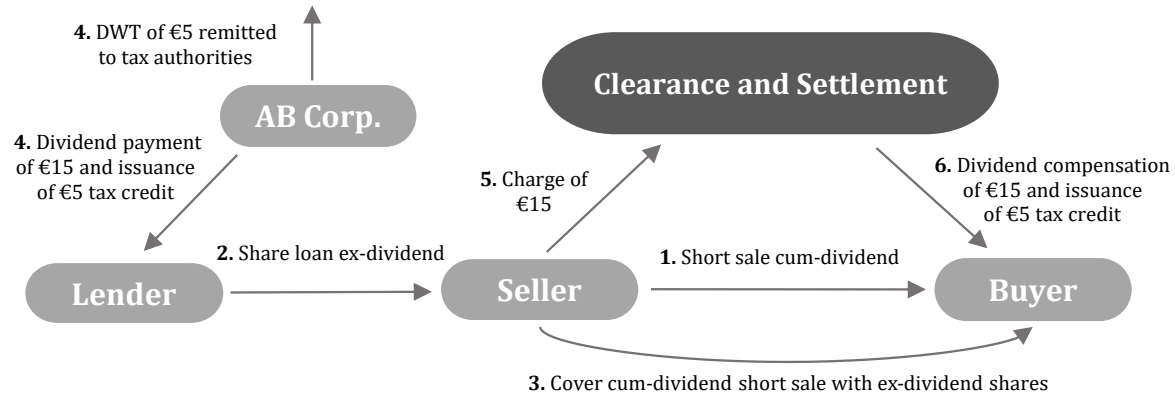


Figure 4: Simplified illustration of a cum-ex transactions using a short sale. (1) The buyer agrees to purchase shares cum-dividend immediately prior to the ex-dividend date. Since the seller does not own the shares, the seller has entered into a short position. Importantly, as settlement of borrowed shares can be done under a short delay than share purchases, the seller is able to (2) borrow shares ex-dividend and (3) cover the short sale of cum-dividend shares by delivering ex-dividend shares to the buyer. (4) The lender receives a dividend payment of €15 and a €5 tax credit, while a DWT of €5 is remitted to the tax authorities. (5) As the buyer by law is entitled to the dividend payment, the clearance and settlement system charges the seller for the dividend of €15. (6) The buyer rightfully receives the dividend compensation of €15, but an anomaly occurs when a second tax credit of €5 is issued, as the clearance and settlement system falsely assume that the DWT was paid by the seller. Source: Own contribution inspired by Collier *(2020)*

[9] Note that this is not equivalent to the illegal practice of *naked short selling*, i.e., selling shares which have not been borrowed. The reason being that it is typically sufficient to arrange for shares to be borrowed or to receive a confirmation of shares being available for borrowing before making a short sale. See e.g., (SEC, 2015) and (CLSA, 2022, p. 4)

In markets where investors engage in cum-ex transactions, we expect to observe abnormalities in the short interest and short sell volume around the ex-dividend date. More specifically, shares will be sold short cum-dividend shortly prior to the ex-date, generating a spike in short sell volume and a correspondent increase in the short interest reflecting the open short positions. After shares begin to trade ex-dividend, short sellers will close their positions by repurchasing shares in the market (Buettner et al, 2020), causing the short interest to drop. These transactions will further result in an increased share turnover around the ex-dividend date, but expectedly at a lesser magnitude as short selling only constitutes a portion of overall trades. Furthermore, whereas the short sale structure is "the most common form of cum-ex transactions" (Casi et al, 2022, p. 11), the scheme may also be structured in ways which would only generate variation in share turnover (Wigan, 2019).

While there is a clear distinction between the *purpose* of cum-ex transactions compared to that of cum-cum and dividend stripping, i.e., generating multiple tax certificates versus avoiding tax, the resulting variation in our variables is nonetheless clustered around the same dates. Hence, the ambiguity of abnormalities in our dependent variables is further amplified.

2.2.6 Dividend Arbitrage Incentives in Sample Countries

In this section, we examine the tax regimes in our sample countries to determine whether investors have incentives to engage in dividend arbitrage strategies. For each country, a review of the taxation of dividends and relevant legislations is conducted to determine the feasibility of the schemes. Furthermore, as securities lending and short sales are commonly used to structure these schemes, we specifically address related regulations where applicable. A summary of the assessments of incentives is provided in Table 1.

First, we emphasize that we are unable to confirm or disregard whether dividend arbitrage strategies may be possible in countries that levy DWTs. These strategies can be highly complex and requires "expertise in finance, international and national tax law, legal compliance, and back-office functions" (Wigan, 2019, p. 16). Consequently, there is an information barrier when determining whether these transactions are feasible in each jurisdiction. E.g., we are unable to determine whether the dividend adjustment mechanism in a market distinguishes between owners and borrowers of shares, and thereby whether that mechanism is prone to exploitation by cum-ex transactions.

Table 1: Summary assessment of dividend arbitrage incentives in sample countries

	HKG	SGP	MYS	THA	TWN	JPN	KOR	CHN	IND
DWT	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
DWT rate (%)									
Domestic				0 – 10	0	20	0	0	10
Foreign				10	21	15 – 20	22	10	10
Foreign (treaty)				5 – 10	5 – 15	0 – 15	5 – 22	0 – 10	5 – 10
Credit or refund									
Domestic				Yes	No	Yes	No	No	Yes
Foreign				No	Yes	Yes	Yes	Yes	Yes
Incentives for									
Cum-cum	No	No	No	Likely	Likely	Likely	Unlikely	Unlikely	Likely
Cum-ex	No	No	No	Unlikely	Likely	Likely	Unlikely	Unlikely	Likely

Notes: This table shows a summary review of dividend withholding-tax rates, the availability of tax credits or refunds, and whether we find incentives for dividend arbitrage schemes in the respective countries. The reported DWT rates represents the interval of rates available to investors.

Nonetheless, there are some characteristics of dividend taxation in our sample countries from which we can infer whether incentives are present. First, as cum-cum transactions exploit differences in DWT rates amongst shareholders, larger deviations in tax rates will intuitively constitute greater incentives. This is of particular importance for investors located in tax havens, as they are typically subject to the highest withholding rate due to their limited tax treaty network (Collier, 2020). Second, as cum-ex transactions seek to generate mutliple credits or refunds for withholding taxes, the availability of such compensation is a necessity.

Hong Kong, Singapore, and Malaysia

Hong Kong, Singapore, and Malaysia do not levy a DWT (EY, 2022). Consequently, there are no incentives for investors to engage in dividend arbitrage in these countries and we do not expect to observe related abnormalities in proximity to the ex-date.

Japan

In Japan, both foreign and resident shareholders are generally subject to a DWT of 20 percent, but foreign minority shareholders are entitled to a rate of 15 percent on publicly traded shares (PwC, 2022a). Foreign shareholders may further be granted reduced treaty rates in the range of nil to 15 percent, whereas domestic companies typically receive a credit or refund for the full amount of withheld tax (EY, 2021a; PwC, 2022a). Foreign investors may also apply for reimbursements for overpaid withholding taxes if they were not granted appropriate reduction

at source (National Tax Agency Japan, n.d.). We find the differences in withholding rates and the availability of credit and reimbursements to constitute incentives for investors to engage in dividend arbitrage strategies and expect to observe increased activity around the ex-date.

Interestingly, in response to an ongoing investigation by the Tokyo Investigative Newsroom, both accountants and members of financial authorities in Japan stated that cum-ex transactions are "not possible" (Giseburt et al., 2021). These experts stated that since tax credits in Japan are granted based on the shareholder record of the company, multiple credits cannot be issued for the same tax. However, a former cum-ex trader was also interviewed, asserting that "there was a definite arbitrage trade [in Japan]" (Giseburt et al., 2021).

Thailand

Thailand levies a DWT rate of 10 percent on almost all shareholders, with a few important exceptions (PwC, 2022b). First, resident companies who are (1) listed on the Stock Exchange of Thailand or (2) hold at least 25 percent of the voting rights in the dividend-paying company, are exempt from DWT. Second, Taiwanese companies who hold at least 25 percent of the capital in the dividend-paying company, are subject to a reduced rate of 5 percent. We do not find these reductions to be subject to any further requirements, and thus find incentives for cum-cum transactions which we expect will generate variation leading up to the ex-date.

Furthermore, while our data for Thailand is limited to share turnover, we note that security lending fees are be subject to the same or higher rate of withholding tax as dividends[10] (Equilend, 2021; PwC, 2022b). Hence, this diminishes some of the incentives to structure these transactions by way of securities lending, as tax exempt lending fees have provided a mean of distributing the tax savings in other markets (see Casi et al., 2022).

Regarding the availability of credit, domestic companies are subject to CIT on dividends if shares are not held for three months both before and after the dividend payment (The Revenue Department of Thailand, 2020). DWT is thus considered a payment on account which can be credited towards the final tax liability, but it is only granted upon providing evidence that the tax was in fact withheld (KPMG, 2018). Additionally, the reduced rates priorly discussed are

[10] The non-treaty rate on such fees is 15 percent. For those encompassed by a treaty, financial institutions are generally subject to a rate of 10 percent, whereas other shareholders are subject to a rate of 15 percent. An exception exists where a financial institution is wholly owned by the contracting state, authority, etc., where a rate of nil percent may apply (PwC, 2022b)

granted at source and not through reimbursements (The Revenue Department of Thailand, n.d.). Furthermore, as practically all foreign shareholders are entitled to the same rate independent of treaties, there are no overpayments to seek a refund for. Hence, the generation of multiple tax credits through cum-ex schemes appears unfeasible and is not expected to generate variation in the transaction volume. This is further substantiated by the requirement that shares must be borrowed prior to a short sale being made and that only specific securities are eligible for short selling[11] (Stock Exchange of Thailand, 2018).

Taiwan

Taiwan only levies DWT on foreign shareholders, whereas dividends are not considered taxable income for resident corporate shareholders (Deloitte, 2022a). Foreign shareholders are generally subject to a rate of 21 percent but may be eligible to a reduced treaty rate in the range of 5 to 15 percent (PwC, 2022c). We find that the absence of withholding taxes for domestic shareholders constitute strong incentives for cum-cum transactions.

We further find that the taxation of manufactured dividends in Taiwan to provides a strong incentive for structuring cum-cum transactions through securities lending involving a short sale. When a manufactured dividend is paid in Taiwan, it is regarded as *dividend income* for the lender if the borrower *holds* the shares over the record date but regarded as *capital gains* if the borrower *sells* the shares prior to the record date (TWSE, 2022). While foreign investors are subject to DWT on dividend income, they are exempt from taxation on capital gains (Equilend, 2021; Deloitte, 2022a). Consequently, we expect cum-cum transactions to generate abnormal variation in both share turnover and short interest.

However, we note that short selling is somewhat restricted in Taiwan, as the number of trades is subject to limits related to both average trading volume and the number of shares outstanding (Equilend, 2021). Notably, during a three-month period beginning on March 19th of 2020, the daily limit for short sales was reduced from 30 to 10 percent of the monthly average trading volume in response to turmoil from the pandemic (Equilend, 2021). These limitations thus provide a cap for the expected abnormalities in our short interest variable.

[11] We note that all stocks in our sample are eligible for short selling as per the overview provided by The Stock Exchange of Thailand on https://classic.set.or.th/set/shortsales.do?language=en&country=US

The deviation between treaty and non-treaty rates for foreign shareholders is relatively large in Taiwan. Since those who have not been granted pre-approval receives dividends net of the non-treaty rate, foreigners may seek refund at source for these overpayments (EY, 2021b). As we are unable to determine the specific requirements for being granted such a refund, we emphasize that this may potentially be exploited through cum-ex transactions. Furthermore, The National Tax Bureau of Taipei implemented a new practice in 2021 that made accessing such refunds easier for foreign institutional investors who recurringly seek them (EY, 2021b). Consequently, we cannot disregard that incentives for cum-ex transactions are present, which substantiates our expectations for abnormalities in the dependent variables.

South Korea

South Korea levies DWT on foreign shareholders but does not impose such a tax on domestic companies (Deloitte, 2022b). For foreign shareholders, the non-treaty rate is 20 percent while the treaty rates generally range from 5 to 15 percent[12] (PwC, 2022d). These differences in DWT-treatments would presumably constitute incentives for dividend arbitrage strategies.

A unique characteristic of the Korean market, however, is that "dividends may be paid with little or no advanced indication of the amount to be paid" (Nasdaq, 2021, p. 1). Furthermore, the dividend payments in Korea have historically been relatively small (Lee & Lee, 2019). Hence, as the potential tax benefits from dividend arbitrage strategies are both uncertain and relatively small, we intuitively find this to reduce incentives for such strategies.

Furthermore, the process of obtaining tax benefits in Korea is generally subject to stringent substance requirements (Taxand, 2021). Tax authorities have "denied beneficial ownership with almost no exception" (Choi et al., 2022) to intermediate recipients of income. Authorities have specifically emphasized that there cannot be a "legal or contractual obligation to further transfer the income" (Choi et al., 2022) if tax benefits are to be granted. We find the active stance from tax authorities on these issues to be a significant hurdle for cum-cum transactions. Consequently, we do not expect these schemes to generate variation in our dependent variables leading up to the ex-date.

[12] An exemption from this range exists for Mexican residents, who are exempt from taxation contingent on an ownership percentage of 10 percent (PwC, 2022d; Taxand, 2021).

With regard to the cum-ex transactions, Article 52 of the Framework Act on National Taxes states that refund may be granted for withholding taxes which have been overpaid (Korea Legislation Research Institute, n.d.). Hence, we find that foreign investors may potentially use cum-ex transactions to generate multiple reimbursements for overpaid withholding taxes. However, while all stocks are eligible for short selling in Korea[13], the practice has become scrutinized in recent years. The Financial Supervisory Service have instigated a crackdown on short sales to "root out illegal and unfair trades" (Lee Y. , 2022). Among the new initiatives are extensive requirements for storing documentation on shares borrowed for short sale purposes, which came into effect in March 2021 (Young-sil, 2021). Furthermore, all short selling was banned during the period March 2020 to May 2021 (Yoo, 2022). In sum, we find that while we cannot disregard the presence of cum-ex transactions, the regulatory scrutiny in recent years particularly restricts the use of short sales to structure these transactions.

China

China levies DWT on foreign shareholders, whereas domestic companies are not subject to tax at source (PwC, 2022e). The non-treaty rate for foreign shareholders is 10 percent, while the treaty rates range between 0 to 10 percent. Furthermore, to promote foreign investment, a full refund for DWT on dividends which are reinvested in China may be granted[14] (Dwyer, 2018). While these factors facilitate for dividend arbitrage strategies, we find several restrictions which makes their presence unlikely.

First, in line with Article 112 of the *Securities Law of the People's Republic of China*, Chinese stock market regulators perform real-time monitoring and surveillance of abnormal trading on stock exchanges (NPC, 2019). Regulators have suspended institutional trading accounts, issued warnings, and suspended individual securities in reaction to abnormal trading patterns (Reuters, 2016; Reuters, 2017; SZSE, 2021). We find this to disincentivize the use of dividend arbitrage schemes on a larger scale as the resulting abnormalities would likely prompt Chinese regulators to intervene. Consequently, we do not expect to observe it in our data.

[13] An exception exists for a very limited number of stocks of "national importance", which are subject to foreign ownership limits and may not be lent between resident and non-resident parties (Equilend, 2021). Per 21.07.2022, 33 stocks in Korea had such limitations, intended to "restrict foreign ownership in major national infrastructure" (Smartkarma, 2022). Only one of these stocks were included in our sample.

[14] Note that the tax is only deferred. That is, if these investments are later recouped, the withholding tax will have to be repaid.

Second, foreign investors were unable to engage in securities lending and short selling prior to November 2020 (Equilend, 2021). The access remains restricted to certain qualified foreign investors and may also only be conducted through "approved onshore brokers" (Equilend, 2021, s. 15). Furthermore, China deviates from the standard "T+2" settlement cycle and requires transactions to be finalized intraday - "often within hours of execution" (Oellers, 2019). Intuitively, the opportunity to settle cum-dividend sales with ex-dividend shares is more restricted under a "T+0" settlement cycle. While unable to confirm this, we emphasize that the window of opportunity for cum-ex transactions is significantly smaller in China than that in countries where such schemes have been confirmed to exist. In conjunction with the restrictions on short sales and the intervention of regulators, we do thus not expect to observe any abnormalities in short sales related to the ex-date.

India

On the 1st of April 2020, India introduced the *Finance Act 2020* which abolished the dividend distribution tax (DDT) and reverted to a system consistent with that of other countries (EY, 2020). The inconsistency of the prior system was that while the DDT was essentially identical to a DWT, the tax was levied on the distributor of dividends, whereas dividends were technically exempt from taxation at the shareholder level (Corporate Services, 2020). Consequently, we find that there were no incentives for dividend arbitrage prior to the abolishment, as all shareholders were subject to the same treatment.

Under the new system, Indian companies are obliged to withhold tax at a rate of 10 percent on dividends paid to resident shareholders[15], and at a rate of 20 percent or the treaty rate on dividends paid to foreign shareholders (Income Tax Department India, n.d. A). The treaty rates vary greatly, ranging from 0 to 20 percent (EY, 2022). Furthermore, as resident shareholders are now subject to CIT on dividend income (Income Tax Department India, n.d. A), they are entitled to a credit for the amount deducted at source (Income Tax Department India, n.d. B). Consequently, we deem that the establishment of different DWT-treatments and the availability of credit that followed the abolishment of DTT is likely to have instigated incentives for investors to engage in dividend arbitrage in subsequent periods.

[15] Except for insurance companies, for whom no withholding tax shall be levied (Income Tax Department India, n.d. A). Furthermore, the rate for domestic recipients was temporary reduced to 7.5 percent during the period between the 14th of May 2020 and the 21st of March 2021 (EY, 2022).

Whereas our data is restricted to transaction volumes, borrowing of shares is only permitted in India when covering short sales (Equilend, 2021). Thus, to the extent that dividend arbitrage strategies may also be structured through security lending, they would nonetheless generate variation in the transaction volume. We conduct an event study for India to examine the effect of the tax-reform on transaction volumes. We expect to observe increased activity in proximity to the ex-date in the post-abolishment period, as we argue that the new system incentivizes investors to engage in dividend arbitrage strategies.

3. Data

This thesis examines the presence of dividend arbitrage strategies in the Asian region. Our analysis is limited to the ten largest stock exchanges by total market capitalization, spread across a total of nine countries. An overview of the stock exchanges and their respective market capitalization is provided in Table A.1. For each stock exchange, we then identify the 25 largest companies by market capitalization.

In our analysis, we examine trading volumes and short sales in proximity to the ex-dates. As the availability of short sale data differs between stock exchanges, we collect two types of data on short sales. Our variables of interest are (1) *transaction volume*, (2) *short sell volume*, and (3) *short interest as a percentage of equity float*.

3.1 Short Interest & Short Sell Volume

We gather data on short sales from Bloomberg. For China, Taiwan, and Japan, we gather short interest as a percentage of equity float (hereafter referred to as *short interest*) which records the number of open short positions relative to the equity float. For Japan, South Korea, Singapore, Malaysia, and Hong Kong, we gather short sell volume which records the number of *new* short sales. The data extends from 2012 to 2022, except for China where data is only available from 2018 to 2022. No data is available for India and Thailand.

Our unit of analysis is the stock. The main variable of interest is either short interest or short sell volume, dependent on the stock exchange. In addition, we observe the equity float and market capitalization of each stock. All variables are observed with a daily frequency.

3.2 Share Turnover

We gather data on trade volume in all sample countries from Compustat Global. In addition, we gather data on shares outstanding, closing prices, currencies, and ex-dividend dates. All variables are observed with a daily frequency. The data extends from 2012 to 2022. Our variable of interest is the daily *share turnover*, computed as the transaction volume over shares outstanding:

$$Share\ turnover_{it} = \frac{Transaction\ Volume_{it}}{Shares\ outstanding_{it}} \quad (1)$$

The share turnover reflects the number of shares traded as a percentage of the shares outstanding for stock *i* on date *t*. This provides a more relative measure than trading volume by taking into consideration differences in the number of outstanding shares for each security.

3.3 Data Management

We make several adjustments to all datasets gathered from Bloomberg and Compustat Global. First, the closing prices for securities listed on the same stock exchange in the Compustat data are denominated in different currencies. We gather daily USD exchange rates for all currencies in our data set from the Federal Reserve[16]. For each security, we then combine the data based on dates and denoted currencies to convert all closing prices to USD. We then compute the daily market capitalization for each security in USD by multiplying shares outstanding with closing prices.

Second, the data from Bloomberg does not contain ex-dividend dates while the data from Compustat does not contain equity floats. We thus merge the ex-dividend dates from Compustat with our Bloomberg data based on dates and security tickers. Similarly, we merge equity floats from Bloomberg with our Compustat data using the same identifiers.

Third, we eliminate any DRIP-events in our data that would generate variation in proximity to the ex-date. DRIP-events involve the issuance of new shares, which affects the equity float of a company. Thus, we exclude all dividend events in which the equity float changes within a 31-day period centred around the ex-dividend date. As a result, we can disregard the presence of DRIP in the interpretation of our results.

Finally, all our data has right-skewed distribution, wherein the short interest and short sell volume are also zero-inflated. Consequently, large outliers exist in the upper portion of the data that are non-representative of the sample population. To avoid distortions from outliers in our estimations, we adjust the data by winsorizing premiums at the upper 5% level. For share turnover, no zero values exist, and we thus avoid the issue by performing a log-transformation, achieving a normal distribution[17].

[16] Data is collected from: https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H10

[17] This is not possible for short interest and short sell volume due to the inflated amount of zeros

3.4 Descriptive Statistics

Table 2 provides descriptive statistics of the datasets for the ten Asian stock exchanges. All columns show the average dividend yield[18], the mean of the dependent variables in the event time [-3, 3], and the mean of the dependent variables outside the event window [-15, 15]. Standard deviations of means are provided in parenthesis. All values are denoted as percentage points. In addition, the table reports the number of events, with and without DRIP-events. The variables short interest and short sell volume are represented as a percentage of equity float, while share turnover is represented as a percentage of shares outstanding.

In general, the mean of the dependent variables is relatively similar both within and outside the event window. Effectively, these statistics indicate that abnormal trading activity seems to be absent around ex-dividend dates. The only country that stands out in this regard is the turnover rate in Taiwan (Column 3), where mean turnover in the event window is roughly 36% higher than that of the mean outside the event window. Furthermore, we observe no apparent correlation between the dividend yield and trading activity.

The amount of dividend events varies across each country. The exclusion of DRIP-events reduces the number of events by 60 percent on average. Notably, the number of events for short sell volume in Malaysia (Column 7) is reduced to only 11, which is likely to cause unreliable results in our analysis.

[18] Computed as the dividend divided by the closing price before the ex-date

	SHA (1)	SZH (2)	TWN (3)	JPN (4)	KOR (5)	SGP (6)	MYS (7)	HKG (8)	IND (9)	THA (10)
Dividend Yield (%)	3.23	2.25	3.63	1.15	1.34	2.10	1.20	1.90	1.01	5.31
	(3.59)	(1.72)	(2.02)	(0.77)	(1.10)	(1.58)	(1.01)	(1.68)	(4.43)	(5.14)
Short Interest										
Event	0.07	0.16	0.93	0.024						
	(0.08)	(0.19)	(0.79)	(0.03)						
Outside event	0.08	0.17	0.95	0.020						
	(0.09)	(0.19)	(0.96)	(0.03)						
Events excl. DRIP	51	41	72	142						
Events incl. DRIP	89	71	270	448						
Short Sell Volume										
Event				0.003	0.02	0.05	0.004	0.07		
				(0.003)	(0.02)	(0.04)	(0.004)	(0.05)		
Outside event				0.002	0.03	0.04	0.005	0.06		
				(0.003)	(0.03)	(0.04)	(0.004)	(0.05)		
Events excl. DRIP				73	52	128	11	130		
Events incl. DRIP				251	260	372	258	261		
Share Turnover										
Event	0.73	1.00	0.30	0.42	0.34	0.21	0.12	0.25	0.18	0.31
	(0.95)	(1.38)	(0.25)	(0.37)	(0.51)	(0.27)	(0.21)	(0.27)	(0.24)	(0.72)
Outside event	0.72	1.02	0.22	0.41	0.48	0.21	0.10	0.27	0.21	0.28
	(1.01)	(1.49)	(0.55)	(0.43)	(1.54)	(0.37)	(0.16)	(0.43)	(0.30)	(0.47)
Events excl. DRIP	97	86	69	290	55	168	360	115	134	264
Events incl. DRIP	253	202	256	468	262	399	602	249	287	386

Table 2: Descriptive Statistics

Notes: This table reports descriptive statistics of key variables and number of events. Columns 1-10 show the mean of the dependent variables and the number of events for each sample country. *Dividend Yield* shows the mean of the dividend yield of our observations. *Event* shows the mean of the dependent variable for event time [-3, 3], whereas *Outside event* shows the mean outside the event window [-15, 15]. These values are denoted as percentage points. The number of events is presented with and without DRIP-events. Short interest and short sell volume are represented as a percentage of equity float, while share turnover is represented as a percentage of shares outstanding. Standard deviations are in parenthesis.

4. Methodology

In this section, we present the research approach of our analysis. Subsection 4.1 briefly describes our main research question and hypothesis. Subsection 4.2 provides the econometric model applied in our analysis, whereas Subsection 4.3 describes model adjustments for the different dependent variables.

4.1 Research Question and Hypothesis

Dividend arbitrage strategies in Europe have been the subject of several recent studies. To our knowledge, no equivalent studies have been conducted on Asian markets. We aim to contribute to existing research by answering the following question:

Q: *Are transaction volumes in Asian markets indicative of dividend arbitrage strategies?*

To answer this question, we analyse transaction volumes in proximity to the ex-dividend date during the period of 2012 to 2022. In line with prior studies, the presence of abnormalities around these dates is interpreted as an indication of investors engaging in dividend arbitrage strategies. We therefore develop the following hypotheses for our analysis:

$\boldsymbol{H_1}$: *Transaction volumes increase around the ex-dividend date in markets where investors have incentives to engage in dividend arbitrage strategies.*

4.2 Econometric Framework

Our empirical analysis explores the development in the share turnover, short interest, and short sell volume around the ex-dividend dates. The econometric framework of this analysis closely follows that of Casi et al. (2022). We apply an event-study methodology, wherein the ex-dividend dates are configured as events. The data is organized as a three-way panel where i denotes the stock, t denotes the date, and τ denotes the event window day. We analyse an event window of 31 days centred around the ex-dividend date, where observations outside this window form the control group. Additionally, we conduct a separate event study for India to examine whether the Finance Act 2020 resulted in the emergence of dividend arbitrage strategies.

For each stock exchange, we estimate the following equation in our analysis:

$$y_{it\tau} = \lambda_\tau D_{it\tau} + Firm_i + \varepsilon_{it\tau} \quad (2)$$

where the dependent variable, $y_{it\tau}$, represents either the share turnover, short interest, or short sell volume, dependent on the dataset. $D_{it\tau}$ is a dummy which takes value 1 for stock i when the date t is an event day τ. $Firm_i$ denotes stock-year fixed effects, which controls for the stock-specific mean volume of the dependent variable in each year. Our coefficient of interest is λ_τ which captures the average abnormal transaction volume for each day τ in the event window.

Equation (2) is estimated using weighted least squares (WLS) with the average annual market capitalization of each stock as weights. The use of WLS enables us to interpret our results as the average abnormal volume per dollar of market capitalization. Standard errors are clustered at the company level to reduce bias from correlated residuals.

4.2.1 Model expectations and adjustments

The nature of our dependent variables differs as the short interest reflects the *balance* of open short positions, whereas share turnover and short sell volume reflects *new* transactions. We therefore consider when abnormalities are expected to occur in these variables. For share turnover and short sell volume, the variation generated from dividend arbitrage strategies will result in abnormalities shortly prior to the ex-dividend date as positions are established cum-dividend. It follows that the short interest, reflecting the number of open short positions, will increase with short sell volume. These positions are then expected to be held until the ex-dividend date when they can be closed, which causes the short interest to drop. Consequently, the timing of expected abnormalities for $y_{it\tau}$ in Equation (2) is the same for all our dependent variables.

Buettner et al. (2020) find that trading volumes in Germany to abruptly spike on the two days leading up to the ex-dividend date which they attribute to dividend arbitrage strategies. Our expectations are identical for countries wherein we find incentives for dividend arbitrage strategies, as we anticipate abnormalities ($\lambda_\tau > 0$) on the event days $\tau \in \{-2, -1\}$ for all our dependent variables. This pattern is illustrated in Figure 5.

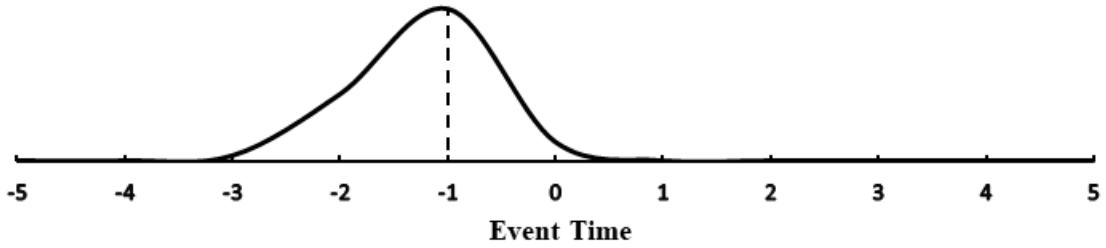


Figure 5: Expected abnormal volumes in the event window

Notes: The figure illustrates the expected peak in transaction volumes. Abnormal transaction volumes occur on the days immediately before ex-dividend date (day 0).

Furthermore, the event study on India requires adjustments to Equation (2) to capture whether the introduction of a DWT led to an increase in abnormalities. We argue that the Finance Act 2020 instigated incentives for dividend arbitrage strategies which were previously missing. To capture this effect, we adjust our estimation model by considering the period after the tax reform as a treatment group, while the prior period acts as a control group.

We expand Equation (2) as follows:

$$\log(Turonver_{it\tau}) = \lambda_\tau D_{it\tau} + \omega_\tau D_{it\tau} A_{it} + Firm_i + \varepsilon_{it\tau} \qquad (3)$$

where A_{it} is a dummy that takes value 1 for stock i when the date t is in the treatment period. $D_{it\tau}A_{it}$ is thereby a dummy which takes value 1 for stock i when the date t is in the post-treatment period for event days $\tau = [-15, 15]$. Our coefficient of interest is ω_τ, which captures the additional abnormal share turnover for event days τ in the treatment period. We expect that $\omega_\tau > 0$ for the event days $\tau \in \{-2, -1\}$.

5. Results

In this section, we present the results from our analysis based on our developed methodology. Subsection 5.1 and 5.2 examines the statistical and graphical evidence of dividend arbitrage strategies in our sample countries. In Subsection 5.3, we consider heterogeneity in our results, while we perform a robustness check in Subsection 5.4. Lastly, we discuss the limitations of our analysis in Subsection 5.5.

5.1 Statistical Evidence

5.1.1 Short Interest

Table 3 presents the results from estimating Equation (2) with short interest as the dependent variable. Columns (1) to (4) provides the evidence for Shanghai, Shenzhen, Japan, and Taiwan. It reports estimates for the 2 days before the ex-dividend date ($\lambda_{-2}, \lambda_{-1}$) for these stock exchanges. For Shanghai and Shenzhen, we include point estimates for the ex-dividend date (λ_0) to reflect that it coincides with the record date under the T+0 settlement cycle in Chinese markets.

Table 3: Regression results: Abnormal short interest around ex-dividend date

	Shanghai	Shenzhen	Japan	Taiwan
	(1)	(2)	(3)	(4)
$D_{i,t,-2}$	0.002	-0.004	0.002	0.037
	(0.008)	(0.032)	(0.002)	(0.053)
$D_{i,t,-1}$	0.005	-0.005	0.004**	0.045
	(0.008)	(0.031)	(0.002)	(0.054)
$D_{i,t,0}$	0.003	0.000		
	(0.008)	(0.031)		
Observations	20,380	17,650	55,194	61,732
R^2	0.62	0.60	0.43	0.68

Notes: The dependent variable is the short interest defined as the outstanding balance of shares sold short but not bought back as a percentage of equity float. The sample includes the 25 largest stocks on each stock exchange, between 2018 and 2022 for column (1) to (2), and between 2012 and 2022 for column (3) and (4). $D_{i,t,\tau}$ is a dummy variable that takes value 1 for stock *i* when the date *t* is within the event days $\tau \in [-15,15]$. The regressions are estimated through WLS, where market capitalization act as weights. Stock-level fixed effects and clustered standard errors are included. Cluster-robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels.

In line with our expectations, none of the coefficients for Shanghai or Shenzhen (Columns 1 and 2) are significant, implying that there is no abnormal short interest in proximity to the ex-dividend date. Interestingly, the point estimates for Japan (Column 3) indicate abnormal short interest on day -1 which is significant at the 5% level. The abnormality corresponds to an increase of 20% relative to the mean short interest outside the event window. We interpret this as an indication of dividend arbitrage strategies being present in Japan. Finally, the result for Taiwan (Column 4) is conflicting with our expectations as there are no significant increases in short interest, which does not suggest that short sales are used to exploit the levy of DWTs.

5.1.2 Short Sell Volume

Table 4 presents the results of estimating Equation (2) with short sell volume as the dependent variable. Columns (1) to (5) presents the results for Japan, South Korea, Hong Kong, Malaysia, and Singapore. It reports estimates for the 2 days leading up to the ex-dividend date ($\lambda_{-2}, \lambda_{-1}$) for these stock exchanges.

Table 4: Regression results: Abnormal short sell volume around ex-dividend date

	Japan	South Korea	Hong Kong	Malaysia	Singapore
	(1)	(2)	(3)	(4)	(5)
$D_{i,t,-2}$	0.001*	-0.003	0.002	0.000	0.004
	(0.0002)	(0.003)	(0.002)	(0.001)	(0.004)
$D_{i,t,-1}$	0.002***	-0.003	0.007*	0.000	0.007*
	(0.0004)	(0.002)	(0.004)	(0.001)	(0.004)
Observations	33,553	62,291	51,293	26,852	59,911
R^2	0.24	0.33	0.33	0.15	0.23

Notes: The dependent variable is the short sell volume as a percentage of equity float (source: Bloomberg). The sample includes the 25 largest stocks on each stock exchange between 2012 and 2022. $D_{i,t,\tau}$ is a dummy variable that takes value 1 for stock *i* when the date *t* is within the event days $\tau \in [-15,15]$. The regressions are estimated through WLS, where market capitalization act as weights. Stock-level fixed effects and clustered standard errors are included. Cluster-robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels.

The coefficient is significant on the two days leading up to the ex-dividend date for Japan (Column 1). Relative to the mean outside the event window, the point estimates indicate an approximate increase of 25% and 72.5% on the days -2 and -1, respectively. However, the effect on day -2 is not significant at conventional levels. Nonetheless, the significant increase on day -1 is consistent with the abnormal short interest in Column 3 in Table 3. In line with our expectations, this substantiates the claim that dividend arbitrage may be present in Japan.

The point estimates for Hong Kong (Column 3) and Singapore (Column 5) indicate increases of approximately 10% and 17% on day -1, respectively, but neither effect is significant at conventional levels. The remainder of our findings show no abnormal increases leading up to the ex-dividend date. Consequently, the result for non-incentive countries is consistent with our expectations, indicating that dividend arbitrage strategies are not present.

5.1.3 Share Turnover

Table 5 presents the results of estimating Equation (2) with share turnover as the dependent variable for all stock exchanges except NSE (India). It reports estimates for the 2 days before the ex-dividend date ($\lambda_{-2}, \lambda_{-1}$), in addition to the ex-date (λ_0) for Shanghai and Shenzhen to account for intraday settlement in China.

Table 5: Regression results: Abnormal share turnover around the ex-dividend date

	HKG	MYS	SGP	JPN	TWN	THA	KOR	SHA	SZX
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$D_{i,t,-2}$	-0.01	0.14***	0.10**	0.01	0.10	0.18***	0.00	0.02	-0.06
	(0.05)	(0.06)	(0.03)	(0.02)	(0.18)	(0.06)	(0.07)	(0.05)	(0.04)
$D_{i,t,-1}$	0.08	0.19***	0.12**	0.17***	0.48***	0.16***	-0.09	0.11***	-0.01
	(0.06)	(0.07)	(0.04)	(0.04)	(0.15)	(0.03)	(0.06)	(0.04)	(0.04)
$D_{i,t,0}$								0.09	0.05
								(0.05)	(0.05)
Observations	59,304	59,551	62,612	54,513	59,202	52,413	60,651	42,678	56,403
R^2	0.38	0.53	0.34	0.38	0.26	0.67	0.35	0.49	0.47

Notes: The dependent variable is the natural logarithm of share turnover. The sample include the 25 largest stocks on each stock exchange between 2012 and 2022 for columns (1) to (9). $D_{i,t,\tau}$ is a dummy variable that takes value 1 for stock *i* when the date *t* is within the event days $\tau \in [-15,15]$ (ex-dividend date normalized to zero). The regressions are estimated through WLS, where market capitalization act as weights. Stock-level fixed effects and clustered standard errors are included. Cluster-robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels. Data source: Compustat Global

First, we consider the results for countries wherein dividend arbitrage strategies are not applicable as they do not levy a DWT. There is no effect in Hong Kong (Column 1), but we find significant increases on both days for Singapore (Column 2) and Malaysia (Column 3) in the range of 10% to 19%. We interpret this as an indication that other trading strategies such as dividend stripping and dividend capture may be present. Consequently, the ambiguity of abnormalities in the share turnover emphasizes the need for discretion in the interpretation of

effects in other countries. The uncertainty of these results makes cause for further analysis, which we provide through graphical evidence and robustness tests in the following sections.

Second, we consider the results for countries where we find that investors have incentives to engage in dividend arbitrage strategies. In Japan (Column 4), there is a significant increase of 17% on day -1. As the average share turnover in Japan is considerably higher than the short sell volume (see Column 4 in Table 2), the increase in share turnover cannot solely be attributed to the increase in short sales found above. For Taiwan (Column 5), we find a significant increase of 48% on day -1, the largest in our sample. The effect in Thailand (Column 6) is further significant on both days -2 and -1, with an increase of 18% and 16%, respectively. In sum, these findings are in line with expectations, as they indicate that dividend arbitrage strategies may be present.

Finally, we consider the results for countries where we find no incentives for dividend arbitrage strategies. We find no effect in Korea (Column 7) or on the Shenzhen Stock Exchange (Column 9). However, we find a significant increase of 11% on day –1 for the Shanghai Stock Exchange (Column 8). This is contrary to our expectations for China, and the effect is not consistent with that of the Shenzhen Stock Exchange although investors are subject to the same tax treatment. A possible explanation for the latter deviation is the findings of Henry & Koski (2016) that abnormal volumes around dividend dates in the U.S. are larger for institutional investors, which they attribute to lower transaction costs that makes dividend capturing strategies more profitable for such investors. Since investors on the Shanghai Stock Exchange primarily consist of banks and pension funds, whereas Shenzhen Stock Exchange primarily consist of individual investors (Amadeo, 2021), this could be an explanatory factor.

5.1.4 Event Study of India

Table 6 presents the regression results of estimating Equation (3) with share turnover as the dependent variable for India. It reports the estimates for the 2 days before ex-dividend dates in the period prior to the Finance Act ($\lambda_{-2}, \lambda_{-1}$) and the treatment effect for these days in the post-reform period (ω_{-2}, ω_{-1}).

We find no effect in the periods before or after the tax reform on April 1st, 2020. While none of the results are significant, the point estimates post-implementation suggests that activity in proximity to the ex-date declines. Contrary to our expectations, these findings indicate that the implementation of a DWT did not incite investors to engage in dividend arbitrage strategies.

Furthermore, we emphasize that securities lending in India is only allowed when covering short sales which would therefore affect share turnover if used at a large scale. Hence, our findings also suggest that these instruments are not used to structure dividend arbitrage strategies.

Table 6: Regression results: Abnormal share turnover around ex-dates (India)

	India (1)	
Before Finance Act 2020:		
$D_{i,t,-2}$	0.02	(0.04)
$D_{i,t,-1}$	0.00	(0.03)
After Finance Act 2020:		
$D_{i,t,-2} * A_{it}$	-0.05	(0.08)
$D_{i,t,-1} * A_{it}$	-0.06	(0.06)
Observations	45,472	
R^2	0.46	

Notes: The dependent variable is the natural logarithm of share turnover. The sample include the 25 largest stocks on each stock exchange between 2012 and 2022 for columns (1) to (9). $D_{i,t,\tau}$ is a dummy variable that takes value 1 for stock *i* when the date *t* is within the event days $\tau \in [-15,15]$. A_{it} is a dummy variable that takes value 1 when the date *t* is in the period after *the Finance Act, 2022*. The regressions are estimated through WLS, where market capitalization act as weights. Stock-level fixed effects and clustered standard errors are included. Cluster-robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels. Data source: Compustat Global

5.2 Graphical Evidence

In this section, we analyse the time pattern of trades around the dividend dates through graphical evidence of abnormalities in the event window. For each stock exchange in our sample, we estimate Equation (2) and plot the coefficients λ_τ of the event days $\tau \in [-15,15]$ as a percentage of the level outside of the event window. This complements the statistical evidence in Section 5.1 by examining abnormalities close to the ex-date relative to the pattern outside the specific event days of interest. An overview of all figures is provided in Section 7.

5.2.1 Short Interest

The left side of the panels in Figure 10 depicts the average abnormal short interest around ex-dividend dates in Shanghai (Panel A), Shenzhen (Panel B), Japan (Panel C), and Taiwan (Panel

D). Apart from Japan, the graphical evidence does not suggest that dividend arbitrage strategies structured through short sales are present.

The short interest in Japan shows an interesting time pattern as highlighted in Figure 6, which supports our interpretation of the statistical evidence as being suggestive of dividend arbitrage strategies. There is a noticeable increase in the short interest leading up to the ex-date with a peak on day -1. As expected, abnormal short interest immediately drops after shares begin to trade ex-dividend. The pattern strongly resembles the expected pattern in the presence of dividend arbitrage strategies (see Figure 5), as there is a distinct increase in activity immediately prior to the ex-date.

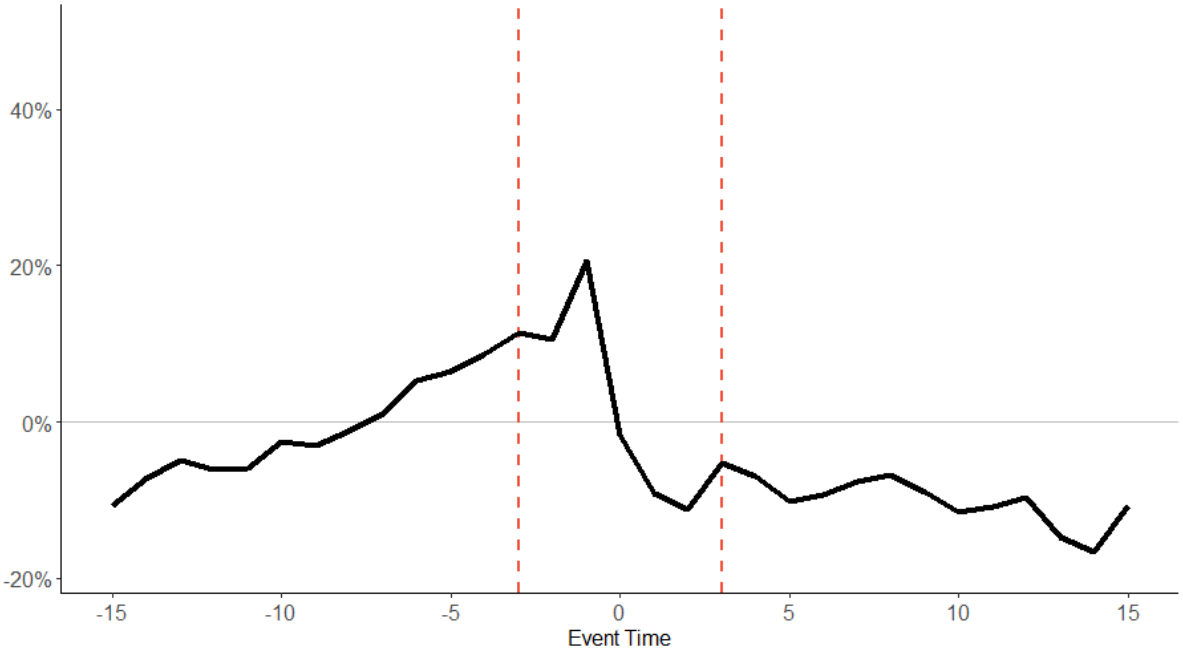


Figure 6: Abnormal short interest in Japan

Notes: This figure shows the daily average abnormal short interest as a percentage of equity float around the ex-dividend date in Taiwan. It is a result of estimating Equation (2) with short interest as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

5.2.2 Short Sell Volume

The left side of the panels in Figure 11 depicts the average short sell volume leading up to the ex-dividend dates in Japan (Panel A), Hong Kong (Panel B), South Korea (Panel C), Malaysia

(Panel D), and Singapore (Panel E). As these figures depict the number of new short sales on each event day, they are naturally more volatile than the patterns seen for the short interest.

In Table 4, we find an abnormal increase in short sales for Hong Kong and Singapore, but neither are significant at conventional levels. In Figure 11, the patterns observed in both Hong Kong (Panel B) and Singapore (Panel E) supports the insignificance of these findings, as similar increases are not exclusively found on the days closest to the ex-date. Moreover, the plots for South Korea (Panel C) and Malaysia (Panel D) show no abnormal increase. In sum, these plots do not suggest that dividend arbitrage strategies structured through short sales are present in these countries.

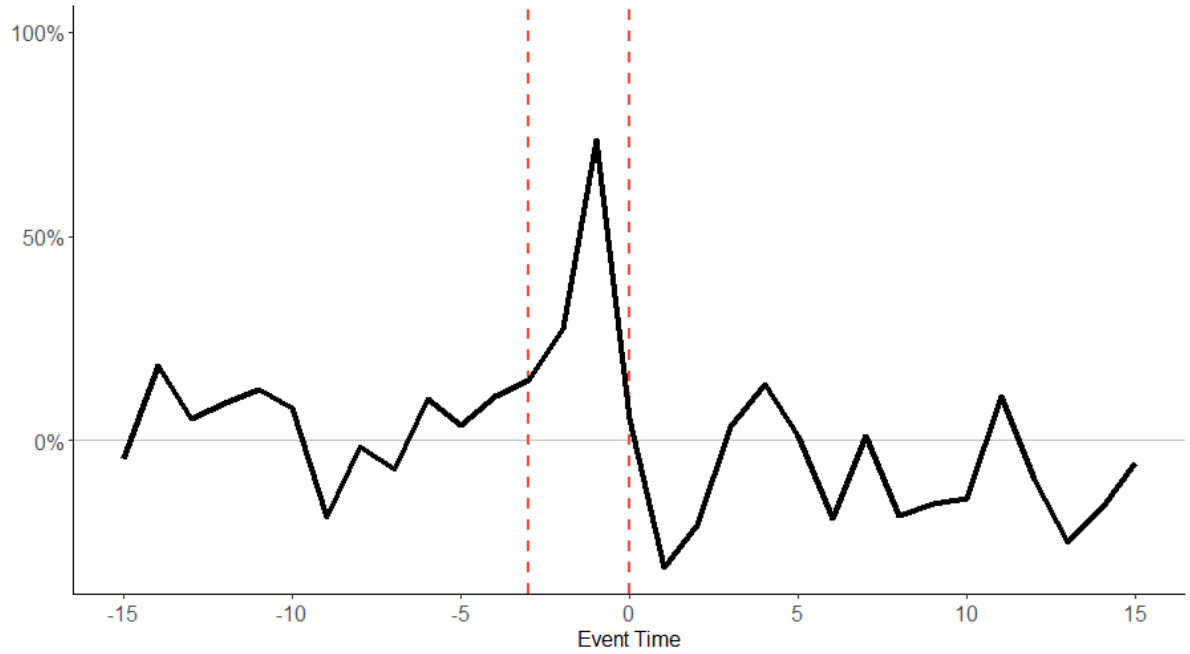


Figure 7: Abnormal short sales in Japan

Notes: This figure shows the daily average abnormal short sales as a percentage of equity float around the ex-dividend date in Japan. It is a result of estimating Equation (2) with short sell volume as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where we use annual market capitalization of each share as weights; stock-level fixed effects and cluster-robust standard errors are also included.

As for Japan, the statistical evidence reported an increase in short sales of 72.5% on day -1, significant at the 1% level. Highlighted in Figure 7, the time pattern in Japan shows that this spike is distinct from those seen on other days. Furthermore, there is an abrupt drop on subsequent days. This pattern further substantiates our interpretation of dividend arbitrage strategies being present, as it is evident that in Japan, there is a distinct increase in short selling activity immediately prior to the ex-dividend date.

5.2.3 Share Turnover

The left side of Figure 12 shows abnormal share turnover in the event window for all stock exchanges in our sample. In the following, we discuss the graphical evidence for those countries where we find a statistically significant increase in Table 5.

Table 5 reports a significant increase on days -2 and -1 in Malaysia (Panel D), Singapore (Panel E), and Thailand (Panel I). However, these increases appear insignificant when we examine the graphical evidence over the 31-day periods. In general, we find trading activity to be higher throughout the whole period, with no clear connection to the ex-dividend date as spikes of similar magnitude occur on other days as well. As both Malaysia and Singapore are part of our control groups, we attribute the increases in share turnover to other trading strategies. While we find incentives for dividend arbitrage strategies in Thailand, the pattern is not distinct from those in Malaysia and Singapore. Consequently, we find that the graphical evidence does not suggest the presence of dividend arbitrage strategies in Thailand.

We find a statistically significant increase on day -1 in Taiwan, Japan, and Shanghai. The most interesting development in share turnover is found in Taiwan as shown in Figure 8. A distinct spike in share turnover appears on the day prior to ex-dividend date and on the day itself, with no equivalent increases for any other days in the event window. This pattern strongly resembles that of dividend arbitrage schemes (see Figure 5). However, the lack of similar abnormalities in short interest for Taiwan suggests that these arrangements are not structured through short sales. Consequently, while we find incentives to avoid DWT on manufactured dividends through short sales in Taiwan, our findings suggest that investors do not engage in such arrangements. Instead, the increase in share turnover suggests that other instruments are used to structure dividend arbitrage strategies. Still, we emphasize that the increase could, in part or in whole, be generated by other strategies such as dividend capture and dividend stripping.

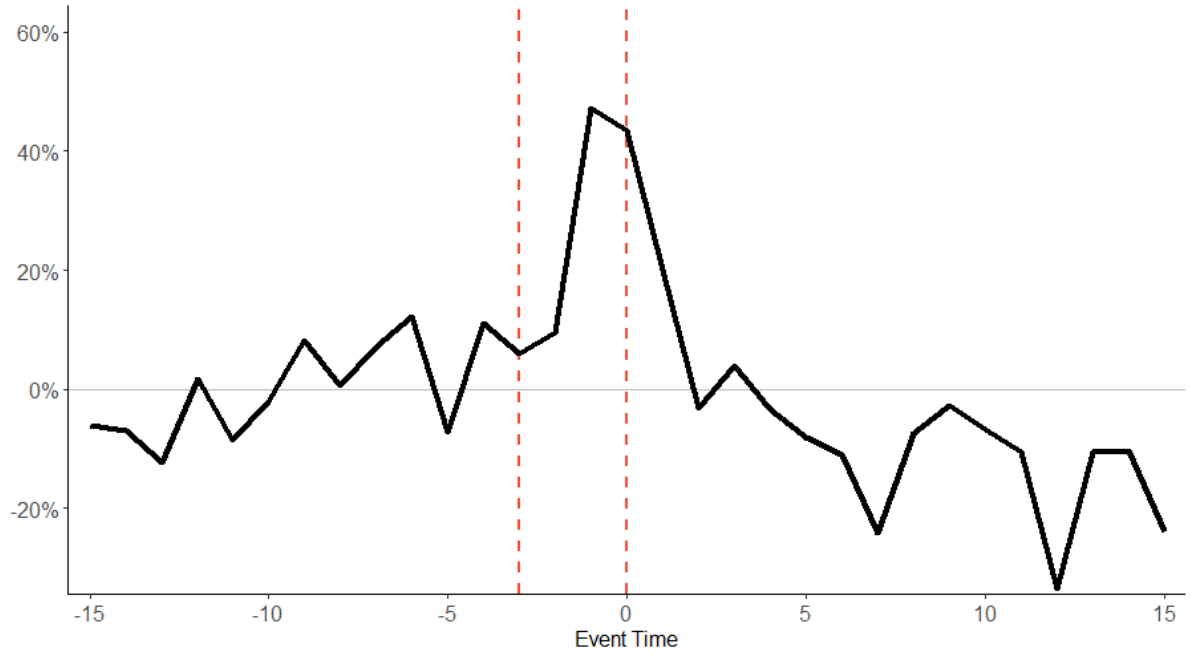


Figure 8: Abnormal turnover in Taiwan

Notes: This figure shows the daily average abnormal turnover around the ex-dividend date in Taiwan. It is a result of estimating Equation (2) with the natural logarithm of share turnover as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where we use annual market capitalization of each share as weights; stock-level fixed effects and cluster-robust standard errors are also included.

For Japan (Panel B), we find that increases of similar magnitude appear frequently over the 31-day period in Japan with no clear connection to the ex-date. This contrasts with the patterns seen in Figure 6 and 7 where the connection is observable, which emphasize that short selling in Japan constitutes a small fraction of trading activity. In sum, the pattern for share turnover in Japan provides no clear indication of dividend arbitrage strategies when viewed in isolation.

For Shanghai (Panel G), there is a distinct increase in proximity to the ex-date resembling the expected pattern for dividend arbitrage strategies, which is contrary to our expectations. Nonetheless, the pattern is not observable in Shenzhen (Panel H) despite being subject to the same regulations. A possible explanation for this deviation is the composition of investors in line with the findings of Henry & Koski (2016) as discussed in Section 5.1.3. Furthermore, we emphasize that other strategies may generate similar abnormalities.

The graphical evidence for the event study on India is provided in Figure 13. There is no clear difference between the pattern of share turnover prior to the Finance Act 2020 (Panel A) and the following periods (Panel B). Consequently, this further supports our conclusion that the establishment of different DWT-treatments did not have a significant effect on share turnover.

5.3 Heterogeneity

Casi et al. (2022) find consistent spikes in short interest around ex-dividend dates on a yearly basis for various Nordic countries from 2010 to 2019. As our sample data spans over a long period, we recognize that our results could vary on a yearly basis due to unobserved factors. Thus, we consider heterogeneity in our results by estimating Equation (2) on a year-to-year basis for each stock exchange. To reduce bias from individual events, we only include results for the years in which there are 5 or more dividend events.

The panels on the right side of Figure 10 and Figure 11 respectively display the average abnormal short interest and short sell volume in the event window on a yearly basis. In general, we find no consistent patterns of abnormalities in relation to the dividend dates in any of the figures. With regard to the spike prior to the ex-dividend date in Japan in Figure 6 and 7, we find it to be absent in most years. This contrasts with our prior findings and thus our conclusion is that the evidence for Japan is inconsistent and unclear on a yearly basis, but that we cannot disregard the presence of dividend arbitrage strategies. The remaining results are harmonious with the prior discussion on statistical and graphical evidence as we find no clear indications of dividend arbitrage strategies structured through short sales in any years.

The panels on the right side of Figure 12 display the average abnormal share turnover in the event window on a yearly basis. With the exception of Taiwan, we do not observe a consistent increase around the ex-dividend dates on a yearly basis. The results from Taiwan are highlighted in Figure 9. The patterns resembling dividend arbitrage strategies are particularly strong in 2022 and 2014. The evidence is weaker for other years due to relatively higher levels outside the days of interest, but there is nonetheless an abnormal level of share turnover in all years except for 2021.

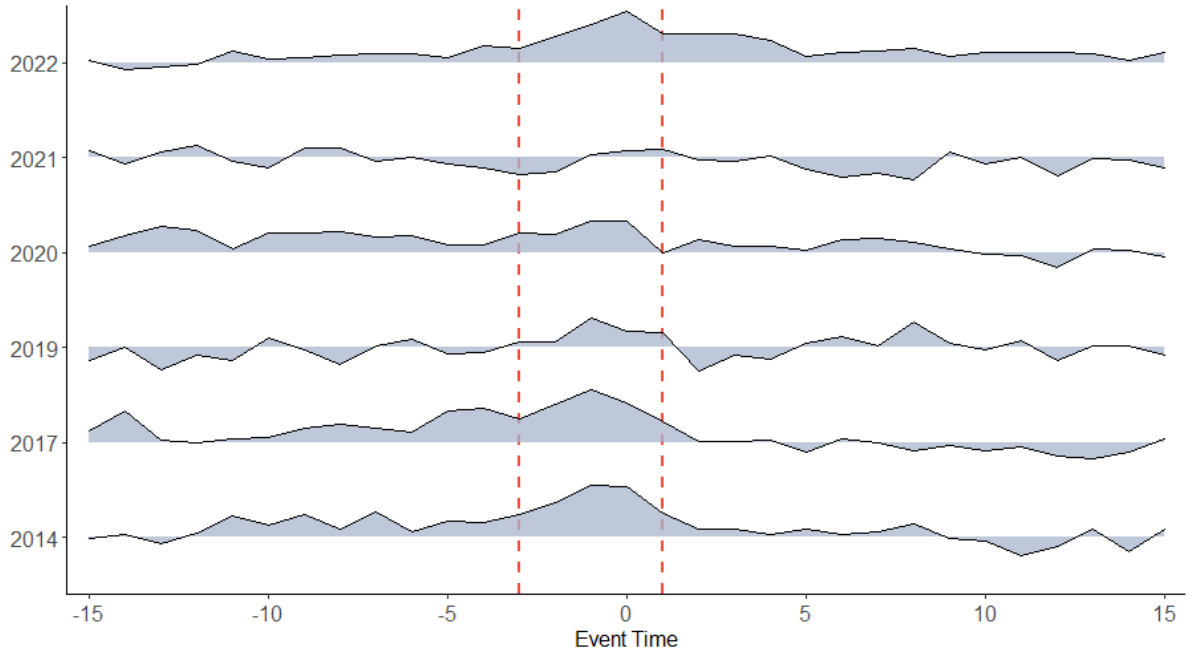


Figure 9: Yearly abnormal turnover in Taiwan

Notes: This figure shows the daily average abnormal turnover around the ex-dividend date in Taiwan on a yearly basis. It is a result of estimating Equation (2) with the natural logarithm of share turnover as the dependent variable on a yearly basis and plotting the coefficients λ_τ. The regression is estimated with WLS, where we use annual market capitalization of each share as weights; stock-level fixed effects and cluster-robust standard errors are also included.

5.4 Robustness checks

In the estimation of our results, all events that could be affected by DRIP transactions are excluded to avoid bias in the results. Although this eliminates abnormal transaction volumes around the ex-dividend dates caused by DRIP investing, the exclusion of these observations removes a significant portion of dividend events. As a robustness check, we therefore re-introduce DRIP events into our analysis. The results are found in the Appendix, where Figure A.1 shows short interest, Figure A.2 shows short sell volume, Figure A.3 shows share turnover, and Figure A.4 shows the event-study for India.

In general, most results are virtually identical to our main results. However, some deviations exist. For Hong Kong (Panel A in Figure A.2), we find abnormal short sell volume around the ex-dividend date that are statistically significant at the 5% level. In addition, a similar pattern is also found in share turnover (see Panel A in Figure A.3). However, this pattern is weakly consistent on a year-to-year basis.

Furthermore, for Japan the increase in short interest leading up to the ex-dividend date is larger and becomes statistically significant at the 1% level when including DRIP (see Panel D in Figure A.1). This spike becomes observable to a greater extent on a yearly basis. Second, the spike in short interest becomes consistent on a yearly basis (see Panel B in Figure A.2).

In their study of DRIP investments, Ang et al. (2019) show that there is abnormal share lending in Australia around ex-dividend dates for DRIP dividends. Furthermore, they find that these abnormalities are absent for non-DRIP dividends. In line with their findings, the new spikes in our robustness checks may be in part or in whole attributed to DRIP investments. Still, it should be acknowledged that unlike Ang et al. (2019), we also find abnormalities for non-DRIP events. Hence, for Japan, where the effects are amplified and becomes consistent on a yearly basis, we cannot disregard that this may also partly be caused by abnormalities related to dividend arbitrage strategies in addition to the DRIP-effect. Nonetheless, we are unable to distinguish between these sources.

5.5 Limitations

A core limitation of our analysis is the ambiguity of abnormalities in our dependent variables. In particular, the impreciseness of share turnover as a measure of dividend arbitrage strategies becomes evident through the significant increases in countries where such strategies are not viable as no DWT is levied. Consequently, while we can determine whether patterns indicative of dividend arbitrage strategies is present in a market, we are unable to further determine whether it is a result of such collusion or not. Whereas Laturnus et al. (2022) find evidence of collusion in the mispricing of single stock futures, such a distinction is not possible in our data.

Furthermore, our data on securities lending is limited to those related to short sales. Hence, we recognize that it does not provide a direct measure of securities lending, and that dividend arbitrage strategies using this structure would not generate variation in our lending variables unless a short sale is conducted. This is particularly relevant for cum-cum transactions as a short sale may not be required to avoid the withholding tax. Finally, considering that our period of analysis spans over a decade and that a total of nine jurisdictions are included in our sample, we emphasize that there may have been specific tax laws, reforms or regulatory changes which are unbeknown to us, but that should have been accounted for in our analysis. Hence, the determination of incentives in our sample countries is prone to error.

6. Conclusion

In this thesis, we provide a bird's-eye view on dividend arbitrage strategies in Asian markets. In Europe, investors have colluded through so-called cum-cum and cum-ex transactions to avoid dividend withholding taxes (DWTs) and to generate multiple corresponding tax credits or refunds, inflicting enormous tax losses upon authorities. The common denominator of these strategies is that they revolve around the dividend dates, generating abnormal spikes in transaction volumes.

We provide a qualitative analysis of dividend taxation in the nine Asian countries included in our sample to determine the incentives for investors in the respective markets to engage in dividend arbitrage strategies. More specifically, we determine whether investors are subject to different DWT-treatments which could be exploited through cum-cum transactions, and whether investors are entitled to tax credit or refunds which could be exploited through cum-ex transactions. Based on this analysis, we find incentives to be present in Thailand, Taiwan, Japan, and India, and expect to observe increased transaction volumes around the ex-dividend date on the corresponding stock exchange.

To test our hypothesis, we analyse data on short interest, short sell volume, and trading volume during the period of 2012 to 2022. With the exception of Taiwan and Japan, our findings indicate that dividend arbitrage strategies are not present in Asian markets. In the countries where we find abnormalities around the ex-dividend dates, we emphasize that while this suggests that such strategies may be present, the variation may in part or in whole be generated by other strategies such as dividend capture and dividend stripping. This is substantiated by our finding of abnormalities around the ex-dividend date in Singapore and Malaysia, where dividend arbitrage strategies are not possible as no DWT is levied.

For Taiwan, we find a large spike in share turnover shortly prior to and on ex-dividend dates. Furthermore, these abnormalities are consistent across several years. We interpret the increase in share turnover as an indication of dividend arbitrage strategies. Similar increases are, however, not present in short sales. Consequently, we find that these arrangements are likely not structured through short sales.

For Japan, we find a spike in short sales immediately before the ex-dividend date in both the short interest and short sell volume. Although we also find abnormal share turnover in

proximity of the ex-dividend date, the time pattern does not resemble that of dividend arbitrage strategies. The abnormalities in both short sales and share turnover are nonetheless inconsistent on a yearly basis. Consequently, we interpret the results as weak evidence of dividend arbitrage strategies.

In the remaining countries where we find incentives for dividend arbitrage strategies, we find no supportive evidence. While the statistical result for Thailand suggests abnormal trading around dividend dates, we disregard the presence of dividend arbitrage schemes based on the graphical evidence. In the event study of India, we find that the reform which introduced a DWT did not affect trading around the ex-dividend date. This suggests that the reform did not cause investors to engage in dividend arbitrage schemes.

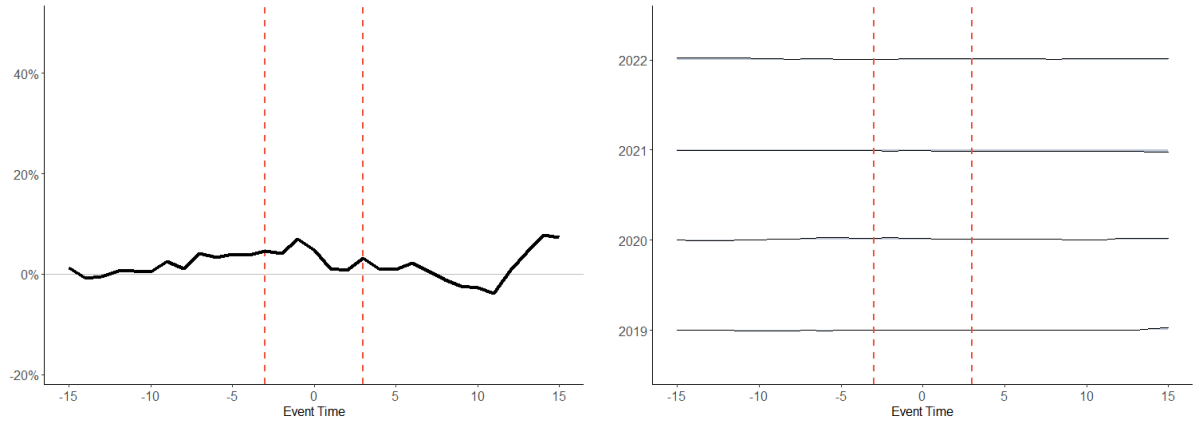
Our thesis contributes to existing literature by providing an initial study on the presence of dividend arbitrage strategies in Asia. Unlike the findings of prior studies on European markets, our results indicate that in large, these strategies do not constitute a substantial issue for Asian tax authorities. Hence, it appears that the legislations in Asia are generally effective in preventing exploitation of DWTs, as we only find indications of dividend arbitrage strategies in two out of the nine countries included in our sample.

For Japan and Taiwan, there is a potential for future research to validate the presence of these strategies in these countries, as we are unable to assess whether abnormalities are, in fact, driven by dividend arbitrage. An interesting contribution would be to examine changes in foreign ownership of companies in Japan and Taiwan around ex-dividend dates. Intuitively, if foreign shareholders temporarily transfer the ownership of shares, the proportion of foreign shareholders would decrease around ex-dividend dates thus confirming that DWTs are avoided. Furthermore, following Laturnus et al. (2022), there is a potential to analyse abnormal trading and pricing behaviour of single stock futures (SSF) to assess whether the trades are collusive in nature, and thereby making a distinction with regard to other strategies. Finally, our data of short positions is limited to short sales and thus, a more appropriate measure to analyse would be shares on loan. Therefore, further research could also replicate our analysis if share lending data is acquired.

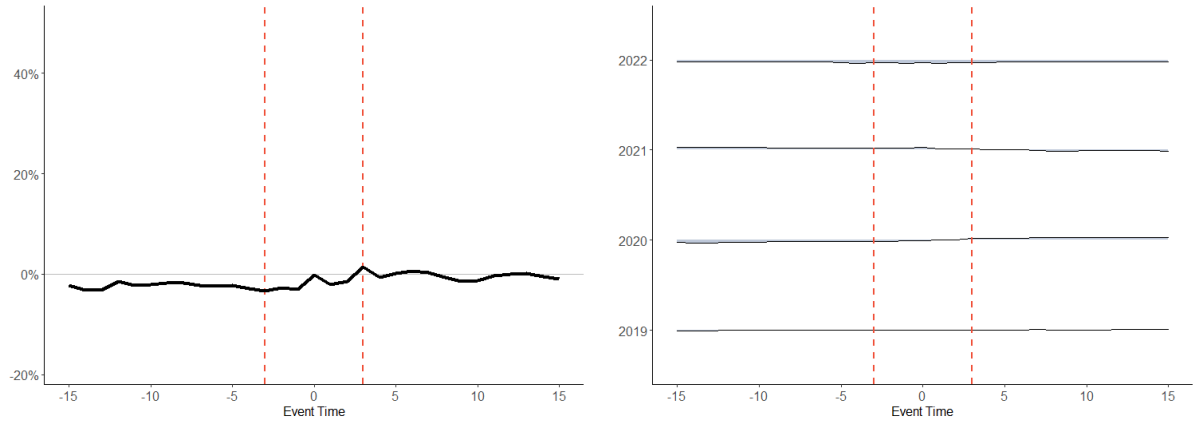
7. Figures and Tables

Figure 10: Abnormal short interest in Asia

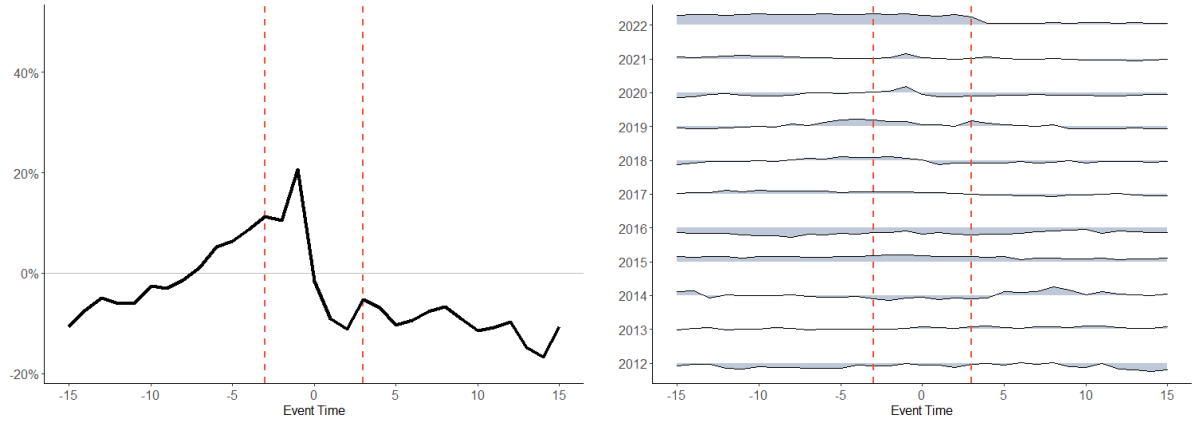
(A) Shanghai



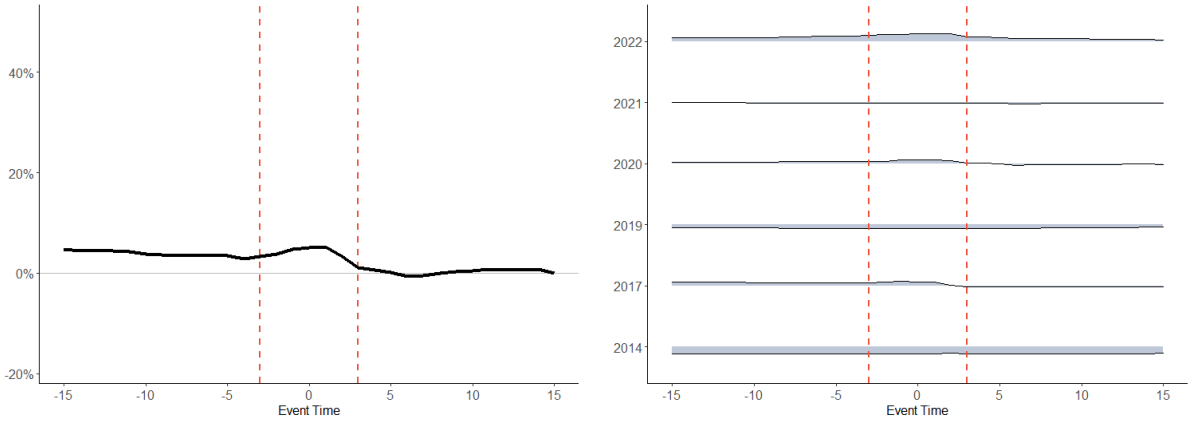
(B) Shenzhen



(C) Japan



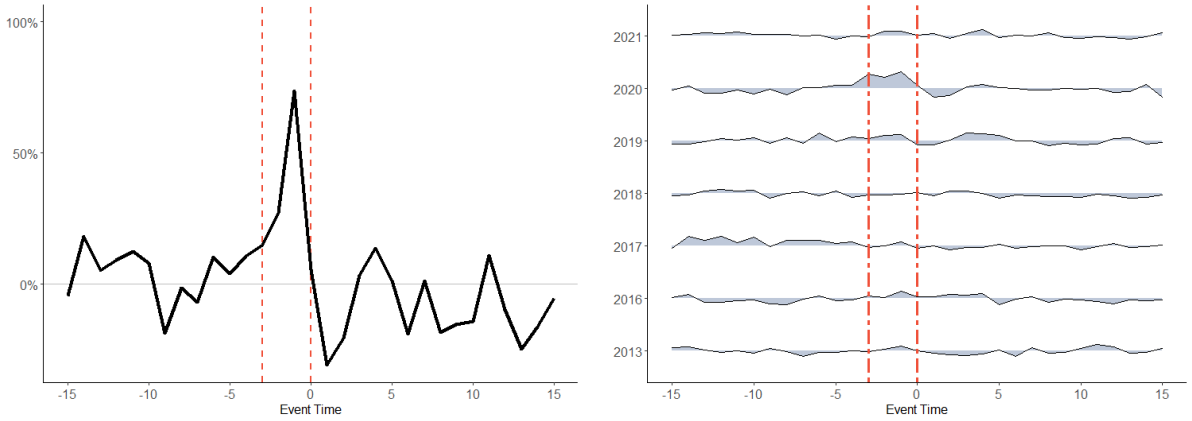
(D) Taiwan



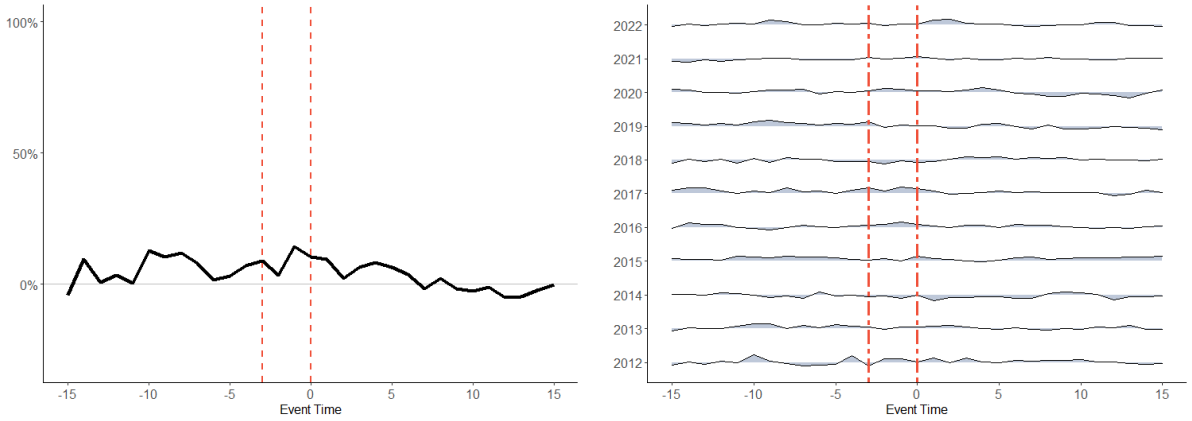
Notes: This figure shows the daily average abnormal short interest as a percentage of equity float around the ex-dividend date. The left side shows overall development, while the right side shows yearly development. It is a result of estimating Equation (2) with short interest as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

Figure 11: Abnormal short sell volume in Asia

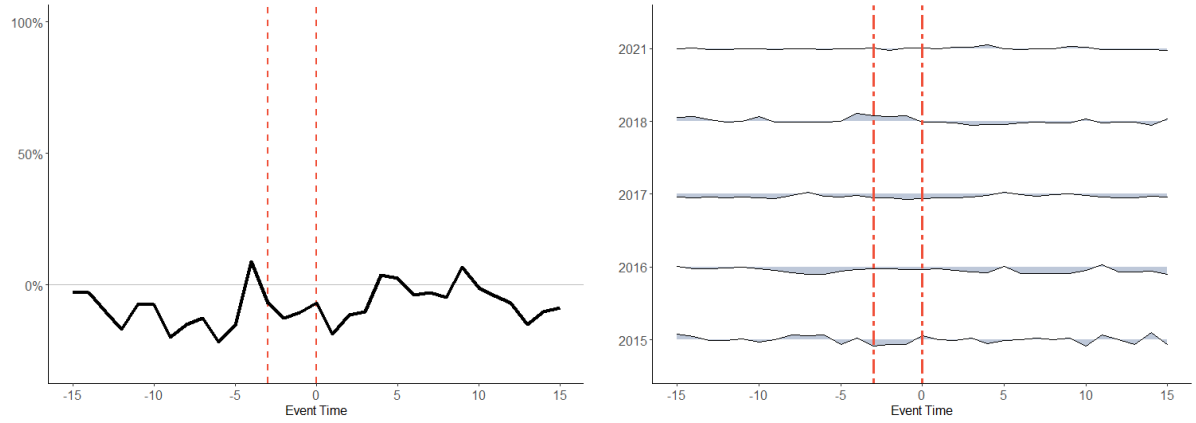
(A) Japan



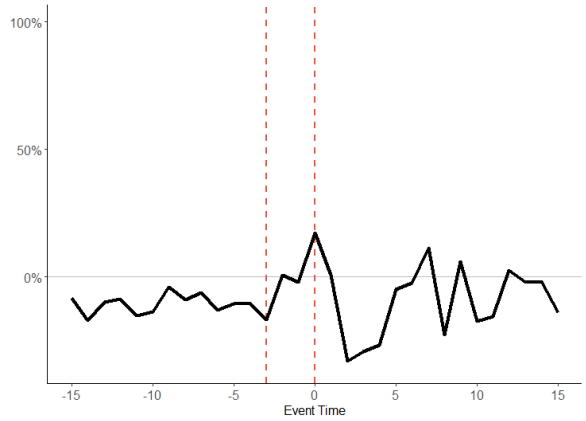
(B) Hong Kong



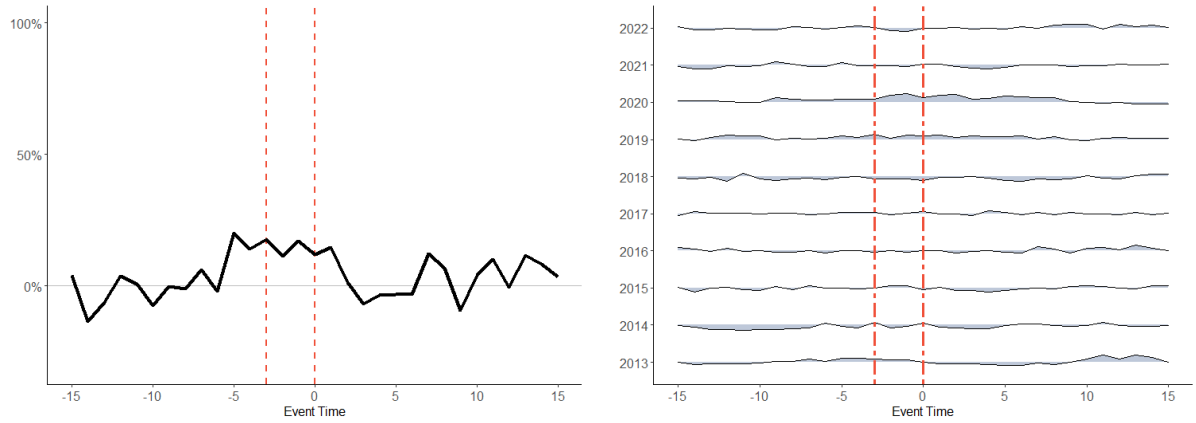
(C) South Korea



(D) Malaysia



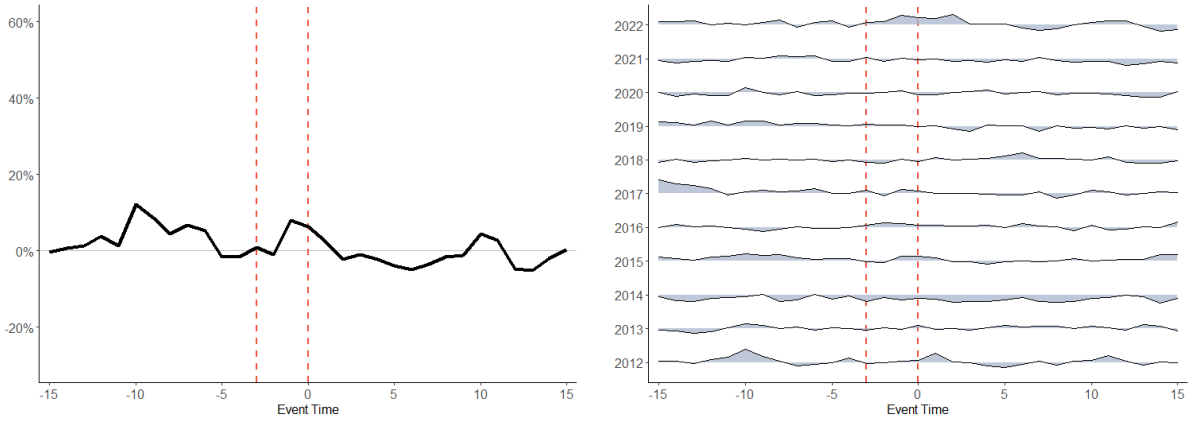
(E) Singapore



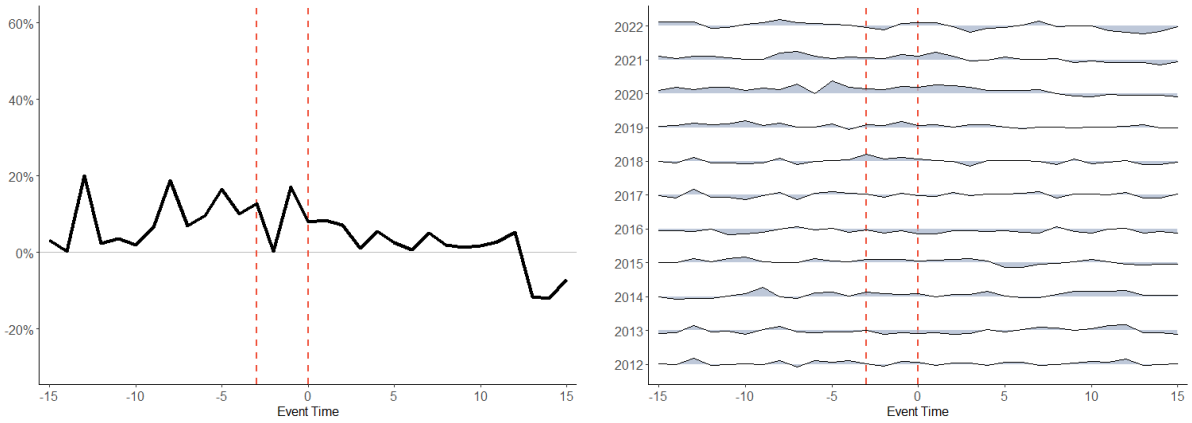
Notes: This figure shows the daily average abnormal short sell volume as a percentage of equity float around the ex-dividend date. The left side shows overall development, while the right side shows yearly development. It is a result of estimating Equation (2) with short sell volume as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

Figure 12: Abnormal share turnover in Asia

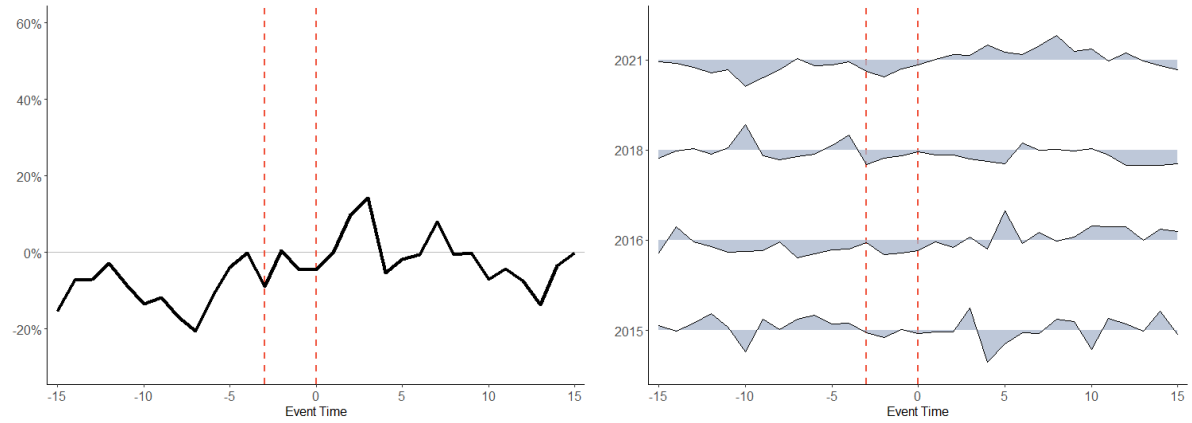
(A) Hong Kong



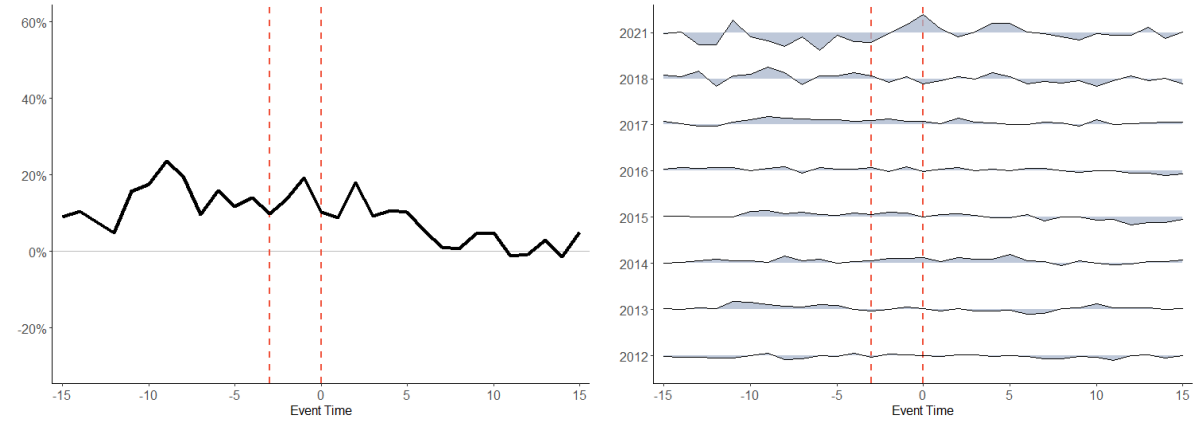
(B) Japan



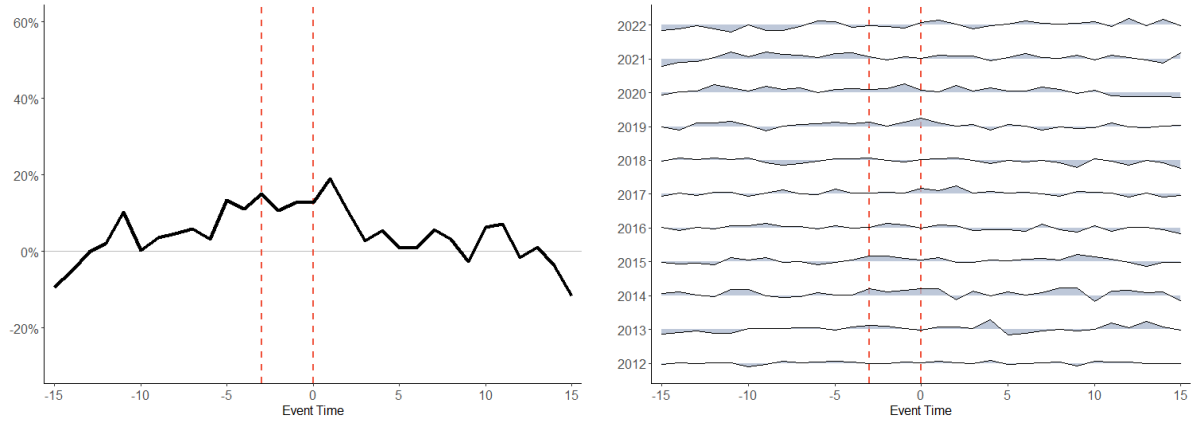
(C) South Korea



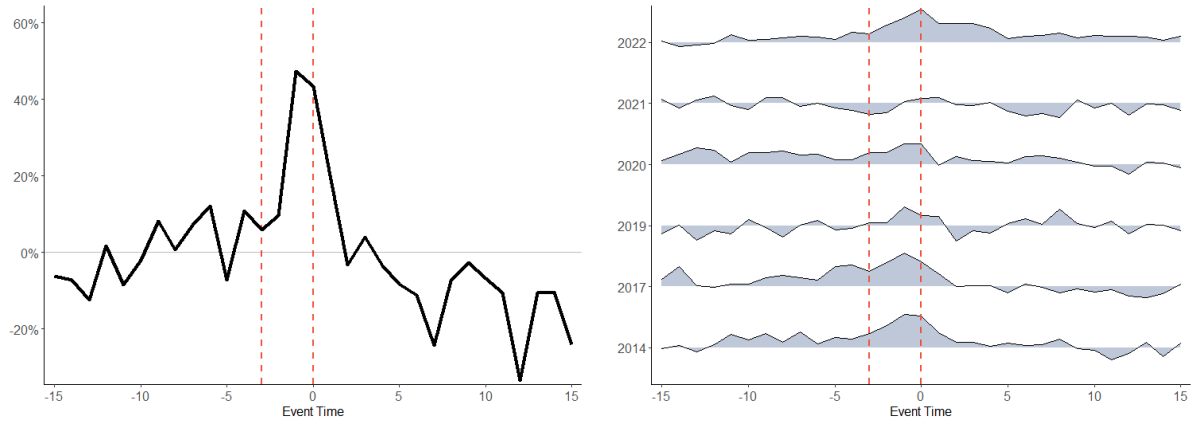
(D) Malaysia



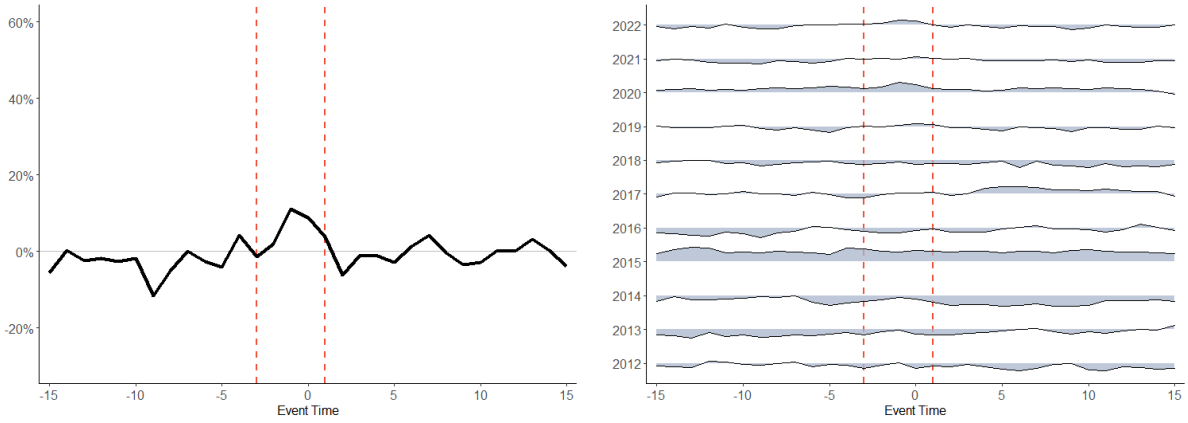
(E) Singapore



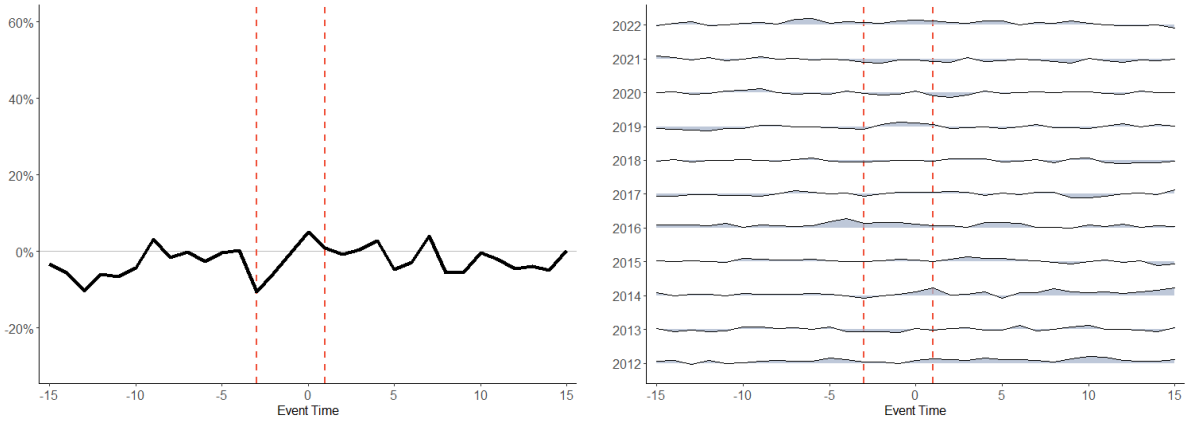
(F) Taiwan



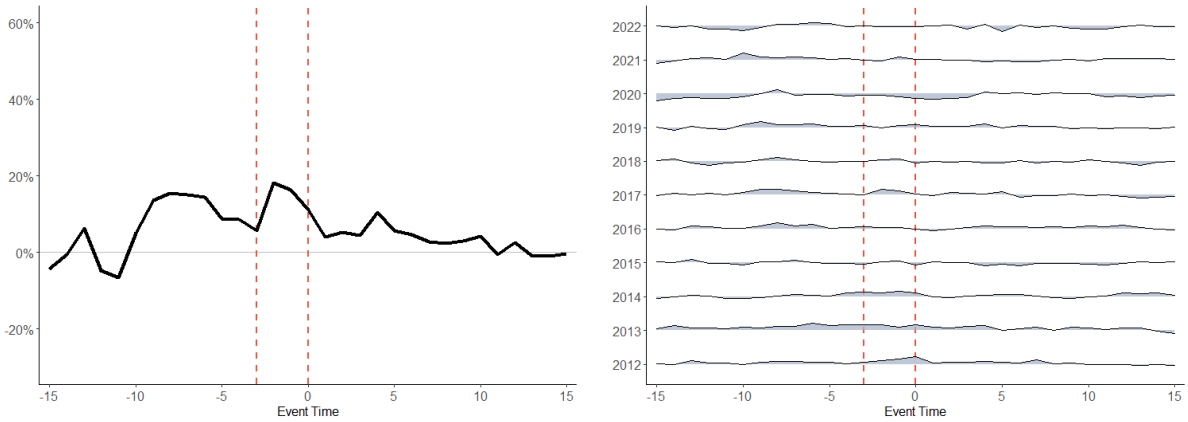
(G) Shanghai



(H) Shenzhen



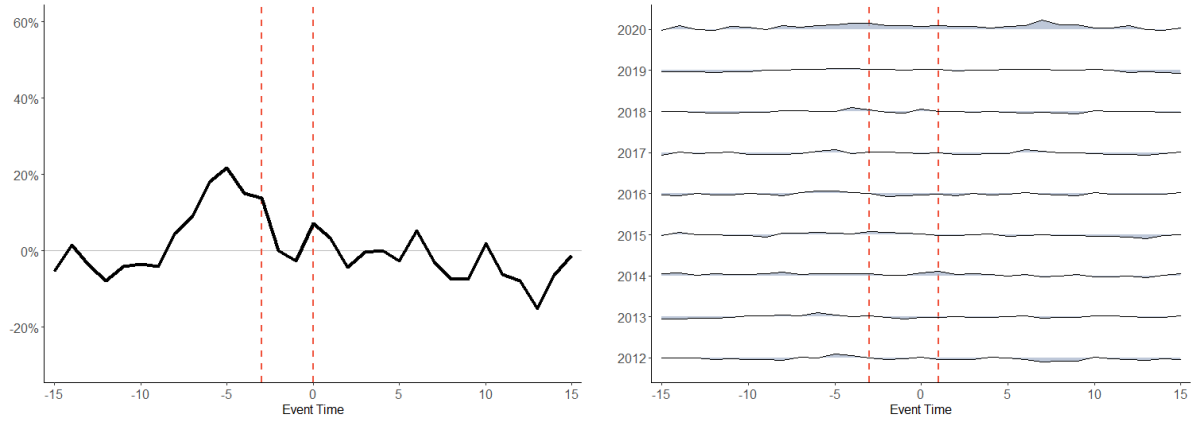
(I) Thailand



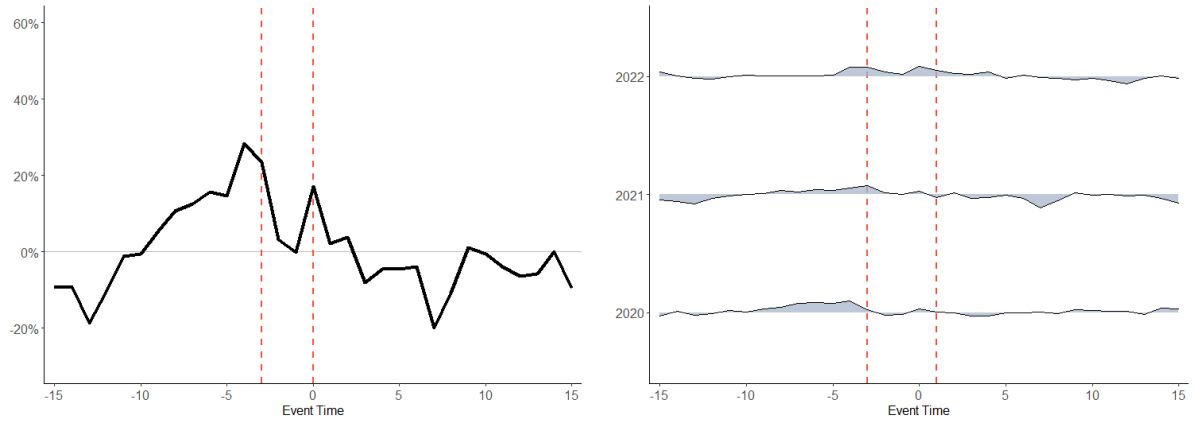
Notes: This figure shows the daily average abnormal share turnover around the ex-dividend date. The left side shows overall development, while the right side shows yearly development. It is a result of estimating Equation (2) with share turnover as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

Figure 13: Abnormal share turnover in India before (top) and after (bottom) the Finance Act.

(A) Before Finance Act



(B) After Finance Act



Notes: This figure shows the daily average abnormal share turnover around the ex-dividend date. The left side shows overall development, while the right side shows yearly development. Panel (A) is the time pattern before the Finance Act. Panel (B) is the time pattern after the Finance Act. It is a result of estimating Equation (2) with share turnover as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

8. Appendix

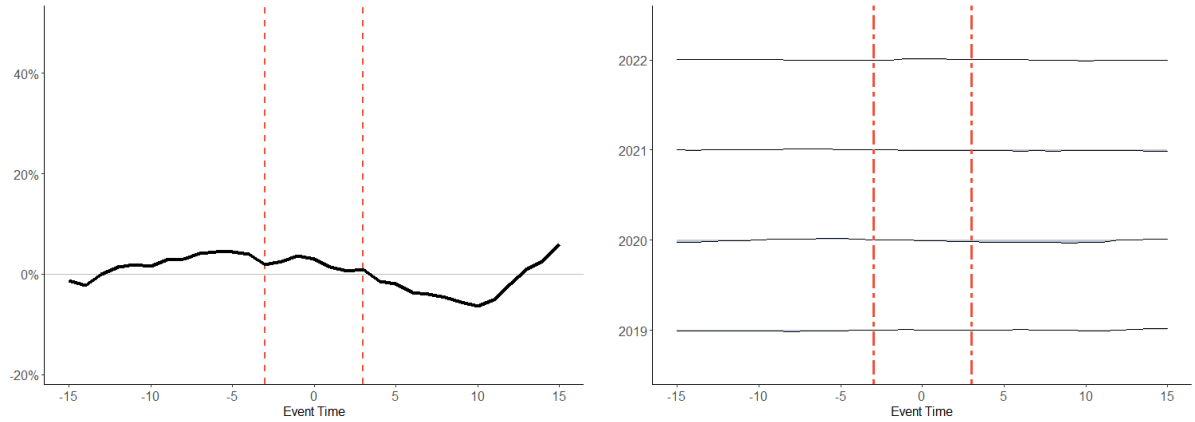
Table A.1: Ten largest stock exchanges in Asia by market capitalization

Stock Exchange	**Country**	**Market Capitalization (MUSD)**
Shanghai Stock Exchange	China	6 874 916
Japan Exchange Group	Japan	5 294 192
Shenzhen Stock Exchange	China	4 906 562
Hong Kong Exchanges and Clearing	Hong Kong	4 534 426
National Stock Exchange of India	India	3 499 420
Korea Exchange	South Korea	1 718 506
Taiwan Stock Exchange	Taiwan	1 551 600
Singapore Exchange	Singapore	633 110
The Stock Exchange of Thailand	Thailand	554 589
Bursa Malaysia	Malaysia	368 383

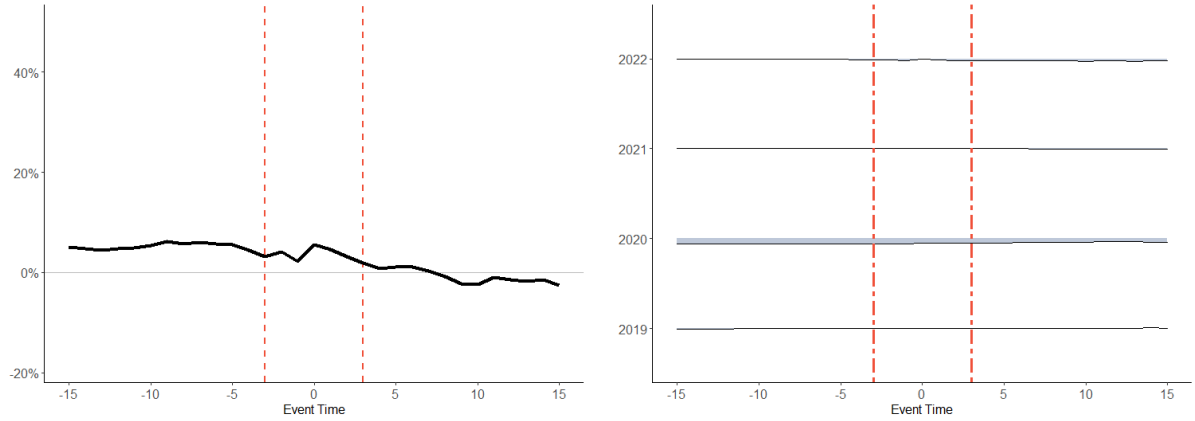
Notes: This table lists the ten largest stock exchanges in Asia by market capitalization. Data is retrieved from the World Federation of Exchanges as of August 2022

Figure A.1: Abnormal short interest in Asia (DRIP events included)

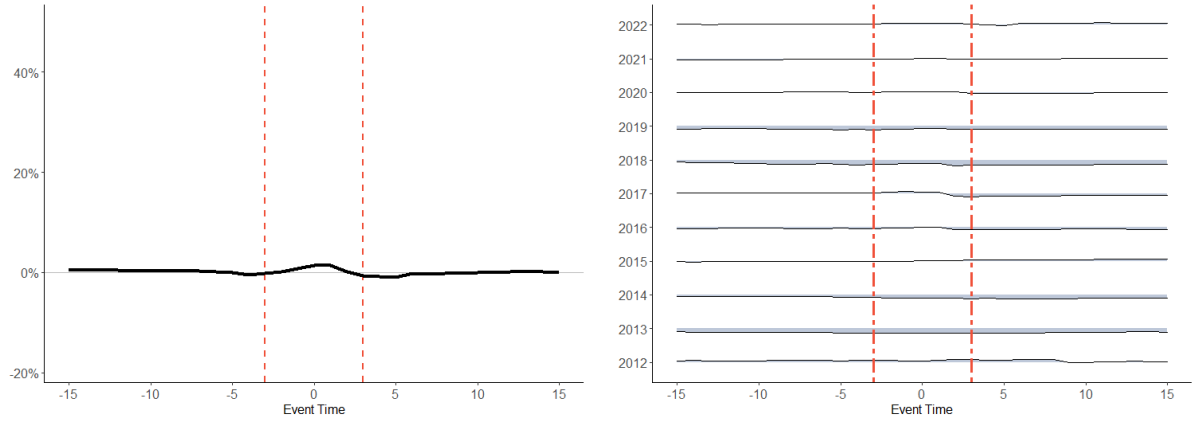
(A) Shanghai



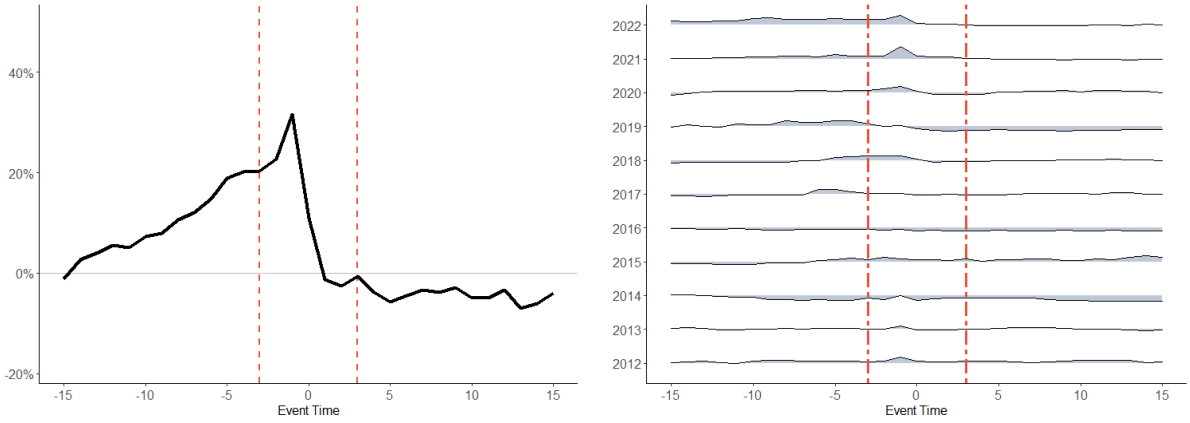
(B) Shenzhen



(C) Taiwan



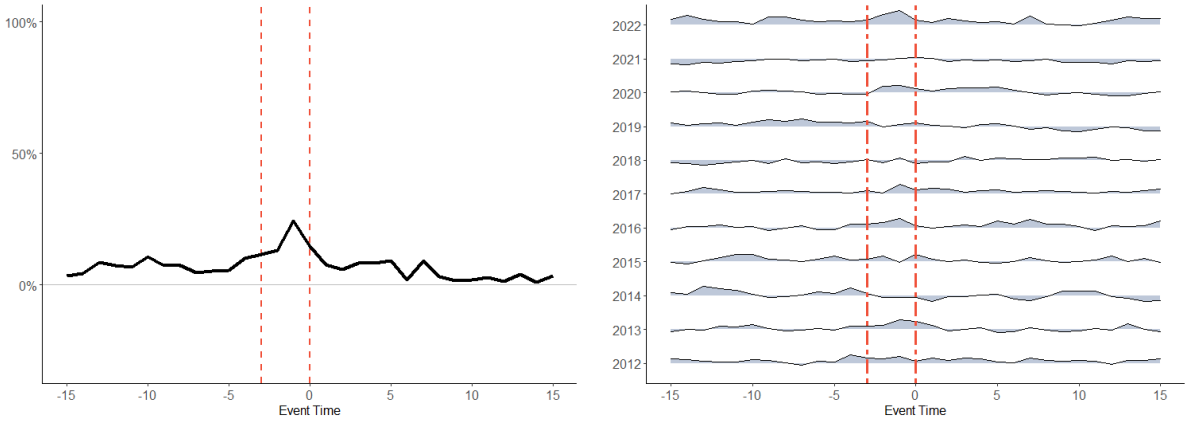
(D) Japan



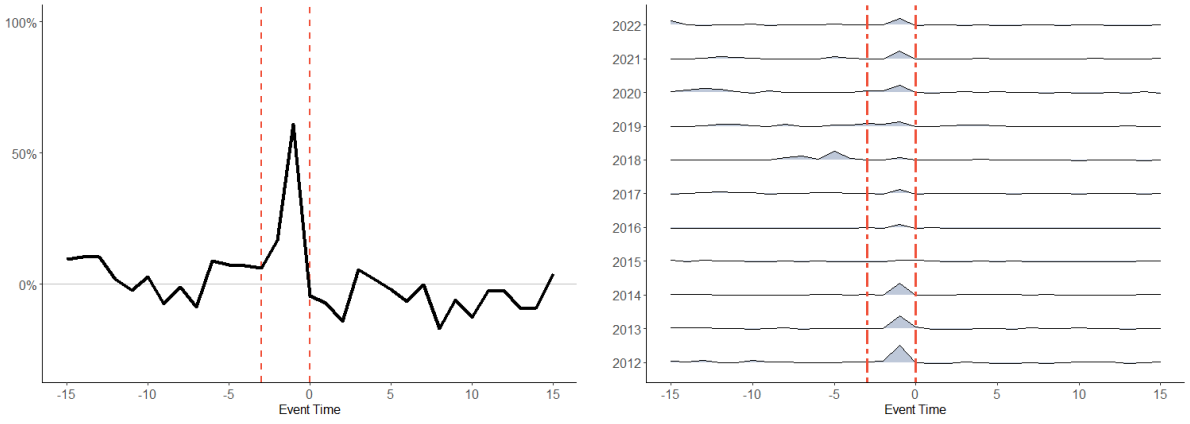
Notes: This figure shows the daily average abnormal short interest as a percentage of equity float around the ex-dividend date with DRIP events included. The left side shows overall development, while the right side shows yearly development. It is a result of estimating Equation (2) with short interest as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

Figure A.2: Abnormal short sales in Asia (DRIP events included)

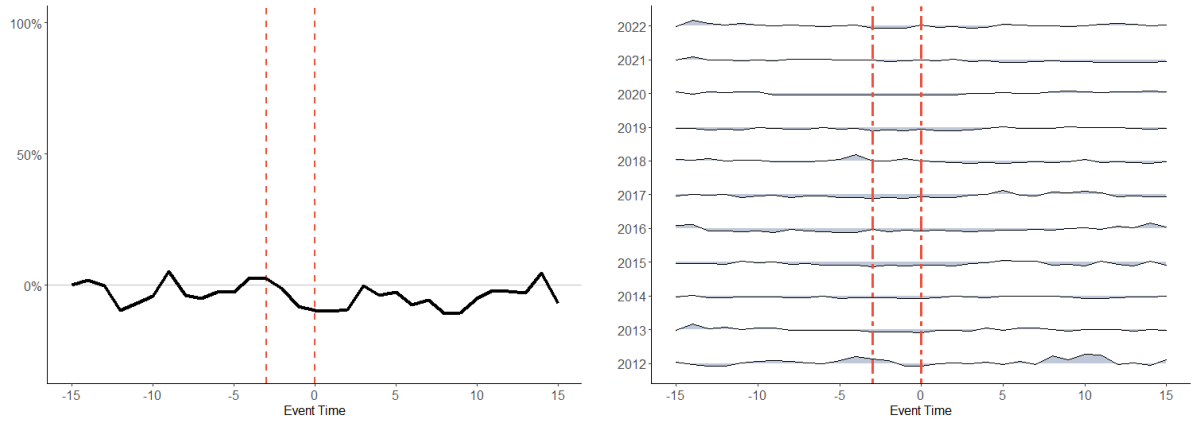
(A) Hong Kong



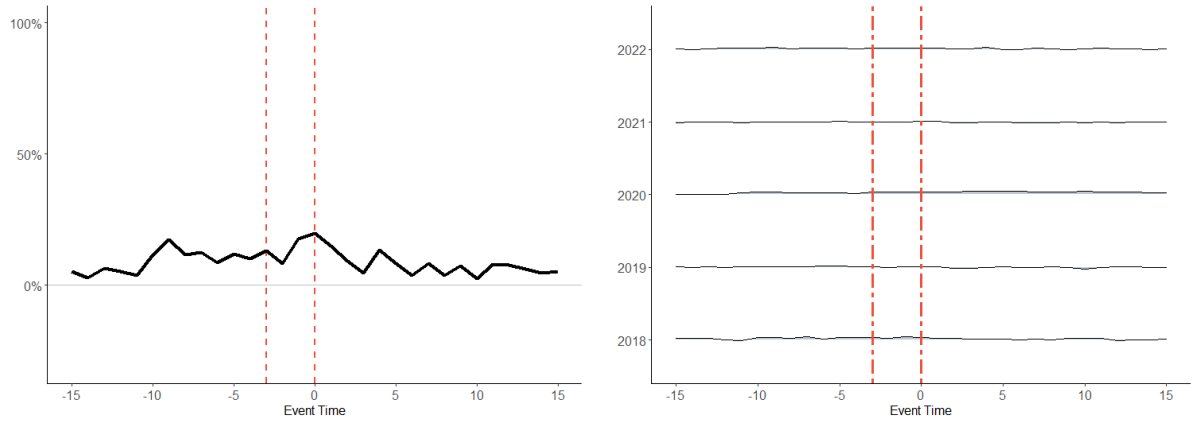
(B) Japan



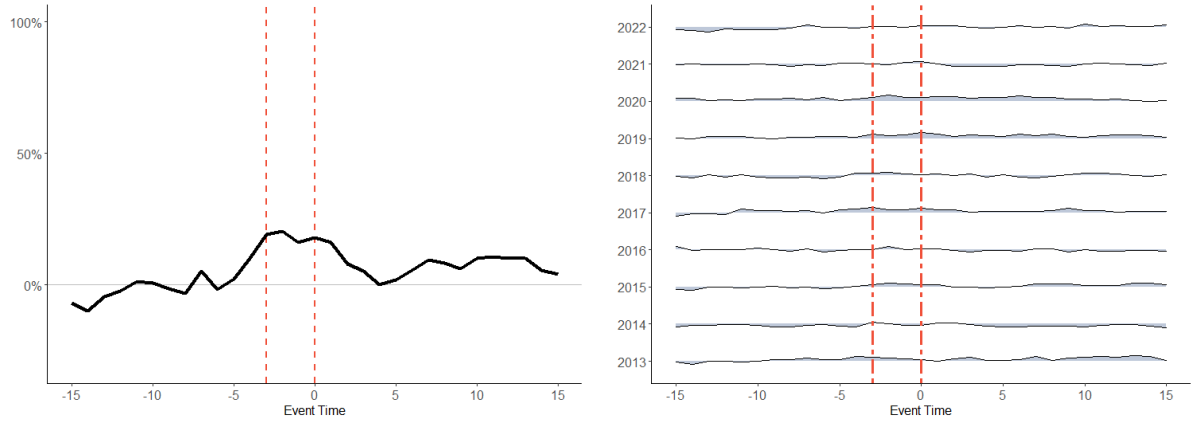
(C) South Korea



(D) Malaysia



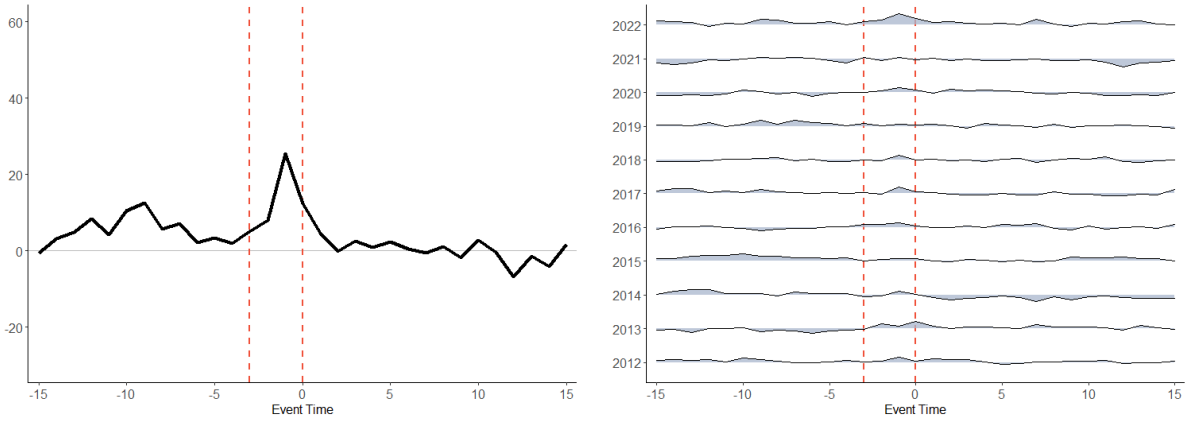
(E) Singapore



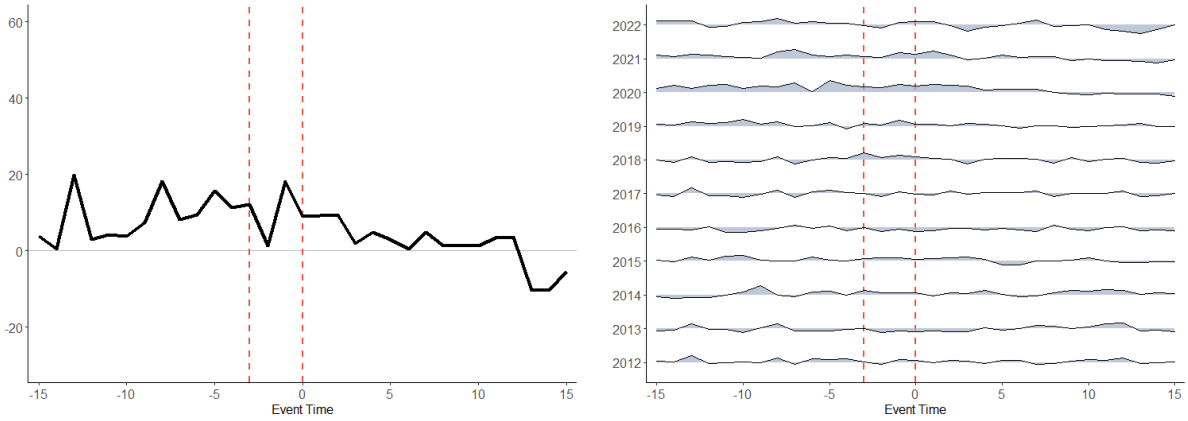
Notes: This figure shows the daily average abnormal short sell volume as a percentage of equity float around the ex-dividend date with DRIP events included. The left side shows overall development, while the right side shows yearly development. It is a result of estimating Equation (2) with short sell volume as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

Figure A.3: Abnormal share turnover in Asia (DRIP events included)

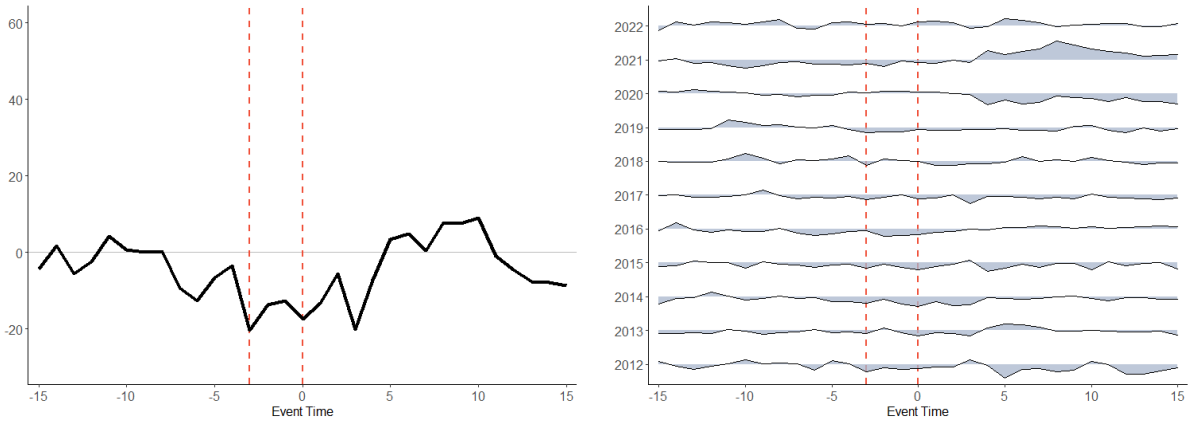
(A) Hong Kong



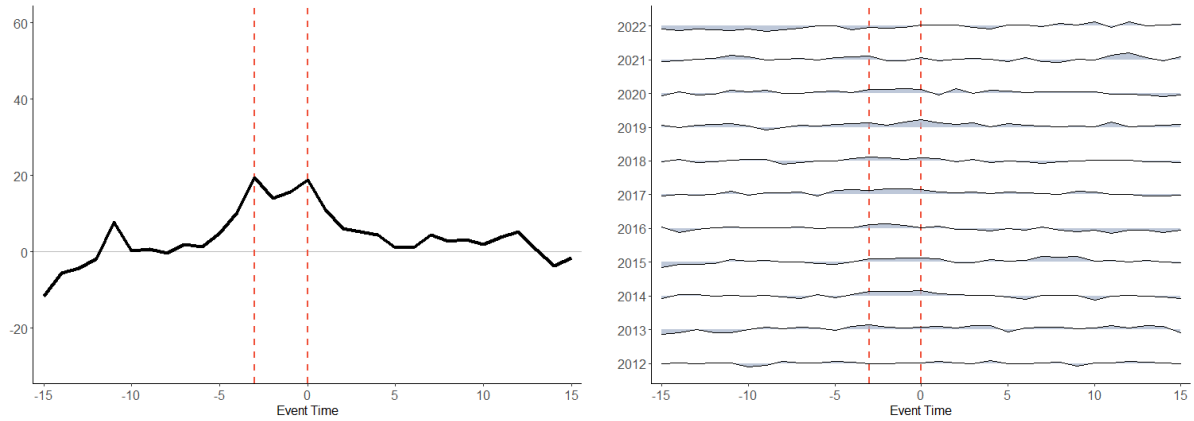
(B) Japan



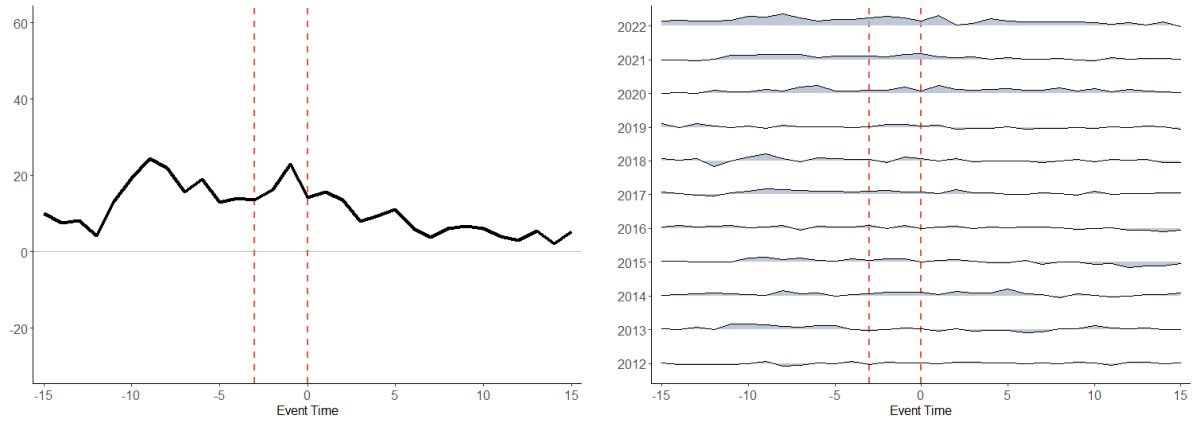
(C) South Korea



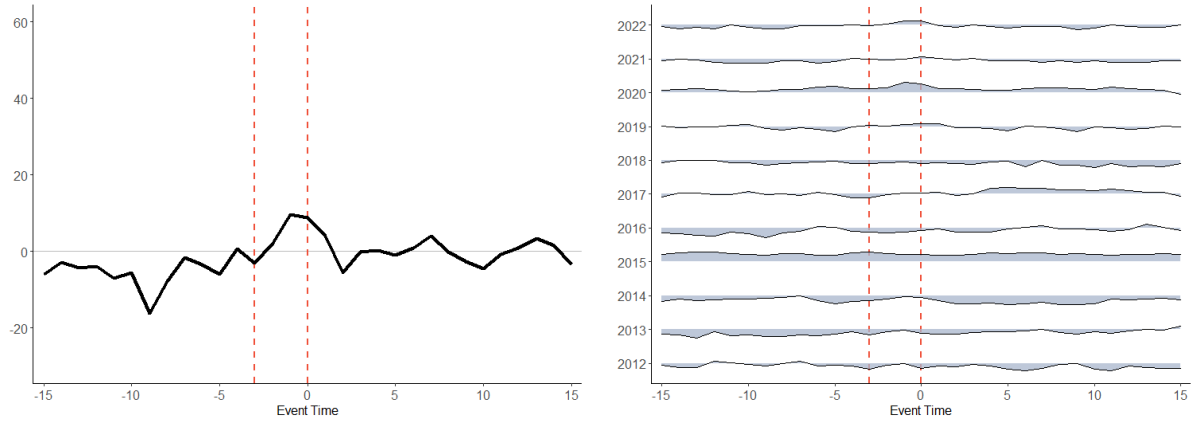
(D) Singapore



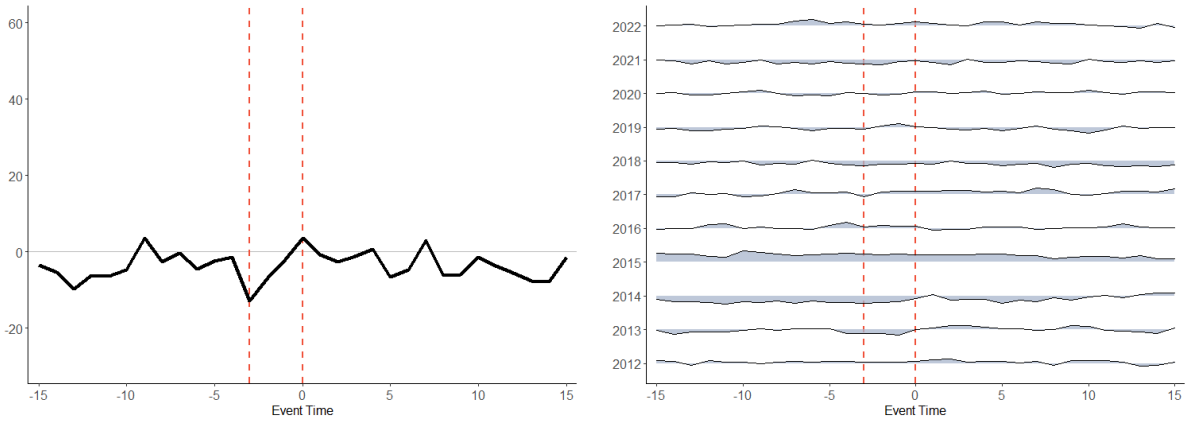
(E) Malaysia



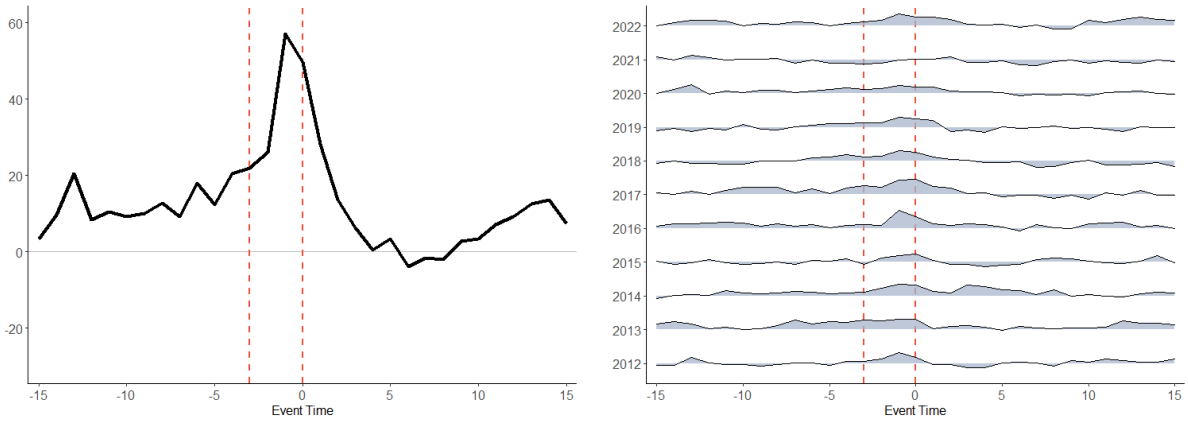
(F) Shanghai



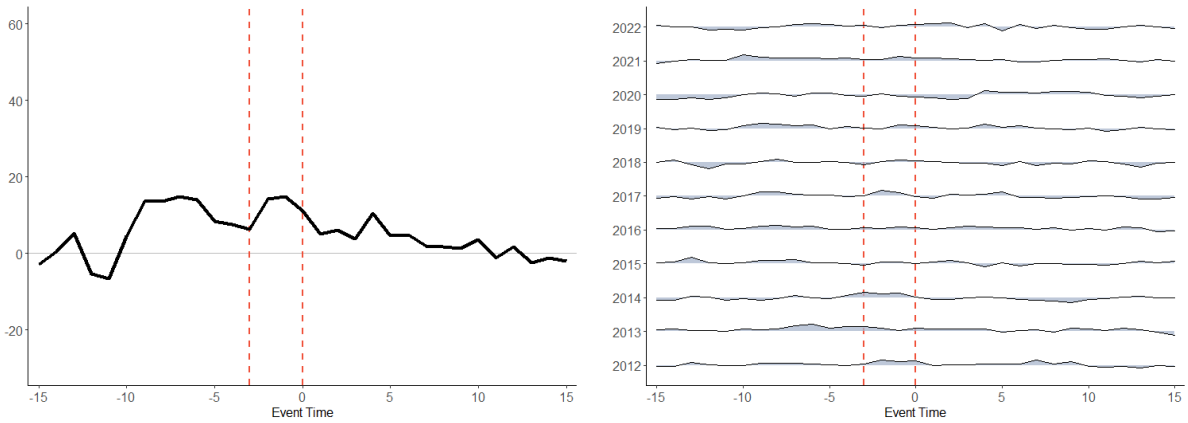
(G) Shenzhen



(H) Taiwan



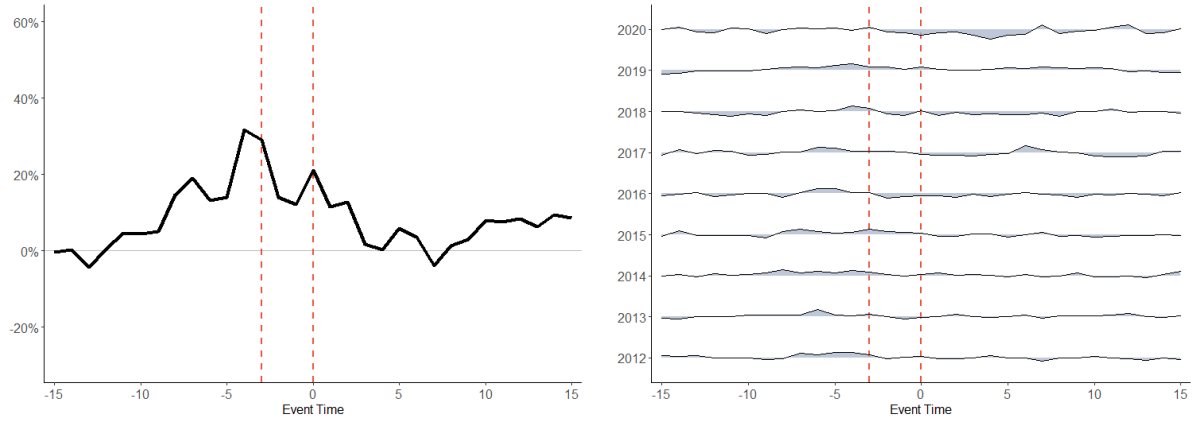
(I) Thailand



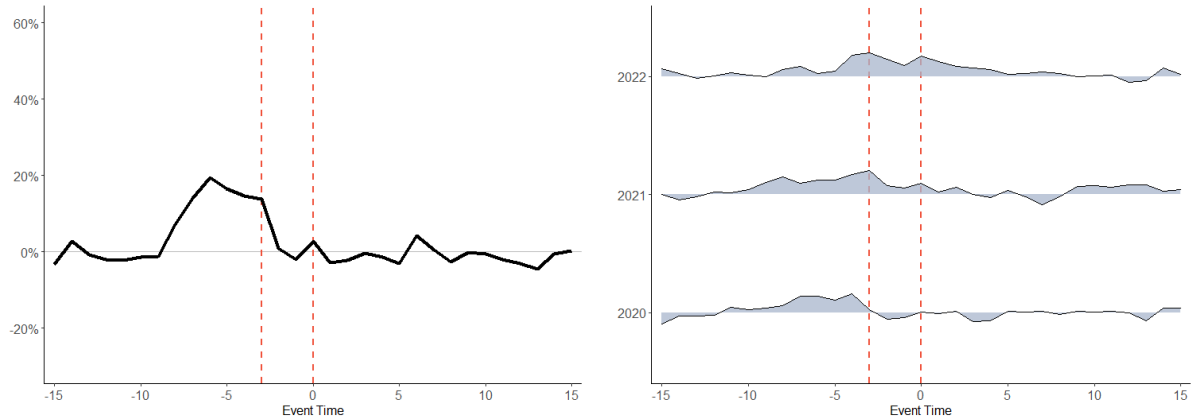
Notes: This figure shows the daily average abnormal share turnover as a percentage of equity float around the ex-dividend date with DRIP events included. The left side shows overall development, while the right side shows yearly development. It is a result of estimating Equation (2) with share turnover as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

Figure A.4: Abnormal share turnover in India (DRIP events included)

(A) Before Finance Act



(B) After Finance Act



Notes: This figure shows the daily average abnormal share turnover around the ex-dividend date. The left side shows overall development, while the right side shows yearly development. Panel (A) is the time pattern before the Finance Act. Panel (B) is the time pattern after the Finance Act. It is a result of estimating Equation (2) with share turnover as the dependent variable and plotting the coefficients λ_τ. The regression is estimated with WLS, where annual avg. market capitalization of each share acts as weights. Stock-level fixed effects and cluster-robust standard errors are also included.

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