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Capital Gains Taxes, Pricing Spreads and Arbitrage: Evidence from Cross-Listed Firms in the U.S.

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Abstract

This paper examines how shareholder-level taxes affect the pricing of foreign firms' cross-listed stocks in the U.S. and what role cross-country arbitrage plays in mitigating this effect. Specifically, we study how an unexpected reduction in U.S. capital gains taxes at the announcement of the 1997 budget accord changes the pricing of cross-listed shares relative to their underlying home country stocks. If the marginal investor in the cross-listed share is a U.S. taxable individual, we expect to find a significant stock price reaction to the external shock. Absent arbitrage, home country stock prices should be largely unaffected by the change in U.S. tax rates. Consistent with tax capitalization, we find that the performance of cross-listed shares in the U.S. is negatively and significantly related to dividend yield during the announcement week. Home country shares generally do not react to the announcement, creating a tax-induced pricing spread. Evidence suggests that cross-country arbitrage partially mitigates this disparity as the spread becomes smaller – and eventually disappears – when we limit the sample to the more and more liquid firms. Overall, our findings indicate that changes in U.S. tax legislation have the potential to affect asset prices in foreign markets.

Key Words: *Tax capitalization, Personal taxes, Dividends, American Depositary Receipts, Arbitrage, International finance*

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1. Introduction

This paper examines how personal taxes affect the pricing of stocks that are simultaneously listed and traded on multiple exchanges around the globe and what role cross-country arbitrage plays in the dissipation of any such effect. Specifically, we study how an unexpected reduction in U.S. capital gains taxes at the announcement of the 1997 budget accord affects the pricing of foreign firms' American Depository Receipts and other types of cross-listed shares ("ADRs") in the U.S. relative to their underlying home country stocks.[1] If the marginal investor in either security is a U.S. taxable individual, we expect to find a statistically significant stock price reaction to the external shock.[2] Otherwise, stock prices should be largely unaffected because the proposed change in U.S. capital gains taxes does not alter the after-tax cash flow expectations of U.S. tax-exempt and foreign investors. Moreover, tax-exempt arbitrageurs may exploit any event-related price deviations from parity and force pricing spreads to revert quickly to pre-event levels. Our goals are to explore the differential pricing effects between shares cross-listed in the U.S. and their underlying home market shares due to different tax clienteles, and to examine the mitigating role of cross-country arbitrage on the tax-induced pricing spread.

Whether shareholder-level taxes are impounded into equity prices is a fundamental question in accounting, finance and economics that has been the subject of an ongoing debate. Though most would agree that prices impound *entity-level* taxes, even the theoretical pricing impact of

[1] Hereafter, we refer to a foreign firm's U.S. cross-listed equity as "ADR", regardless of whether it is an actual American Depositary Receipt, a direct listing, a globally registered share or a New York registered share (see Section 2.1 for institutional details).

[2] We use the term "marginal" investor, although identifying a marginal investor is not critical to our analysis. If prices are set by the "aggregate average response" of investors, then our maintained hypothesis becomes that U.S. taxable individuals form a large enough portion of the investor pool to have an effect on price.

investor-level taxes is unclear.[3] If individual investors indeed react to dividend or capital gains taxation, then share prices are sensitive not only to firm payout policy (e.g., dividends, repurchases or liquidating dividends) but also to changes in the tax rates. To date, empirical evidence on the relation between investor-level taxes and prices has been mixed and leads Shackelford and Shevlin (2001) to conclude that the implicit null throughout this stream of literature (i.e., marginal investors do not pay taxes) is far from rebutted.

We contribute to this literature by looking at the impact of capital gains taxes on ADR prices. By investigating contemporaneous returns in the ADR *and* the underlying stock, we are able to draw inferences about the investor clienteles of the two share types, which essentially represent claims on the same fundamental cash flows. In addition, differences in shareholder composition across the two securities allows us to better disentangle the competing theories of how investor level taxes impact equity value (e.g., tax irrelevance, tax capitalization or lock-in) without any confounding effects of risk-based stories. This adds to the existing stream of literature on the relation between capital gains taxes and asset prices that has focused on companies from a single country (e.g., Amoako-Adu et al., 1992; Lang and Shackelford, 2000) or has examined special occasions in the lifespan of an entity (e.g., Landsman and Shackelford, 1995; Guenther and Willenborg, 1999). However, now one to our knowledge has exploited the ADR setting where firms serve as their own controls and that is subject to a wide range of tax clienteles.

Another motivation for our paper is to understand the role of taxes and cross-country arbitrage in explaining the existence of pricing spreads between ADRs and their underlying securities. Prior studies merely acknowledge the potential role of taxes in creating such a spread. For instance, Froot and Dabora (1999) assemble some descriptive evidence for differences in

[3] For example, there is a raging debate regarding how or whether firms' cost of equity capital on its marginal investment project is affected by shareholder-level taxes (see Blouin, 2005; Zodrow, 1991; Sinn, 1991 for a discussion of the New versus Traditional Views).

after-tax cash flows to investors in "Siamese twin" stocks. Gagnon and Karolyi (2004), who study a broad range of market-based, information-based and trading-based barriers to arbitrage, recognize the potential role taxes may play in pricing spreads, but do not provide direct evidence on the existence of tax-induced spreads. In fact, they conclude that the static nature of their analysis "may mask large and interesting patterns in price deviations from parity … that can arise around specific episodes" (p. 30). We overcome this limitation by using an unexpected legislative proposal as the potential source for a tax-induced pricing spread. In theory, arbitrage should then mitigate any one-sided price reaction and cause the two prices to quickly revert to parity. However, barriers to arbitrage are likely to vary across firms and institutions leading to cross-sectional differences in whether and how deviations from parity prevail. To our knowledge we are the first broad-based study to focus on a particular event in order to better understand pricing disparities between ADRs and underlying stocks.

Finally, we also contribute to the literature on the effects of cross-listing (e.g., Karolyi, 1998; Leuz, 2003) by examining how shareholder-level taxes affect the equilibrium pricing of stocks that are listed across multiple international exchanges. Contingent on whether we find the price reaction in the U.S. to prevail or not, we can draw inferences on how a macro-economic shock in the U.S. geared toward a well-defined clientele (i.e., U.S. taxable individual investors) affects international asset prices. To the extent that shareholder-level taxes affect firms' stock prices in the country of the cross-listing *and* transfer to the home country of the underlying security, cross-listed firms' cost of capital may ultimately change due to their marginal investor base abroad.

We employ an event study methodology around the May 1997 budget accord. Without prior notice, the Clinton administration proposed to cut the long-term capital gains tax rate from 28% to 20%, leaving the dividend tax rate unchanged. Like Amoako-Adu et al. (1992) and Lang and

Shackelford (2000), we use dividend yield as our proxy for a security's sensitivity to the reduction in capital gains taxes and assume that high-dividend yield firms have less of their shareholders' profits taxed as capital gains relative to low-dividend yield firms.

We begin by examining the price reaction of ADRs. If the marginal investor is a U.S. taxable individual, we expect ADR prices to react to the proposed tax rate cut with low-dividend yield firms exhibiting the highest upward reaction. No such response is expected in the underlying stock (unless the marginal investor is a U.S. individual) causing the two prices to diverge and leading to a pricing spread contingent on dividend yield. We next examine the volume reaction to the event and the persistence of the price effect to better understand the theory behind the movement of equity prices toward a new equilibrium. In an attempt to shed light on the role of cross-country arbitrage, we then explore whether stock liquidity and investor sophistication are systematically associated with the price reactions of the ADR and the underlying security.

We find that in the event week, ADRs' stock performance is significantly and negatively related to dividend yield. Based on the inter-quartile range, no or low-dividend yield firms outperform high-dividend yield firms by 121 basis points during the event period. Generally no such pattern is apparent for the underlying securities in the ADRs' home country, creating a tax-induced pricing spread of up to 114 basis points. Our results are robust to various sensitivity tests and also corroborate earlier findings that ADRs' home country markets play a more important role in price discovery than do U.S. markets. Tests of abnormal volume suggest that the reaction is not attributable to short-term liquidity effects, as one would expect if investors were locked-in to higher pre-tax returns before the proposed tax rate cut. If anything, trading volume during the event is below normal for stocks with positive share appreciation over the

preceding year. The persistence tests show positive cumulative abnormal returns for non-dividend paying firms for about 30 days after the event, suggesting that the documented price reaction to the budget accord had some (short-term) price equilibrium effects for ADRs. Consistent with cross-country arbitrage partially mitigating the one-sided price effect, the spread between ADRs and home country shares becomes smaller and eventually dissipates when we limit the sample to firms with low barriers to arbitrage. Home country shares of highly liquid firms (measured as average U.S. trading volume, number of trading days of a firm's ADR or average price impact) and firms with a sophisticated investor base (measured by institutional holdings) closely mirror the price reaction of the ADR during the event rendering the differential pricing spread between low and high dividend yield firms substantially smaller or insignificant. This lends support to our conjecture that changes in U.S. investor-level taxes transfer into international asset prices.

The paper proceeds as follows: Section 2 provides background information on ADRs and the 1997 U.S. budget accord, and develops our hypotheses. In Section 3 we discuss sample selection, present descriptive statistics and outline the empirical design. Section 4 reports results on the stock price and volume reaction immediately surrounding the event, and tests the persistence of the price deviation. In Section 5 we explore the role of cross-country arbitrage on ADR and home country stock prices. Section 6 concludes.

2. Institutional Background and Hypotheses Development

2.1. Cross-listed Equities

Foreign incorporated firms cross-list on U.S. exchanges most commonly in the form of American Depositary Receipts or direct listings. The former are U.S. negotiable certificates representing underlying shares in a company incorporated outside the U.S. Depository banks

(e.g., Bank of New York) immobilize shares of the home country stock with a custodian in the home country and issue U.S. dollar denominated depositary receipts as claims against the immobilized shares. They also convert the proportional share of dividends and other payments into U.S. dollars before transferring them to the shareholders. These securities were developed to make it easier and more cost effective for U.S. investors to purchase shares in non-U.S. firms. Canadian firms exclusively utilize direct listings. The shares traded in the U.S. represent the identical shares traded on the Canadian exchange, and like depositary receipts, the cross-border transactions involve a transfer agent. Under the Multi-Jurisdictional Disclosure System, Canadian firms have modified SEC reporting requirements in the U.S. that lower the costs of direct listing (see Frost and Kinney, 1996, for a discussion of those disclosure requirements). Prior research has documented that U.S. investors own a substantial portion of ADRs and direct listings, suggesting that the marginal investor may be a U.S. taxable individual (Callaghan and Barry, 2003; Ammer et al., 2004; Bradshaw et al., 2004).

In the U.S., depositary receipts, direct listings and directly owned foreign securities are taxed similarly. ADR dividend payments are subject to applicable foreign withholding taxes, which are generally not waived for U.S. tax-exempt investors. Taxable U.S. investors are subject to the U.S. dividend tax, but are eligible for a credit up to the amount of the foreign withholding tax. In addition, the dividend-received deduction is not applicable to foreign investments. With respect to capital gains, ADRs and directly owned foreign securities are taxed identically to U.S. equity investments (see Callaghan and Barry, 2003 for an in depth discussion of ADR taxation). From a risk perspective, an ADR represents the same cash flows as its underlying home country stock. Thus, with the exception of currency risk, there is no difference in the operational riskiness

between the two securities.[4] To the extent that both security types are fully fungible and that markets are efficient, the prices of the two securities should equate (after adjusting for the ADR bundling ratio and exchange rates).

Pricing spreads between the two sets of securities allow for two types of arbitrage: convergence and instrument. First, an investor may engage in "convergence arbitrage" and profit from pricing spreads by taking a long (short) position in the ADR when the ADR is relatively underpriced (overpriced) compared to the underlying security and reverse the transaction after prices have converged. This strategy is not without risk because convergence may not occur in any predictable way and foreign exchange rate risk remains. Second, an investor may engage in "instrument arbitrage" and profit from pricing spreads by exchanging shares across markets (Kim et al., 2000). For example, assuming the ADR is priced lower than the home country security, an investor would take a long position in the ADR *and* at the same time a short position in the underlying stock, go through the ADR conversion process (which takes about a day and is subject to a conversion fee), and then use the de-immobilized home country shares to settle the short position. This form of arbitrage is not riskless since the transactions do not occur simultaneously.[5] Although both of these strategies are not (risk-free) *arbitrage* in a strict technical sense and involve (round-trip) transaction costs, we use the term

[4] In terms of corporate governance, exchange listed ADRs (i.e., those included in our sample) are generally subject to U.S. securities laws. However, there are some cases where ADR investors are more restricted than the home country share investors in their ability to exercise their voting rights (see Cowett, 2004 for a discussion). While this might affect the general magnitude of the pricing spread between an ADR and the underlying share, it should not affect any change in spread during our event period.

[5] Practically speaking, this type of arbitrage is not always successful. For example, in trying to exploit pricing discrepancies, Headwaters Capital of Sausalito, California, sought to simultaneously take a long position in the ADRs of Terra Networks, a Spanish Internet portal company, in the U.S. and a short position in ordinary shares in Spain. However, at the time, Terra's ADR securities were not very liquid (i.e., they were hard to come by). The broker successfully placed the sell order in Spain for the home country stock but was unsuccessful in purchasing the corresponding ADRs, leaving Headwaters' arbitrage incomplete (see "Headwaters wins in arbitration", The Wall Street Journal, April 20, 2004).

"arbitrage" (similar to Pontiff, 1996) to refer to taking a position in a mispriced asset and/or taking the opposite position in its related security.[6]

Prior studies provide evidence of substantial and systematic price differences in cross-listed shares by either examining firms in a few selected countries (e.g., Maldonado and Saunders, 1983; Kato et al., 1991; Wahab et al., 1992; Park and Tavakkol, 1994), a single company (Miller and Morey, 1996; Puthenpurackal, 2004) or the special case of dual-listed firms like Unilever N.V. and Unilever PLC (e.g., Rosenthal and Young, 1990; Froot and Dabora, 1999; de Jong et al., 2004). Based on a comprehensive sample similar to ours, Gagnon and Karolyi (2004) document pricing spreads between ADRs and underlying stocks to generally fall between 20 to 85 basis points, but in the extreme ranging up to a premium (discount) of 66% (87%). None of these papers, though, empirically assess the direct role that taxes play in the formation of such a spread and how tax-induced price deviations vary contingent on barriers to arbitrage.

2.2. Event – 1997 Budget Accord

We investigate returns around the May 1997 budget accord, which brought about a reduction from 28% to 20% in the long-term capital gains tax rate on U.S. investors, but no change in the dividend tax rate. It is important to understand when market expectations about capital gains rates may have changed in the time period leading up to the rate reduction. It is reasonable to believe that the market did not predict a capital gains tax reduction because neither President Clinton's 1996 reelection campaign nor his March 1997 introduction of the 1998 budget endorsed such a reduction. In fact, in March 1997, William Archer, the House Ways and Means Committee Chair at the time, indicated no greater than a 50% chance that a 1997 tax bill would include such a reduction (Tax Notes, March 24, 1997). There was little release of information

[6] We thank Jason Paltrowitz, Vice President of Broker & Institutional Marketing at the Bank of New York ADR Division, for informative discussions on the institutional details regarding arbitrage between ADRs and their home country stocks.

regarding the budget discussions until April 30, when information suggesting a balanced budget was imminent. Finally, on May 2 there was an announcement of an agreement between President Clinton and Congress members to both balance the budget and reduce the capital gains tax rate. Although the actual rates were not specified until August, prior research has focused on May 2 as an event date because the announcement of the budget accord provided the market with new and fairly certain information regarding a decrease in the capital gains tax rate. Indeed, prior research finds that most of the uncertainty regarding the reduction is resolved around this event period (Lang and Shackelford, 2000).

2.3. Hypotheses Development

We develop our hypotheses of how investor-level taxes (and hence changes in these taxes) affect equity prices based on the Klein (1998, 1999) general equilibrium-pricing model (see the Appendix for a more formal discussion of the model). This model is sufficiently rich to test the competing theories of tax capitalization, lock-in and tax irrelevancy, which form the basis for our empirical tax predictions.[7] In the model, price is determined by the present value of after-tax cash flows resulting from both dividends and capital appreciation/depreciation. The impact of capital gains taxes is twofold:[8] (1) the taxes on expected *future* capital appreciation are "capitalized" into the price of the asset (i.e., price is decreasing in expected tax liabilities), and

[7] There exists other theory on the relation between tax rate changes and price. Using a stylized trading model, Shackelford and Verrecchia (2002) study intertemporal tax discontinuities (ITDs), which result from circumstances in which different tax rates are applied depending upon an asset's holding period (e.g., long-term versus short-term capital gains). In an economy where long-term capital gains tax rates are lower than short-term rates, the greater the unrealized short-term appreciation, the greater the incentive to defer selling the asset until long-term qualification has occurred. Likewise, there is greater desire to defer selling securities with accrued short-term capital gains the larger the disparity between the long-term and short-term capital gains tax rates. However, the Shackelford and Verrecchia (2002) predictions stem from short-term liquidity shocks, namely sellers' strikes by individuals with short-term capital gains who are just on the cusp of long-term qualification, where prices must rise to clear the market. Their model is discussed in the context of rebalancing around earnings announcements whereby new information is conveyed to the market. However, in our setting, any potential portfolio rebalancing is attributable to only individual investors. As such, institutional investors should be available to eliminate any potential slack in supply.

[8] In the remainder of this section, we describe the effects of the Klein model assuming capital appreciation. However, the model does allow for the tax benefits of capital depreciation.

(2) tax liabilities on *past* appreciation increase investors' pre-tax rates of return on the firm's stock (i.e., shareholders are "locked-in" and price is increasing in unrealized capital gains). Since the two effects yield opposing predictions, it is uncertain how a change in the capital gains tax rate would impact equilibrium prices. Empirically, none of the key parameters of the Klein model necessary to gauge the relation between capital gains taxes and prices (i.e., the marginal seller's unrealized gain, expected future capital gains, anticipated holding period, and marginal tax rates) are observable. In an effort to find a proxy for cross-sectional variation in capital appreciation, we rely on dividend yield. To the extent that prices are formed based on a weighted average of after tax cash flows stemming from both capital gains and dividends (Poterba and Summers, 1985), the higher the proportion paid in dividends, the lower the proportion paid in capital gains.[9]

Based on the intuition of the Klein model in conjunction with our event (i.e., a reduction in the expected capital gains tax rates) and setting (i.e., prices for ADRs and the underlying securities) we formulate the following set of tax-related hypotheses. Our null hypothesis of tax irrelevance (Miller and Scholes, 1978) follows directly from the ambiguity of the overall effect and the consideration of the marginal investor. If investors are either tax-exempt or not affected in their after-tax cash flow expectations, then the sudden change in capital gains tax rates would have no effect on the price of the security.

H_0: There is *no* significant return in the event period for the ADR or the underlying stock, *regardless* of the firm's dividend paying status.

Our first alternative hypothesis is based on the theory of tax capitalization. Consistent with the idea that the marginal investor in the ADR is a U.S. individual who anticipates incurring

[9] Tax clientele theory predicts that dividend and non-dividend paying stocks could be held by investors with different marginal tax rates (low versus high, respectively). However, both types of investors could benefit from reductions in the capital gains tax rate if the new lower capital gains tax rates are graduated (i.e., lower maximum capital gains rates for lower income individuals).

capital gains, we expect that a reduction in the capital gains tax rate will increase security prices because the present value of the future capital gains tax liability has been reduced. Yet share prices for firms expecting to pay proportionately more of their profits in capital appreciation (i.e., having low dividend yields) should react more positively in the event week. The underlying stock in the home country, though, is unlikely to have a U.S. individual as the marginal investor and therefore should exhibit no reaction.

H_{1a}: During the event week, there is a significant *positive* return for the ADR, which is *decreasing* in dividend yield, but *no* significant return for the underlying stock.

The second alternative hypothesis is based on the lock-in effect and assumes not only that the marginal investor in the ADR is a U.S. individual investor, but also that during the event week these investors would have known that the reduction in capital gains tax rates would apply to their sales of securities. Since the lock-in effect results from shareholders demanding higher pre-tax returns due to impending capital gains taxes, the reduction of the capital gains tax rate should reduce the reservation price of the holders of the ADRs, causing an increase in volume and downward price pressure.

H_{2a}: During the event week, there is a significant *negative* return for the ADR, which is *increasing* in dividend yield, but *no* significant return for the underlying stock.

If we find that prices move consistent with the theory of tax capitalization or lock-in, then the next question is whether these new prices persist. Under the lock-in effect, the price reduction is nothing more than a short-term liquidity shock that should quickly reverse. On the other hand, tax capitalization implies that there is a new equilibrium price. As such, it is an empirical question as to whether the reduction in U.S. capital gains taxes affects prices beyond the event window.

We now turn to the effects of cross-country arbitrage. Absent capital market frictions or restrictions, any one-sided price change in the ADR or underlying security should immediately and completely revert or lead to a parallel change in the other security. Whether a tax-induced pricing shock to the ADR is reflected in the price of the underlying home country security or the ADR price quickly reverts back to the pre-event level is ultimately an empirical question. Transactions costs, liquidity constraints, investor sophistication, short selling restrictions, or market inefficiencies could prevent or delay prices from reaching the new equilibrium, resulting in a temporary tax-induced pricing spread between the ADR and the underlying stock. Under the assumption that the expected tax rate cut is impounded in ADR prices, we complement hypotheses H_{1a} and H_{2a} with the following arbitrage-related hypothesis.

$H_{1/2b}$: When costs of arbitrage are *low*, there is a *significant* return in the event week for the underlying stock similar in size and direction to the return of the ADR.[10]

Since we expect arbitrageurs' ability to profit from temporary price deviations to vary in the cross-section, we formulate the above hypothesis conditional on the barriers to arbitrage. Whenever the barriers to arbitrage are high, we expect a pricing spread to develop as it will take longer for the two prices to convert to a new equilibrium. Gagnon and Karolyi (2004) document that such deviations from parity can persist for at least up to five trading days. On the other hand, for easily arbitraged stocks, we expect ADR and home country prices to react similarly to the U.S. capital gains tax rate reduction, resulting in a reduced or insignificant pricing spread. This latter result is consistent with changes in U.S. tax rules affecting international asset prices. Figure 1 summarizes the predictions based on our hypotheses developed above.

[10] Both H_{1b} and H_{2b} are also consistent with the marginal investor of the underlying stock being a U.S. taxable individual, which we believe is unlikely.

3. Data, Descriptive Statistics and Research Design

3.1. Sample Selection and Description

The sample selection is designed to identify ADRs and their underlying securities with sufficient trading activity in the two years surrounding the Congressional passage of the May 1997 budget accord. Since we are looking at the effect of tax rule changes on contemporaneous ADR and home market returns, we want to avoid stale or inefficient prices due to non-trading, one-sided trading or low trading volume. To ensure that results are not confounded by newly listed firms and delisting firms, we require a sample with a reasonably long trading history before and after the event.

We draw the initial sample from the intersection of foreign firms with U.S. prices on CRSP and home country stock prices on Datastream. First, to identify ADRs, we use CRSP share codes (first digit of SHRCD equal to 3). Next, we identify Canadian direct cross-listings by means of the Compustat country of incorporation (FINC equal to 9), and then match to CRSP via the CRSP/Compustat merged file. Finally, we merge our set of foreign firms with available U.S. prices to the Datastream universe and confirm the inclusion of these firms in the Citibank Universal Issuance Guide (www.citibank.com/adr) or the Bank of New York's Complete DR Directory (www.adrbny.com). This yields 179,557 pairs (ADR and underlying stock) of daily returns between May 1, 1996 and April 30, 1998 representing 431 individual firms.

Next, we require that firms be listed and actively traded in the U.S. during our five-day event period (April 30 to May 6, 1997), which reduces the sample to 318 firms with 152,955 observations.[11] In an attempt to ensure informative prices, we further eliminate (1) firms that

[11] We define a firm as actively traded if U.S. price and volume data exist on four out of the five event days. If we limit our sample to firms with consecutive trading during the event (i.e., five out of five days), we lose another 42 firms. Using this smaller sample does not affect our main findings. All the results are similar and the inferences

recently initiated an ADR exchange listing in the U.S. (i.e., exchange listing date after May 1, 1996), (2) observations with only one-sided trading (i.e., for each trading day, volume and price data must exist in the U.S. *and* the home country), and (3) observations with U.S. trading volume of less than US$ 50,000.[12] The first criterion is necessary because an exchange listing in the U.S. is a special event in the lifespan of a foreign corporation (see Leuz, 2003 or Karolyi, 2004 for an overview). Firms initiating a U.S. cross-listing experience abnormal returns at the listing announcement as well as during the pre- and post-listing period (e.g., Karolyi, 1998; Errunza and Miller, 2000; Sarkissian and Schill, 2004). Furthermore, the effects are most pronounced in the first year immediately surrounding the cross-listing. This criterion eliminates 13,240 observations and 40 firms. Criteria (2) and (3) omit stale prices and assure some minimal level of liquidity to allow efficient price formation. The sample selection procedure yields a final sample of 98,389 return pairs representing 266 firms.

Table 1, Panel A provides an overview of the sample composition. For each sample country, we report the number of firms, dividend paying firms, daily observations and dividend paying daily observations. Aside from the Canadian firms, which are approximately 35% of our sample, only four countries compose 5% or more of the total observations (i.e., Australia, Japan, Mexico, and the United Kingdom).

Table 1, Panel B reports descriptive statistics of our sample firms. DIVYLD and YLD_DUM are the continuous dividend yield (calculated as the sum of the last twelve months of dividends scaled by daily stock prices) and the dichotomous dividend-paying indicator (equal to

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remain unchanged. If, on the other hand, we do not impose any trading restrictions during the event period, the sample size increases by 23 firms, and all the results are very similar to those reported in the text.

[12] We do not eliminate any observations during the event window based on U.S. trading volume since low trading activity may also reflect information with regard to the effect under study. See also Section 4 where we examine the trading volume reaction to the event as well as Section 5 where we assess the impact of liquidity on our results.

one for dividend paying firms), respectively.[13] About two-thirds of our observations are from firms that paid dividends over the last fiscal year. VOL_ADR and VOL_HOME represent daily US$ trading volume (in thousands) for a firm's ADR in the U.S. and the underlying stock in the home country. In both markets, volume is highly skewed, but generally higher in the firm's home country. We discuss the definitions of the remaining firm characteristics, which will be used in our liquidity tests, in Section 5.

3.2. ADR Returns, Home Market Returns and Return Spreads

In our main analyses we use either the return of a firm's ADR in the U.S. (RET_ADR), the return of its underlying security in the home country (RET_HOME) or the difference between the two (SPREAD = RET_ADR – RET_HOME) as our dependent variable. We compute each return as the daily change in stock price based on closing prices in local currency (dividend and split adjusted).[14]

The observations in the event period are of special concern. In many countries the five trading days from April 30 to May 6, 1997, coincide with one or more national holidays (e.g., Cinco de Mayo in Mexico, Constitution Memorial Day in Japan or May Day Bank Holiday in the UK). So, for many sample firms we have to discard one or more event day observations with valid RET_ADRs because of missing RET_HOMEs. In these cases, we add event-period

[13] We scale the dividends by the daily stock price five days before the event, as we want to avoid any spurious correlations by using the stock price in the event week.

[14] In contrast to Gagnon and Karolyi (2004), we do not attempt to correct our return metrics for non-synchronous trading between the U.S. and foreign markets. First, our event window covers a five-day period, which allows for some spillover effects. Second, when we include lead and lag values of the independent variables in our analyses, the results (not reported) remain virtually unchanged. Finally, the inclusion of country-fixed effects should account for any systematic biases due to partially or non-overlapping trading hours.

RET_ADRs from one-sided trading in the U.S. to the next RET_ADR with home country trading data available.[15]

A variable used in later analyses is PDIFF, which reflects the difference between contemporaneous ADR and underlying stock prices and is measured as the natural log of the ratio of the ADR price to the underlying stock price, both denominated in US$. As many ADRs do not map one-to-one into home country stocks, we multiply the underlying stock price by its bundling ratio.[16] This metric is intended to account for cross-autocorrelation between RET_ADR and RET_HOME and should help control for prices' tendency to revert towards parity (Gagnon and Karolyi, 2004).

Table 1, Panel B reports that RET_ADR and RET_HOME are similar with a mean of about 10 basis points and standard deviations of roughly 3%. This translates into a tight SPREAD distribution with 80% of the observations having a return spread within ± 2%. However, not all return pairs are so close. PDIFF has a similar distribution. While the average price differential is 34 basis points, some companies are traded in the two markets at prices far from parity.[17] Since market efficiency implies that extreme observations form part of the effect researchers are trying to capture (Kothari et al., 2005), we refrain from any data trimming in our main analyses. When we do trim for sensitivity purposes (see Section 4.2), the return boundaries quickly shrink to a reasonable range (from -23% to +29% after winsorizing at the ± 0.025% level).

[15] This adjustment is consistent with RET_HOME immediately after the international holiday incorporating all the information that is embedded in RET_ADR over the two trading days (the holiday and the day after). Results throughout the paper are not sensitive to the inclusion of this ADR return.

[16] Canadian shares require no adjustment since they trade on a one-to-one basis in the U.S. For all other firms we obtain ADR bundling ratios from either the Bank of New York ADR database or the JP Morgan Global Issuance file.

[17] When we calculate firm average values of PDIFF, we get results that closely resemble those presented by Gagnon and Karolyi (2004): our inter-quartile range is 85 basis points with extreme observations trading at a discount (premium) of up to 76% (76%) in the U.S. compared to their home market shares.

3.3. Market and Currency Controls

In our analyses we control for three market forces: the U.S. stock market (US_MKT), the stock market in the country of the underlying security (HOME_MKT) and the exchange rate (FX). US_MKT is the daily CRSP value-weighted market return. HOME_MKT and FX are the daily changes in the relevant home country market indices and the foreign exchange rates (foreign currency relative to US$), respectively. Non-U.S. data and exchange rates are collected from Datastream. Table 1, Panel B provides descriptive information on the three market characteristics. They are on average slightly positive and the inter-quartile range never exceeds 100 basis points.

Next, we investigate univariate relations between the return variables, the market forces and the dividend paying characteristics. Table 1, Panel C presents Pearson and Spearman rank correlation coefficients and p-values. The correlation between RET_ADR and RET_HOME is only about 0.65 suggesting that market and institutional forces affect ADRs and the underlying stocks differently. Notice that RET_ADR is correlated similarly with both US_MKT and HOME_MKT; whereas, RET_HOME has a much higher correlation with HOME_MKT than US_MKT suggesting only a subordinate pricing role for US_MKT in the ADRs' country of origin. Note further that the negative correlation between FX and RET_ADR follows from ADRs being quoted and traded in US$; all else equal, an increase in exchange rates decreases the US$ value of a security denominated in foreign currency. Finally, SPREAD is not associated with a firm's propensity to pay dividends (DIVYLD and YLD_DUM).

3.4. Specification of Empirical Model

To empirically test our competing tax-related hypotheses, we build on a model by Lang and Shackelford (2000), who interact a dividend-paying indicator (a proxy for a firm's sensitivity to

the tax rate reduction) with an event indicator and include the U.S. market return as a control for general market conditions. We modify this model for our setting in several ways. First, we use the continuous dividend yield in place of a dichotomous indicator in order to better capture the variation across the dividend paying firms in our sample. Next, in accordance with prior research on the return spread of cross-listed firms (Froot and Dabora, 1999; Kim et al., 2000; Patro, 2000; de Jong et al., 2004; Grammig et al., 2005) we include two additional control variables: exchange rate fluctuations (FX) and home country market index returns (HOME_MKT). They account for the fact that home country returns are expressed in local currency and that substantial information with respect to price discovery is produced in ADRs' country of origin. Based on Gagnon and Karolyi (2004) we also include lagged log price differentials of the ADR and underlying stock (PDIFF) in our model to control for mean reversion across the two sets of prices. Finally, we include country-fixed effects to account for systematic country-level biases (e.g., time zone differences, varying transaction costs between national exchanges or different legal and institutional environments).

This leads to the following empirical model:

$$\text{Dependent Variable}_{i,t} = \beta_0 + \beta_1 \text{DIVYLD}_{i,t} + \beta_2 \text{EVENT}_t + \beta_3 \text{EVENT}_t * \text{DIVYLD}_{i,t} + \beta_4 \text{US\_MKT}_t + \beta_5 \text{HOME\_MKT}_{i,t} + \beta_6 \text{FX}_{i,t} + \beta_7 \text{PDIFF}_{i,t-1} + \sum \beta_j \text{Country Controls}_i + \varepsilon_{i,t}. \quad (1)$$

We define the dependent variable either as RET_ADR, RET_HOME, or the difference between the two (SPREAD). *i* and *t* represent firm and time indicators. EVENT is a binary indicator set equal to one if the observation date is on or after April 30 through May 6, 1997, the five trading days surrounding the passage of the budget accord. The remaining variables are as described above. We estimate all models using OLS with heteroscedasticity corrected standard errors that are clustered by firm to control for within firm correlation among variables.

When RET_ADR is the dependent variable, our main prediction based on tax capitalization (lock-in) stipulates a negative (positive) sign on the interaction term between EVENT and DIVYLD (β_3), consistent with non or low dividend yield firms outperforming (underperforming) high dividend yield firms during the event. When using RET_HOME as the dependent variable and absent arbitrage, we expect to find no difference related to the firm's payout policy (β_3=0). Taken together, we predict a negative (positive) sign on β_3 for the SPREAD specification. Depending on the degree of arbitrage, under tax capitalization (lock-in) β_3 in the RET_HOME and SPREAD specification is expected to become significantly negative (positive) and insignificant, respectively.

The coefficient on EVENT (β_2) will capture the event week return for non-dividend paying firms *incremental* to that captured in the U.S. market control. Absent the U.S. market control and consistent with tax capitalization (lock-in), we would expect a positive (negative) sign on β_2, consistent with non-dividend paying firms exhibiting positive (negative) abnormal returns. However given the presence of the U.S. market control, if the composite of our non-dividend paying sample firms react – on average – similar to the U.S. market as a whole, then β_2 will be insignificant.[18] Thus, we refrain from putting a signed prediction on this parameter. Note, though, that our main hypothesis (i.e., prediction on β_3) does *not* rely on how our sample compares to the overall U.S. market, as US_MKT purges out the *average* event week return whereas EVENT*DIVYLD captures the *incremental* returns to dividend paying firms over and above the returns to non-dividend paying firms.[19]

[18] Upon inspection, we find that about two thirds of our sample consists of dividend paying firms. In comparison, Fama and French (2001) document that in the U.S. dividend payers also account for more than 75% of aggregate book and market values during 1993-1998.

[19] For example, assume that our sample and the U.S. value-weighted market index are both comprised of 30% (70%) non-dividend (dividend) paying firms. Also assume that the average returns for non-dividend (dividend) paying firms in our sample and the U.S. market are 1.2% (0.8%) during the event week. While the event week effect for non-dividend paying firms is 1.2%, controlling for the U.S. market return of 0.92% (30% * 1.2% + 70% * 0.8%)

With regard to the market controls, we expect RET_ADR to be positively related to US_MKT and HOME_MKT. In the home countries, the role of the U.S. stock market is less obvious. Although there exists some evidence of a positive relation between RET_HOME and US_MKT (e.g., Kim et al., 2000; Eun and Sabherwal, 2003), we refrain from putting a signed prediction on this parameter. Since the relative importance of the US_MKT is likely to differ between RET_ADR and RET_HOME, we predict a positive coefficient on US_MKT and a negative coefficient on HOME_MKT in the SPREAD regressions.[20]

Prior studies suggest a negative association between exchange rates (computed as discussed in Section 3.3) and RET_ADR, as well as a positive (or insignificant) relation with RET_HOME (e.g., Froot and Dabora, 1999; Kim et al., 2000; Grammig et al., 2005).[21] Together these effects indicate a negative relation between FX and SPREAD. Furthermore, if prices tend to revert towards parity, we should find a negative (positive) coefficient on PDIFF using RET_ADR (RET_HOME) as the dependent variable. Together, this implies a negative effect on SPREAD.

4. Price and Volume Reaction to the 1997 Reduction in U.S. Capital Gains Taxes

4.1. Univariate Returns Analysis

We begin by providing univariate results on the price reaction to the 1997 budget accord by comparing RET_ADR and RET_HOME across dividend payout policy over the five-day event period as well as the non-event period and report the results in Table 2. Recall from Section 2.3 that our hypotheses are predicated on extant theory and that our predictions regarding return

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will reduce the coefficient on EVENT (potentially to an insignificant level). However, the combination of EVENT and US_MKT would capture the full 1.2% return for non-dividend paying firms and would allow for EVENT*DIVYLD to fully reflect the *incremental* returns to dividend paying firms.

[20] For instance, Eun and Sabherwal (2003) suggest that the contribution of U.S. exchanges to the price discovery for a sample of Canadian cross-listed firms is on average 38%. They also show that U.S. prices adjust more to Canadian prices than vice versa.

[21] The positive predicted sign on FX in the RET_HOME specification assumes that our sample firms have at least some US$ exposure and that, on average, an increase in exchange rates (foreign currency to US$) is interpreted as good news by investors.

reactions to a change in the capital gains tax rate range from positive to negative in the event week. When comparing mean values across the two time periods, we find that event period returns are statistically higher than the non-event period returns, regardless of firm payout policy or market. However, only non-dividend paying firms' shares (i.e., those with the most potential to be affected by the change in the capital gains tax rate) give rise to a significant difference in SPREAD. Within the event week we observe that RET_ADR for non-dividend paying firms outperform RET_ADR for dividend payers by 36 basis points per day. The difference between RET_HOME for non-dividend and dividend firms is only -2 basis points and not statistically different from zero. This creates a significant 38 basis point daily SPREAD associated with payout policy during the event, which is not evident in the non-event period.

Figure 2 pictorially presents the above findings. Rolling five-day averages of RET_ADR and RET_HOME for both dividend and non-dividend firms are presented in the 30 days surrounding the event (upper two quadrants of the graph). Confirming the results in Table 2, we observe a clear upward movement in RET_ADR for non-dividend paying firms after the announcement of the budget accord. Dividend paying firms are less affected by the tax rate proposal. A similar, although less pronounced pattern appears for RET_HOME. The differential returns behavior becomes more obvious in the two bottom quadrants, where we compare RET_ADR with RET_HOME across dividend and non-dividend payers. While there is clear gap of almost 40 basis points immediately following the event for non-dividend payers, no such spread is apparent for dividend paying firms.[22] In fact, the spread for the non-dividend paying firms is in the top

[22] To gauge the economic importance of the event, we attempt to ascertain whether the spread exceeds the arbitrage tunnel. In an ad-hoc manner, we compare our event week spread of 200 basis points to the 160 basis points average two-way costs of arbitrage in ADRs for institutional investors (see Chakravarty et al., 2004, Table 5, Panel A) plus an average conversion cost of 10 basis points (estimated by taking a nickel conversion cost as reported in Mehta, 2003, deflated by the average ADR share price in our sample). Although we do not have a specific estimate for risk, we surmise that the tax-induced spread persists because the potential net gains from arbitrage (i.e., 30 basis points) are relatively small and do not compensate adequately for risk (e.g., currency or liquidity risk).

2% of the distribution of five-day spreads over the entire sample period. The results are magnified in Figure 3, which depicts the return spread for dividend and non-dividend payers. Overall, the univariate findings imply that prices went up around the capital gains tax reduction and that this effect was decreasing in dividend yield, consistent with tax capitalization. However, all analyses so far are based on raw returns and thus should be interpreted cautiously. To get a clearer picture, we need to account for general market conditions around the event.

4.2. Multivariate Returns Analysis

Table 3 reports the results of the multivariate returns analysis. The three columns present the coefficient estimates from regressing the dependent variable on our test variables and controls, where the dependent variable is RET_ADR, RET_HOME and SPREAD, respectively. Consistent with tax capitalization, results show that ADR firms with no or low dividend yields outperform high-dividend yield firms by approximately 1.21% during the five days surrounding the event (2% two-tailed).[23] No such divergence is apparent when looking at RET_HOME. The coefficient on EVENT*DIVYLD, though negative, is far from statistically significant. Together, this creates a negative and highly significant coefficient on the interaction term in the SPREAD specification, where the effect on the dependent variable of moving from the 25th to the 75th percentile of the dividend yield distribution is about 1.14% over the event week.[24,25]

[23] We assess the magnitude of the effect by computing the estimated change in ADR returns based on the inter-quartile range of the DIVYLD variable, i.e., (2.69% – 0%) * -0.0898 * 5 days = -1.21%.

[24] An alternative explanation for our results is that the macro-economic shock created by the reduction in the capital gains tax rates differentially alters the price formation process of non-dividend and dividend paying firms. We run CUSUM analyses in order to determine whether there was a structural shift in our model. Untabulated results suggest that our regression model remained stable over the entire sample period.

[25] In untabulated analyses, we also test whether the event generated any real economic effects. Since Congress enacted the capital gains reduction to stimulate the U.S. economy, we expect a favorable U.S. market reaction. We regress foreign currency, local, and U.S. market returns (our proxies for macroeconomic effects) on the event indicator, lead and lag values of the dependent variable, and the pair of market and/or currency controls not used on the left-hand side. We find no economic effect of the event on local market returns, a significant and negative effect on foreign currency returns and, as expected, a significantly positive effect on market returns in the U.S.

A comparison of the remaining variables also reveals some interesting details. First, the insignificant coefficient on EVENT does *not* suggest that non-dividend paying firms did not react to the event (our univariate results show that they did). It merely shows an insignificant reaction *after* controlling for general market conditions, which exhibit a positive event week performance. Next, all of the market controls as well as the lagged price differential behave as predicted and are generally highly statistically significant. Both US_MKT, and HOME_MKT explain significant variation in RET_ADR. However, for RET_HOME, the coefficient on HOME_MKT is close to one and highly significant, whereas the coefficient on US_MKT is insignificant. In addition, the coefficient on FX is significantly negative in the RET_ADR specification, and positive but only marginally significant when using RET_HOME as the dependent variable. These differential associations are captured in the SPREAD regression, where we find significant relations with currency fluctuations, but also with U.S. and local market returns. Finally, lagged PDIFF behaves consistent with prices reverting towards parity over time.[26]

To assess the sensitivity of our results, we conduct a series of robustness tests and report the abbreviated results (i.e., on EVENT and EVENT*DIVYLD) in Table 4. First, we analyze the robustness of our results to changes in the sampling and event periods. Our a priori expectation is to find generally weaker results. If the change in tax rate proposal is at least partially preempted by the market, then a shorter sample period will increase the weight attributed to higher pre-event returns. A shorter event window, on the other hand, risks missing some of the capital market response. However, as Table 4 indicates, in both cases our inferences remain

[26] Note that we do not control for differing firm characteristics (i.e., size, financial leverage, return on assets) since our research design assures that (in the spread regressions) each company serves as its own control. Moreover, if we include firm-fixed effects instead of country controls, the results also hold, albeit at slightly weaker levels of statistical significance.

unchanged. When we shorten the overall sampling period from event ± 12 months to event ± 3 months, there is a positive stock price reaction to the event that is decreasing in dividend yield in the U.S., but not in the home market, creating a significant return spread. When we reduce the event period from a five-day to a three-day window beginning at the announcement day of the budget accord (i.e., May 2 through May 6), the RET_ADR results are slightly attenuated, consistent with the shorter event window missing part of the capital market response. The absence of a reaction in the home market, though, renders the spread highly significant.

Next, we ensure that our results are not driven by how we calculate the return measures. When we replace home country returns denominated in local currencies by measures translated into U.S. dollars, the results are virtually the same as in our original specification. Further, in an attempt to identify potential data errors (or to assess the influence of outliers), we winsorize the daily returns at the 0.025 percentile. Again, the results are very similar to those already reported and none of the inferences change.

Finally, to allow for a comparison with Lang and Shackelford (2000) we replace the continuous dividend yield variable with the binary indicator YLD_DUM, which is set equal to one for dividend paying firms. Because the vast majority of our firms are dividend payers, we expect to lose variation across these firms, which should dampen our results. Indeed, as shown in the last two rows of Table 4, the interaction term between EVENT and YLD_DUM is no longer significant in the RET_ADR specification.[27] In the SPREAD specification, though, the coefficient on EVENT*YLD_DUM is negative and highly significant, consistent with our prior results (and tax capitalization). The conjecture of a loss in power when using a dichotomous

[27] In comparison, Lang and Shackelford (2000) report a significant 4.25% event week return difference between dividend and non-dividend paying firms for their sample consisting of the 2,000 largest U.S. corporations. When we limit our sample to the larger, more liquid firms (i.e., those that trade every day), we find an event week return differential of approximately 4%, which is significant at the 1% level.

dividend indicator is further supported when we limit the sample to the sub-set of dividend paying firms and use dividend yield (not tabulated). Results are very similar to those already reported with a negative and significant EVENT*DIVYLD interaction in the RET_ADR (-7.56, t=2.33) and SPREAD model (-4.58, t=2.51), suggesting that variation in the dividend yield explains the reaction (i.e., firms with higher dividend yields exhibit less of a reaction to the capital gains tax rate reduction than low-dividend yield firms).

In additional analyses (results not tabulated), we analyze the robustness of our findings across alternate model specifications. First, to control for the possibility that dividend yield may be correlated with market risk and to account for the fact that ADRs and home country stocks react differently to changes in the respective local and foreign markets, we include firm specific betas for the ADRs and the underlying securities in the regression models.[28] None of the beta factors is statistically significant and our previous results remain quasi unchanged. Second, in accordance with Gagnon and Karolyi (2004) we estimate a regression model where we include one-day lead and lag values of the market factors (HOME_MKT, US_MKT and FX). This allows us to control for asynchronous trading between the U.S. and home markets (i.e., due to time zone differences) and to capture slow information diffusion across markets. Results are not affected by this alternative specification. The coefficient on EVENT*DIVYLD is negative and significant in the RET_ADR (-7.60, t=1.99) and SPREAD model (-6.33, t=2.86) while it is insignificant for RET_HOME. Finally, we identify two other dates of extreme positive market performance during our sample period (e.g., October 30, 1997 and January 15, 1998) to see whether dividend yield appears to act as a proxy for some omitted market-risk reaction between

[28] Market betas of the ADR and the underlying stock are estimated based on 100-day, one-factor market model regressions on either the U.S. stock market or the stock market in the country of the underlying security, leading to a total of four different beta factors (i.e., two for the ADR and two for the underlying security).

dividend and non-dividend paying stocks.[29] We rerun our primary analysis where EVENT is set to each of the other extreme positive returns periods. For ADRs the interaction term, EVENT*DIVYLD, is insignificant in both of these alternative periods and none of the patterns across the three dependent variables is consistent with our tax predictions, suggesting that our results are not spurious.

In summary, our multivariate returns analysis provides evidence consistent with tax capitalization. We find that ADRs' stock prices react to the announcement of the reduction in U.S. capital gains taxes contingent on dividend yield. At the same time, no such reaction is apparent in the home country, creating a significant pricing spread between the two markets.

4.3. Multivariate Volume Analysis

Our return results show that ADR firms with no or low dividend yields significantly outperform high-dividend yield firms during the event week, consistent with tax capitalization. However, the question remains whether our event was subject to the lock-in effect as well. It is possible that both tax capitalization and lock-in effects were in play during this event and that our returns analysis simply captured the net of these effects (i.e., that price run-ups of tax capitalization dominated price decreases related to lock-in). Since the price reaction of lock-in behavior at the event stems from a temporary increase in supply of shares, we perform an analysis on volume in an attempt to further document evidence of lock-in. Although our tax capitalization hypothesis does not provide any predictions regarding the volume behavior around the event, the lock-in hypothesis predicts a significant increase in volume that is decreasing in dividend yield (because the decrease in capital gains tax rates decreases investors' reservation prices for selling an appreciated stock). Furthermore, since the lock-in effect only applies to

[29] We determine alternate dates of extreme market activity by cumulating five-day windows of CRSP's value-weighted returns. Note that the top period of market performance is our tax event, with the five days surrounding October 30, 1997 (January 15, 1998) as the second (third) strongest week during the entire sample period.

U.S. taxable individuals, we do not expect to find a volume effect in the ADR's country of origin.

Empirically, we calculate abnormal U.S. (home country) volume, AVOL_ADR (AVOL_HOME), by scaling daily US$ trading volume with either the mean trading volume in the year leading up to the event for a firm's ADR or the same number for the underlying home country stock.[30] To test our predictions, we replace the return variables in equation (1) with the corresponding abnormal volume measures. If lock-in is prevalent around the 1997 budget accord, we expect an increase in abnormal volume for those firms with a higher proportion of profits taxed as capital gains, again using dividend yield as proxy for a security's sensitivity to the capital gains tax reduction. Results reported in first three columns of Table 5 provide no evidence of an abnormal volume response around the event nor is there any significant difference between the ADR and the underlying security.

Recall that lock-in should be most pervasive in firms with *past* appreciation. As dividend yield may be a poor predictor for past price run-ups, we divide our sample based on whether firms had appreciated over the year prior to the event (i.e., 194 out of 262 firms with data available experienced a positive year-to-year change in stock price). Once again, we find no evidence of an increase in abnormal volume around the tax law change. If anything, there is evidence for a decline in volume of appreciated ADRs during the event (-101.18, t=1.68). However, the U.S. response was not significantly different from the underlying home country abnormal volume as exhibited by the coefficient on the interaction term in the AVOL_SPREAD regression (-76.52, t=1.09). Using a continuous measure of past share price appreciation merely

[30] The results of the abnormal volume analyses are not affected if alternatively we use the entire two-year sample period (excluding the event) as the benchmark or the residuals from firm-specific regressions of the above measures on U.S. and home country market abnormal trading volume and currency returns.

confirms the lack of lock-in behavior. Results reported in Table 5 suggest that abnormal volume for highly appreciated firms was down in the U.S. as well as at home.

Since the lock-in hypothesis assumes that during the event week investors would have known the consequences of any reduction in capital gains taxes for their sales of securities, our lack of confirmatory evidence could stem from the fact that there was uncertainty regarding the effective date of the tax rate cut. As such, we investigate the period when the uncertainty regarding the effective date of any applicable rate reduction was resolved. House Ways and Means Committee chairman Bill Archer and Senate Finance Committee chairman William Roth issued a statement on May 7, 1997 stating that "any capital gains tax cut included in the budget reconciliation bill will be with respect to deals and exchanges occurring on or after today, May 7, 1997", prompting a potential surge in volume following these days. Untabulated results, however, provide no evidence of any increase in volume from May 7 through 9, leading us to conclude that lock-in effects, if existant, are extremely small in our event window.

4.4. Persistence of the Price Effect

Having documented a significant increase in price of the no or low-dividend yield ADRs *during* the week of the budget accord, we now investigate for how long this effect persists into the future. Evidence of continuing abnormal returns is consistent with investor-level taxes having an equilibrium price effect and suggests that ultimately U.S. taxes can alter a foreign firm's cost of capital. We test these claims by graphically examining cumulative abnormal returns over a 40-days period beginning on April 30, 1997, using the binary dividend-paying indicator to distinguish between firms affected by the tax rate cut. Cumulative abnormal returns are calculated by fitting the parameter estimates from a three-factor daily market model that includes U.S. market, home country market and foreign exchange rate returns over the one-year

period ending on April 29, to data beginning with April 30, 1997.[31] Further, in an effort to increase the power of the tests, we run this analysis for a sub-set of firms that supposedly have efficient prices (i.e., 142 firms that traded every day during our sample period).[32]

Figure 4 depicts the cumulative abnormal returns for ADRs and the underlying home country stocks for both dividend and non-dividend paying firms. In the upper two quadrants of the graph, we plot cumulative abnormal returns across trading location (U.S. versus home market). While there is evidence that non-dividend paying firms exhibit positive abnormal returns on and after the event, abnormal returns for dividend paying firms hover around zero in both markets. The differential abnormal returns behavior becomes more obvious in the two bottom quadrants, where we compare ADRs with home country stocks across dividend paying status and add confidence intervals to the graphs (10%, two-tailed). Non-dividend paying firms show positive cumulative abnormal returns until approximately 30 days after the event. No such reaction is apparent for dividend payers.[33] Overall, the results imply a tax-induced shift in the equilibrium price of (dividend paying) cross-listed shares that persists beyond the initial event. We interpret these findings as preliminary evidence suggesting that a change in U.S. tax rules may affect firms' cost of equity capital (Dhaliwal et al., 2005).

The graphs also reveal another interesting detail. When limiting the sample to the larger, more liquid firms (i.e., firms that trade every day), the stock price reaction to the tax rate proposal is not confined to ADRs anymore. Returns of underlying home country stocks closely

[31] Results are not affected when we estimate the abnormal returns model over the entire sample period and use the residuals in our tests. Furthermore, in unreported analyses we ensure that our primary results in Table 3 hold when using abnormal returns generated in this manner as compared to RET_ADR, RET_HOME and SPREAD.
[32] In separate analyses (not reported) we confirm that our primary findings also hold for this sub-sample of firms.
[33] In untabulated analyses, we also assess the magnitude and statistical significance of the cumulative abnormal returns over varying post-event periods. Using a series of dummy variables, we divide our post-event sample into 12 equally sized increments of 25 trading days. We find that the cumulated abnormal returns for the non-dividend paying firms are significantly positive for at least one month after the event. We recognize, though, that other events/information may be altering the cumulative abnormal returns as we extend the window.

mirror ADR returns, consistent with the ADR and home county stocks reaching a new equilibrium price. We next turn to examine how cross-country arbitrage affects our tax capitalization results for cross-listed shares.

5. The Role of Liquidity in Cross-Country Arbitrage

During the five days surrounding the announcement of the U.S. capital gains tax rate reduction, we document a significant reaction that is decreasing in dividend yield for our sample of ADRs, but not for their home country counterparts thus creating a pricing wedge between the two securities. In theory, arbitrage should mitigate any one-sided price reaction and cause the two prices to quickly revert to parity. Empirical evidence, though, documents the existence of substantial cross-country barriers to arbitrage that can impede or delay efficient price formation (Gagnon and Karolyi, 2004). In this section we examine whether cross-sectional variation in sample firms' reactions to the tax event can be explained by costs of arbitrage. When costs of arbitrage are low, we expect the one-sided price deviation to quickly dissipate. Moreover, the direction of the correction (i.e., ADR prices revert *or* home country stock prices follow) helps us in interpreting the underlying causal relation. We measure ease of arbitrage by examining several proxies of firm-level liquidity, which captures agency costs, market inefficiencies and institutional attributes.[34] We not only expect the most liquid ADRs to exhibit the strongest

[34] Alternatively, one could measure barriers to arbitrage on the country-level, e.g., using a country's financial development, stock market synchronicity or short sale restrictions. However, with regard to the rather limited number of individual firms in our sample, each partition on the country-level heavily weighs on the cross-sectional variation in the effect we are trying to capture. For instance, when we partition our sample based on a country-level measure of short sale restrictions (Bris, Goetzmann and Zhu, 2005), only 30 firms are headquartered in countries prohibiting short selling as of 1997 (i.e., Argentina, Chile, China, Columbia, Finland, Indonesia, Korea, Peru, and Philippines), and all but two are dividend paying firms. Moreover, because country-level characteristics tend to be highly correlated, resulting partitions of our limited sample often look similar.

reaction to the U.S. tax rate proposal, but also to be most susceptible to arbitrage activity resulting in our prediction for a less pronounced pricing spread.[35]

Our first liquidity measure is the average daily US$ trading volume for a firm's ADR.[36] Trading volume captures investors' willingness to engage in share purchase and sales transactions and, ceteris paribus, should be inversely related to the existence of information asymmetries (Leuz and Verrecchia, 2000). We partition the entire sample using increasingly tighter liquidity thresholds and estimate regressions based on equation (1) on the respective sub-samples. Moving from left to right in Table 6, Panel A, we begin by performing the analysis on firms with average US$ trading volume above the 25th percentile of the sample distribution. This yields a high liquidity sub-sample of 166 firms. Next, we restrict the high liquidity sub-sample to firms in the top half of the US$ trading volume distribution (105 firms). Finally, we only include the extremely liquid firms that are in the top quartile of the sample distribution, leading to a high liquidity sub-sample of 52 firms. As the liquidity constraint gets tighter, we expect the magnitude of the coefficient on the interaction term EVENT*DIVYLD to become more negative in the RET_ADR specification. At the same time, based on the graphical evidence in Figure 4, we anticipate that lower costs of cross-country arbitrage will lead RET_HOME to more closely track ADR returns, suggesting a more rapid convergence of the two sets of prices as we limit our sample to the higher liquidity firms.

The results reported in the upper half of Table 6, Panel A confirm our expectations. For RET_ADR, the coefficient on EVENT*DIVYLD is monotonically decreasing as we compare

[35] Briefly, we mention a caveat concerning the concept of arbitrage. As noted in footnote 22, our pricing spreads do not necessarily create profitable arbitrage opportunities. As such, any event-induced pricing spreads are likely mitigated via ordinary trading. However, ordinary trading, like arbitrage activity, should be impeded by higher trading costs leading to cross-sectional variation in the spreads.

[36] Cross-country arbitrage requires liquidity in both the U.S. and at home. When we correlate ADR trading volume with the respective home country number, we find a positive and significant association (ρ=0.3, p-value < 1%). In later analyses we also partition our sample based on liquidity in the two markets simultaneously.

from the full sample (see Table 3) through the most liquid sub-sample (-8.98, -9.39, -16.82, -21.78). All the coefficients are statistically significant at the 5% level or better. At the same time, the effect of EVENT*DIVYLD on RET_HOME is monotonically decreasing as well (-0.52, -4.06, -9.65, -19.58) and becomes significant for the two most liquid sub-samples. As a result, the spread generally weakens as we move across sub-samples (-8.46, -5.33, -7.17, -2.20), and in fact loses its statistical significance for the most liquid firms' sub-sample. The pattern is consistent with arbitrage causing at least some of the tax capitalization effect to spillover from the U.S. to the home country thereby lending support to the conjecture that an exogenous shock to U.S. tax rules affects international asset prices.

When we direct our attention to the low liquidity sub-samples (lower half of Table 6, Panel A), we do not find any significant coefficients on the interaction term in the RET_ADR and RET_HOME specifications for the first two partitions (below 25^{th} and 50^{th} percentile). This is consistent with low liquidity prices not being informative enough to reflect the one-sided macro-economic shock. In the SPREAD specification, though, the coefficient on EVENT*DIVYLD is always negative and highly significant suggesting that taken together ADR and home country stock prices generally behave as predicted by the tax capitalization hypothesis. When using the 75^{th} percentile as cut-off value, the results in the low liquidity sub-sample across the RET_ADR, RET_HOME and SPREAD specifications look already very similar to those in the full sample. Comparing the high and low liquidity groups via a fully interacted model using binary indicators, we generally find the spread results to be significantly more negative for the less liquid sub-samples (see t-statistics reported in the bottom row of Panel A). Overall, a gradual partitioning across ADR trading volume strongly corroborates a mitigating role of cross-country arbitrage in the capitalization of the proposed tax rate cut.

We test the robustness of the above findings by partitioning the sample across alternative firm-level liquidity measures and report the results in Table 6, Panel B. Our first measure is based on daily trading activity in the U.S. We define the high (low) liquidity sub-sample as those ADRs with (without) consecutive trading in the U.S. over the two-year sample period (i.e., 505 days with non-zero trading volume). Our next measure is based on Amihud (2002), who proposes the ratio of absolute stock return to US$ volume as a measure of the price impact of the order flow, which increases in illiquidity. We calculate this metric by averaging the daily ratios for each firm in each market (i.e., ILLIQ_ADR and ILLIQ_HOME) over the entire sample period. A look at the descriptive statistics (see Table 1, Panel B) shows that ADRs generally experience more liquid trading in their home markets, but that the home market distribution is also more dispersed. We assign firms to the high liquidity sub-sample where ILLIQ_ADR *and/or* ILLIQ_HOME are below the 33rd percentile of their respective distribution. Finally, we partition the sample based on the proportion of a firm's stock that is held by known institutional investors. This variable may serve as a proxy not only for liquidity, but also investor sophistication, lower information asymmetry, lower risk of expropriation by entrenched managers, and generally higher firm visibility. We measure institutional ownership, INSTHLD, using quarterly updates in the Spectrum Database. While Spectrum reports mean institutional holdings of 12%, for more than half of the sample observations known institutional holdings are no greater than 4.5% (see Table 1, Panel B). We classify firms as more liquid if their institutional ownership is above the 75th percentile of the distribution.

Table 6, Panel B reports results similar in spirit to the trading volume partitions in Panel A. Focusing on the high liquidity sub-samples in the upper half of the panel, we find that across all three alternative liquidity measures the reaction in both markets (i.e., for RET_ADR and

RET_HOME) is significantly decreasing in dividend yield, consistent with tax capitalization *and* cross-country arbitrage. Nonetheless, there remains a significant pricing spread suggesting that arbitrage is not complete. Turning now to the low liquidity sub-samples, the reaction in the U.S. is decreasing in dividend yield but not significant across any of the three proxies. In comparison, the reaction at home is increasing in dividend yield, and except for the maximum trading days partition not significant. The net result is a significantly negative pricing spread, consistent with tax capitalization and low liquidity impeding arbitrage. In terms of comparing the coefficients across the high and low liquidity groups, we find a more pronounced negative reaction to the event for the high liquidity firms in the RET_ADR and RET_HOME specifications (as evidenced by the difference in EVENT*DIVYLD between sub-samples). This leads to a coefficient in the SPREAD model that is less negative in magnitude, though not all of the differences are statistically significant (see bottom row of Panel B).

In summary, the results of the cross-sectional analyses are consistent with our measures of firm-level liquidity acting as valid proxies for intensified arbitrage activity.[37] In addition, the findings support our main results of tax capitalization occurring in the U.S. and creating a pricing spread between ADRs and home country securities. The liquidity results further support the notion that cross-country arbitrage serves in facilitating the transfer of U.S. stock price reactions to an exogenous shock to foreign markets. In the extreme, arbitrage is complete, rendering the differential price reaction between ADRs and underlying stocks insignificant. In most cases, though, a pricing spread prevails.

[37] To further corroborate the findings with regard to institutional ownership, which could also serve as inverse proxy for the number of taxable individuals, we divide INSTHLD into taxable (i.e., banks and investment advisors) and tax-exempt institutions (i.e., foundations and pensions). Partitioning the sample based on the former variable yields very similar, albeit slightly weaker coefficient estimates. Using tax-exempt institutions to partition the sample, on the other hand, produces results that are generally consistent with this variable capturing marginal U.S. taxable individuals. However, the high and low sub-samples are never statistically different from each other.

6. Conclusion

In this paper, we examine how shareholder-level taxes and cross-country arbitrage affect the pricing of cross-listed stocks in the U.S. Building on the general equilibrium-pricing model by Klein (1998, 1999), we test the three competing theories of tax irrelevance, tax capitalization, and lock-in. We conduct an event study in the week around the May 1997 budget accord and use dividend yield as a proxy for a security's sensitivity to the unanticipated proposal of a reduction in capital gains taxes. We find that, based on the inter-quartile range, no or low-dividend yield firms outperform high-dividend yield firms by 121 basis points during the event. No such pattern is generally apparent for the underlying securities in the ADR's home country, creating a tax-induced pricing spread of up to 114 basis points. This result is consistent with the marginal investor being a U.S. taxable individual who capitalizes personal taxes into security prices. Further evidence shows that, if anything, trading volume went down during the event week (inconsistent with lock-in), and that the price effect of the tax rate proposal persisted for about one month after the event (suggesting a change in cost of capital). However, consistent with cross-country arbitrage partially mitigating the effect, the returns reaction to the U.S. tax event appears to be impounded in the underlying home country shares when we limit the sample to the more and more liquid firms rendering the observed pricing spread significantly smaller and eventually indistinguishable. We conclude that perceived changes in U.S. tax rules transfer into international asset prices.

Our study is subject to several limitations. First, the analysis is narrowly focused on a single tax change in the capital gains tax rate. While this provides for a relatively clean setting, it does limit our ability to interpret how U.S. personal taxes affect equity prices in a broader sense. Second, firms with cross-listings represent a special subset among the listed corporations in a

country, again potentially limiting the generalizability of the results. Third, although we present results consistent with tax capitalization and with arbitrage serving a mitigating role, it is not possible to completely disentangle the two competing sources of price movements for cross-listed shares. Finally, as with all event studies, our results are contingent on the identification of an event that is unconfounded by other (non-tax) factors.

Appendix: Klein Model on the Effect of Investor-Level Taxes on Price

In Klein (1998, 1999), price is the present value of the after-tax cash flows resulting from dividends and capital appreciation. A notable contribution of the Klein model is that capital gains are deemed taxed at realization rather than at recognition (or accrual).[38] Also, in contrast to prior models (Constantinides, 1983, 1984), Klein assumes that investors cannot costlessly defer capital gains taxation through short-selling.

Intuitively, in the Klein model, price is determined not only by the anticipated after-tax, risk adjusted cash flows generated between period *t* and *t+1*, but also incorporates any capital gains tax liability (benefit) related to appreciation (depreciation) from prior periods. Said another way, a firm's equilibrium price is a function of an investor's tax liability on future and past appreciation (or depreciation). To the extent that these capital gains liabilities exist (assuming appreciation), the model surmises they have two effects on price. First, taxes are said to be "capitalized" into the price of the asset; in other words, price is decreasing in *future* tax liabilities, which reduce the cash flows the investors will receive upon sale of the security (similar to valuing after-tax dividends). This capitalization effect, however, is decreasing in the investor's estimated holding period due to the time value of money. So, the longer that an investor intends to hold the security the lower the current value of the expected liability.

Second, capital gains tax liabilities on *past* appreciation increase the investor's required pre-tax rate of return on the firm's stock. Consider the following example. Suppose that there are two investors in a particular stock, both facing a 20% capital gains tax rate and having an after-tax liquidity need of $100. If investor A bought the stock when it was $50, then the stock price

[38] In practice, a shareholder realizes a capital gains tax liability upon the sale of shares. The liability is based on the difference between the stock's sale price and the shareholder's tax basis (typically, purchase price). For parsimony, most theoretical work assumes that any appreciation is taxed every period (upon accrual of the gain) even if the shareholder continues to hold the stock.

would need to be at least $112.50 to meet his liquidity needs. Whereas investor B, who bought the stock at $25, requires the stock price to be at least $118.75. In other words, the capital gains tax liability induces investor B to demand a higher reservation price and to be "locked-in" to his holding relative to investor A. Since there is no automatic increase in the supply of shares, the equilibrium price must rise in order for the market to clear. As such, lock-in is a liquidity effect.

In terms of the formal model, equilibrium price (P) for a risky security held by risk adverse investors at time t is set by the following expression:

$$P_t = \frac{1}{1+r}\left[P_{t+1} - \left(P_{t+1} - P_t\right)\tau_t^{cg}\bar{B}_t + \bar{\delta}_t + d_{t+1}\left(1-\tau_t^d\right) - \psi_t \right]$$

Where:

r = after tax risk free rate

P_{t+1} = exogenously determined stock price at time t+1

τ_t^{cg} = capital gains tax rate

$\bar{B}_t$ = estimated selling schedule = $\left\{ \frac{\bar{A}_t}{1+r} \; if \;\; \alpha_{t+1} = 0; 1 \; otherwise \right\}$

$\bar{A}_t$ = future sales = $\sum_{t=1}^{T} \frac{\alpha_{t+2}}{\left(1+r\right)^{t-1}} \prod_{m=1}^{t-1} (1-\alpha_{m+2})$

α_t = proportion of shares held by all investors at t - 1 sold during period t

$\bar{\delta}_t$ = tax effect of past appreciation (or depreciation)

$$= \left[w_t \left(\frac{\tau_t^{cg}(1+r-\bar{B}_t)G_t}{S_{t-1}} + \lambda_t \right) - \left(1-w_t\right)\tau_t^{cg}\bar{C}_t \left(\frac{G_t S_{t+1}}{S_t^2} \right) \right]$$

w_t = proportion of investors trading at time t; $w_t = 1(0)$ if all investors sell (buy)

G_t = accrued capital gains = $G_{t-1}(1-\bar{A}_{t-1}) + \left(P_t - P_{t-1}\right)S_{t-1}$

S_t = number of shares owned at time t

λ_t = short - selling constraint

$\bar{C}_t$ = effect of increasing basis on capital gains realizations
(i.e., higher basis, lower capital gains taxes)
$= \left\{ 1 - \frac{\bar{A}_t}{1+r} \, if \;\; \alpha_{t+1} \neq 0; 0 \, otherwise \right\}$

d_{t+1} = next period's expected dividend payment

τ_t^d = dividend tax rate

ψ_t = represents the market's estimation of the effects of risk on price

The impact of capital gains taxation on asset prices is twofold: first, price is reduced by $\left(P_{t+1} - P_t\right)\tau_t^{cg}\bar{B}_t$, the *future* anticipated capital gains tax on appreciation over the next period. $\bar{B}_t$ represents the average investor's selling schedule (i.e., the inverse of the holding period) for the security. Thus, the longer investors plan to hold the security, the smaller the present value of the capital gains tax liability incorporated into price. Notice, if all investors either buy or do not trade the security at time *t*, $\bar{B}_t$ only depends upon the sales in the future ($\bar{A}_t$). If capital gains tax rates decrease, this term implies that prices will rise, as there will be less tax impounded into price. This effect is commonly referred to as the capitalization of capital gains taxes (e.g., Lang and Shackelford, 2000).

Second, $\bar{\delta}_t$, which details how *past* capital appreciation and additional purchases of the security affect price, also depends on capital gains tax rates. The first component of $\bar{\delta}_t$, called the "lock-in effect",

$$(w_t (\frac{\tau_t^{cg}(1 + r - \bar{B}_t)G_t}{S_{t-1}} + \lambda_t)),$$

represents the effect that the taxation of past capital gains (G_t) has on price. If investors have unrealized capital gains, this term implies that their reservation price is increasing in capital gains taxes. Also, the longer the security has been held by investors, the greater the lock-in

effect (i.e., when $\overline{B}_t$ is low). All else equal, the deferred tax liability is greater (lower) in an appreciating security where share turnover is low (high) because investors' basis will be lower (higher). The second term of $\overline{\delta}_t$ is called the "basis effect":

$$\left(1-w_t\right)\tau_t^{cg}\overline{C}_t\left(\frac{G_t S_{t+1}}{S_t^2}\right).$$

It indicates that when shareholders buy additional shares of the security, their gain per share actually decreases thereby mitigating a portion of the lock-in effect. This "averaging effect", $\overline{C}_t$, depends on the method of accounting for the basis of the shares. Klein's $\overline{C}_t$ assumes that the basis (i.e., the original purchase price of the share used to calculate the gain) is determined by averaging over all shares purchased rather than by specific identification as done in the U.S., which would generally increase the value of the capital gains tax deferral by allowing shareholders to recognize a greater proportion of their gains in the future. An evaluation of terms $\overline{C}_t$ (the average basis effect) and $\overline{B}_t$ (the average holding period effect) indicates that the lock-in component of $\overline{\delta}_t$ strictly dominates the benefit of increasing basis. As such, $\overline{\delta}_t$ decreases security prices when capital gains tax rates are cut.

Finally, a comparison of the tax capitalization and the lock-in terms implies that it is uncertain how changes in the capital gains tax rate would impact equilibrium prices. In fact, Klein's model shows that if holders of the security are either tax-exempt or taxed identically on all investment income, then a change in the capital gains tax rate will have no effect on the equilibrium price of the security. This tax irrelevance theory is developed in Miller and Scholes (1978).

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Figure 1: Hypotheses Overview of Reaction to 1997 Reduction in U.S. Capital Gains Taxes

Case	Variables of Interest	ADR Return (RET_ADR)	Home Market Return (RET_HOME)	Return Spread (SPREAD)	Remarks
H_0	Event-week return * market's assessment of capital gains tax effect for dividend paying firms (EVENT * DIVYLD)	Not significant	Not significant	Not significant	**Tax Irrelevance Theory** Miller and Scholes (1978, 1982) (1) Marginal investor of the ADR not being a U.S. taxable individual AND/OR (2) Equity prices not reacting to taxes.
H_{1a}	Event-week return * market's assessment of capital gains tax effect for dividend paying firms (EVENT * DIVYLD)	Negative	Not significant	Decrease	**Tax Capitalization Theory** Lang and Shackelford (2000) (1) Taxes capitalized into equity prices AND (2) Marginal investor of the ADR is a U.S. taxable individual.
H_{1b}	Event-week return * market's assessment of capital gains tax effect for dividend paying firms (EVENT * DIVYLD)	Negative	Negative	Decrease or not significant	(3a) Underlying security quickly moves with ADR towards an equilibrium price (cross-country arbitrage) OR (3b) Underlying security investors are U.S. taxable individuals (unlikely).
H_{2a}	Event-week return * market's assessment of capital gains tax effect for dividend paying firms (EVENT * DIVYLD)	Positive	Not significant	Increase	**Lock-in Effect Theory** Feldstein, Slemrod and Yitzhaki (1980), Klein (1998, 1999) (1) Lock-in effect AND (2) Marginal investor of the ADR is a U.S. taxable individual.
H_{2b}	Event-week return * market's assessment of capital gains tax effect for dividend paying firms (EVENT * DIVYLD)	Positive	Positive	Increase or not significant	(3a) Underlying security quickly moves with ADR towards an equilibrium price (cross-country arbitrage) OR (3b) Underlying security investors are U.S. taxable individuals (unlikely).

Figure 2: ADR and Home Market Returns for Dividend and Non-Dividend Paying Firms
(Rolling five-day averages, 30 days around event)

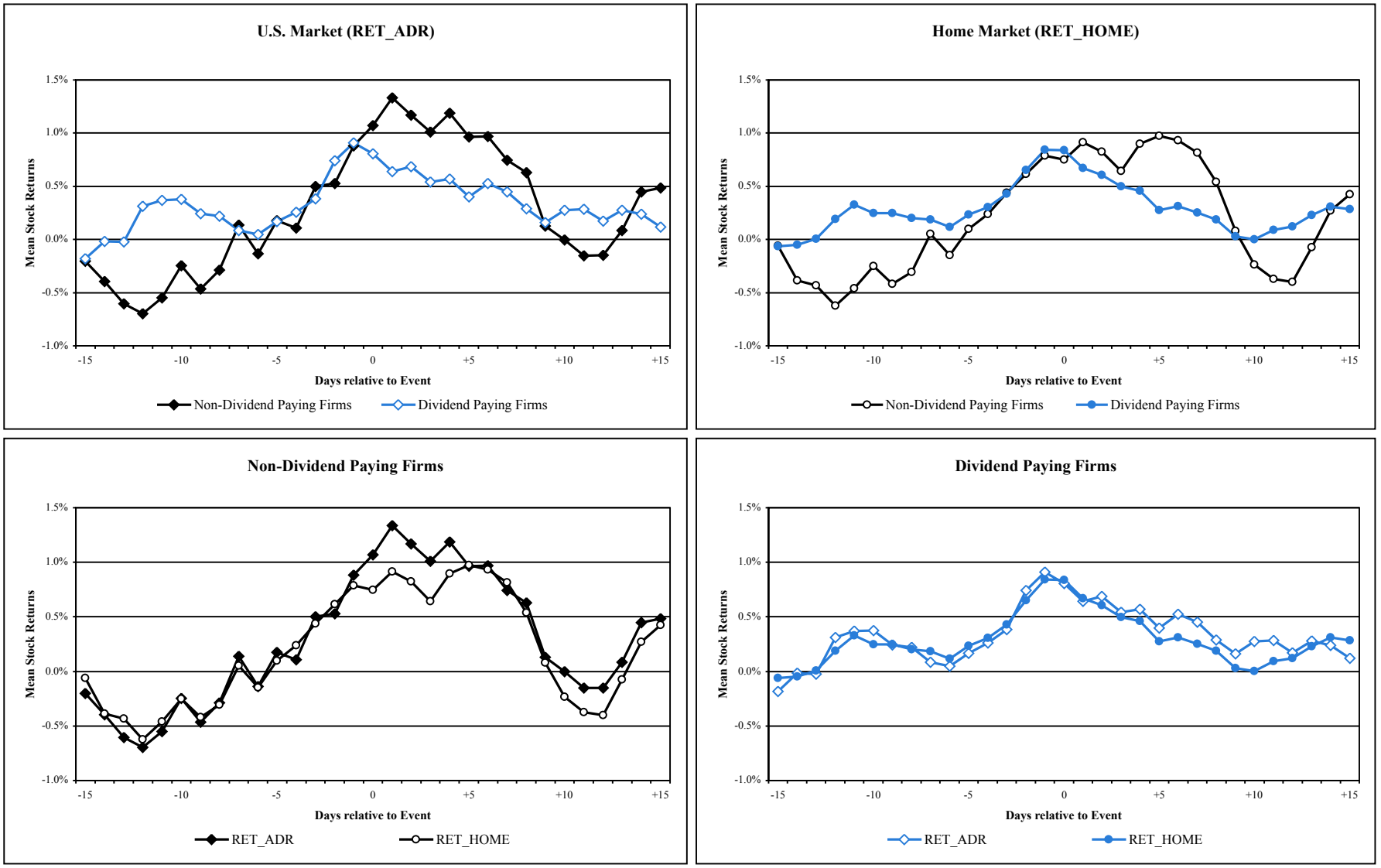

Figure 3: Return Spreads for Dividend and Non-Dividend Paying Firms
(Rolling five-day averages, 30 days around event)

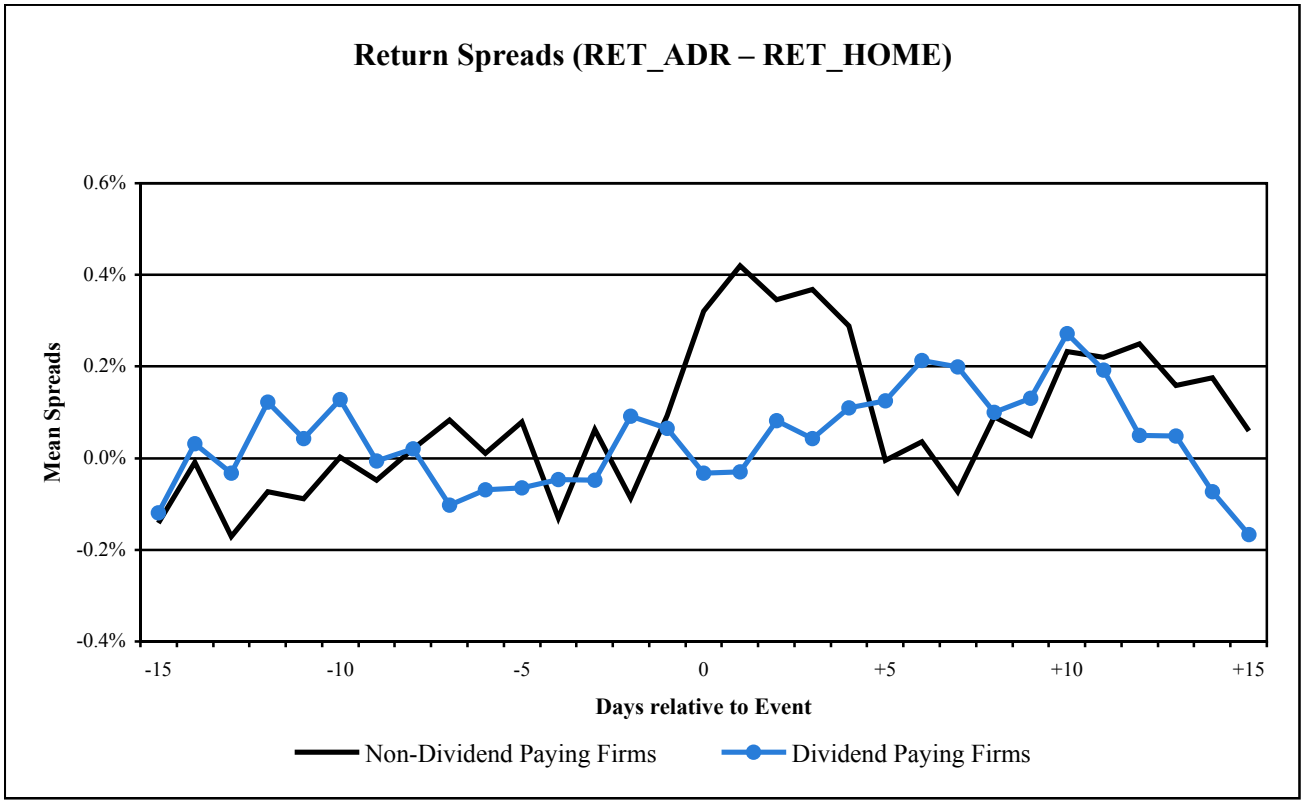

Figure 4: Cumulative ADR and Home Market Abnormal Returns for Dividend and Non-Dividend Paying Firms
(Firms with consecutive U.S. trading, daily averages, 40 days beginning at the event date)

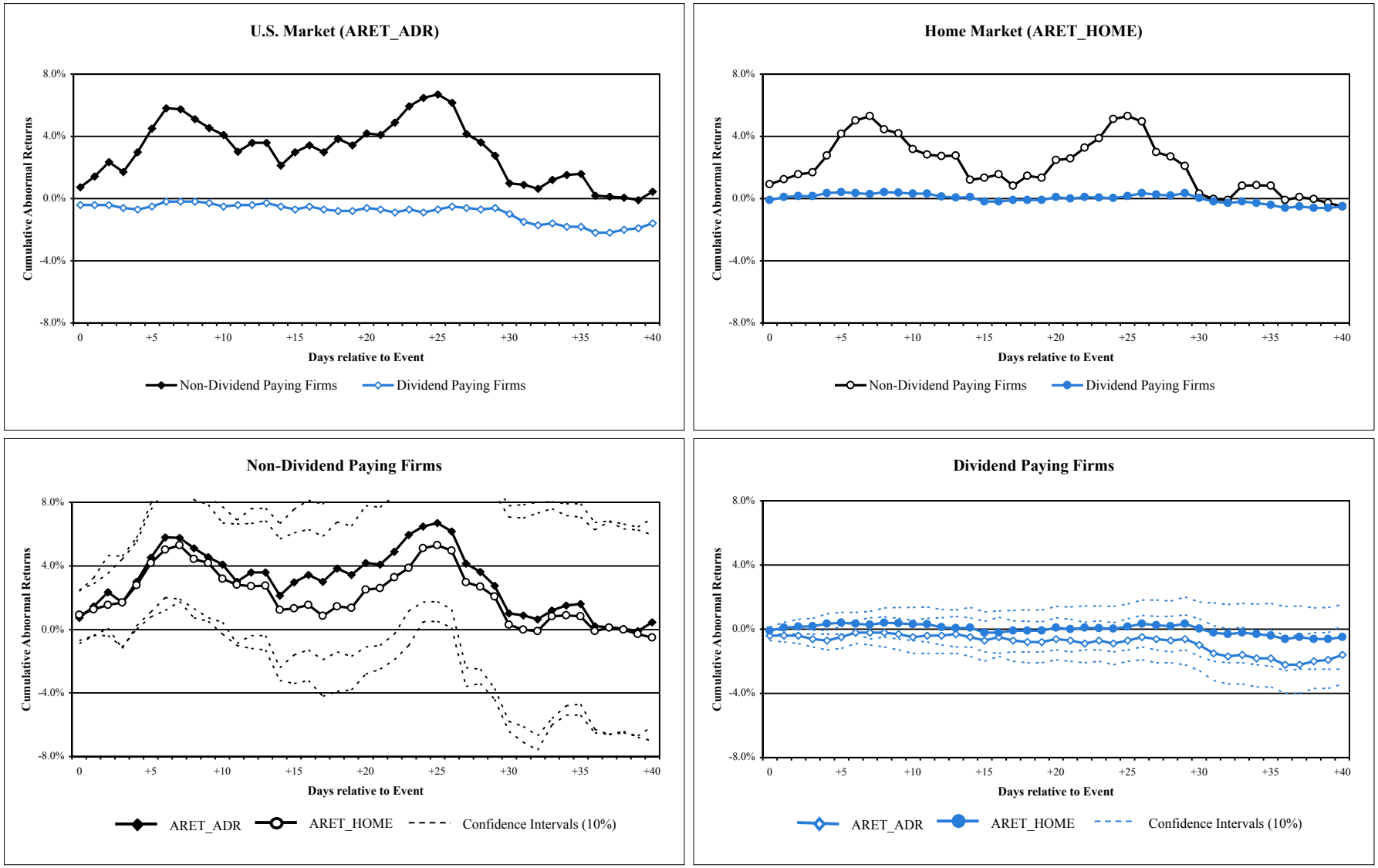

Table 1: Descriptive Statistics on ADR and Home Market Stocks

Panel A: Sample Composition by Country for Dividend and Non-Dividend Paying Firms

Country	# of Dividend Paying Firms	Total # of Firms	# of Dividend Paying Observations	Total # of Observations	Total # of Observations in % of Sample
Argentina	6	7	2,804	2,995	3.04
Australia	10	14	3,837	5,495	5.58
Brazil	0	1	0	473	0.48
Canada	34	105	12,898	34,292	34.85
Chile	12	12	4,634	4,634	4.71
China	1	2	470	924	0.94
Columbia	1	1	381	381	0.39
Denmark	2	2	825	825	0.84
Finland	1	1	486	486	0.49
France	5	6	2,351	2,821	2.87
Hong Kong	1	1	423	423	0.43
Indonesia	3	3	1,110	1,110	1.13
Israel	1	2	464	888	0.90
Italy	5	5	1,956	1,956	1.99
Japan	15	16	5,304	5,444	5.53
Korea	2	2	945	945	0.96
Mexico	9	17	3,934	7,315	7.43
Netherlands	9	9	3,548	3,548	3.61
New Zealand	3	3	1,404	1,404	1.43
Norway	2	3	608	1,095	1.11
Peru	1	1	297	297	0.30
Philippines	1	1	487	487	0.49
Portugal	2	2	685	685	0.70
South Africa	3	3	1,229	1,229	1.25
Spain	5	5	2,129	2,129	2.16
Sweden	5	5	1,874	1,874	1.90
Switzerland	1	2	340	392	0.40
United Kingdom	32	35	12,995	13,842	14.07
Total	172	266	68,418	98,389	100.00

(continued)

The sample is based on all foreign firms with a U.S. exchange listing, for which sufficient ADR price data on CRSP and home market price data on Datastream exist during the two years surrounding the 1997 reduction in U.S. capital gains taxes. We require that firms are listed in the U.S. for at least one year at the time of the event (May 2, 1997), firms' stocks actively trade in the event week, and same day ADR and home market prices are available. We exclude trading days with ADR daily volume below a minimum liquidity threshold of US$ 50,000. The table reports the number of individual firms and firm-day observations by country.

Table 1 (cont.): Descriptive Statistics on ADR and Home Market Stocks

Panel B: Summary Statistics of Returns, Market and Firm Characteristics for ADR and Underlying Stocks

	Mean	Std. Deviation	Min	Q1	Median	Q3	Max
ADR and Home Market Returns:							
RET_ADR	0.10%	3.03%	-61.29%	-1.17%	0.00%	1.24%	75.86%
RET_HOME	0.11%	3.23%	-62.10%	-1.07%	0.00%	1.16%	460.62%
SPREAD	-0.01%	2.70%	-465.92%	-0.83%	0.00%	0.79%	48.98%
PDIFF	-0.0034	0.1683	-1.5278	-0.0072	0.0019	0.0151	1.8474
Market Characteristics:							
US_MKT	0.11%	0.88%	-6.53%	-0.31%	0.16%	0.61%	4.02%
HOME_MKT	0.09%	1.07%	-18.30%	-0.40%	0.12%	0.60%	16.81%
FX	0.02%	0.62%	-21.03%	-0.17%	0.00%	0.21%	37.14%
Firm Characteristics:							
DIVYLD	1.73%	2.07%	0.00%	0.00%	1.13%	2.69%	56.68%
YLD_DUM	0.6954	0.4602	0	0	1	1	1
VOL_ADR	4,853.0	19,455.1	0.2	237.3	872.0	3,208.2	3,303,425.0
VOL_HOME	21,103.5	44,916.5	0.0	368.9	3,391.6	23,614.4	2,232,993.0
ILLIQ_ADR	0.0666	0.4541	0.0000	0.0014	0.0098	0.0480	35.4610
ILLIQ_HOME	0.3185	1.8243	0.0000	0.0004	0.0025	0.0306	23.4525
INSTHLD	11.83%	15.74%	0.00%	1.03%	4.46%	18.02%	100.00%

(continued)

The sample comprises 98,389 firm-day observations from all foreign firms with a U.S. exchange listing, for which sufficient ADR price data on CRSP and home market price data on Datastream exist during the two years surrounding the 1997 reduction in U.S. capital gains taxes. RET_ADR and RET_HOME are daily stock returns (based on closing prices) for a firm's ADR in the U.S. and the underlying stock in the home country. SPREAD is the difference between RET_ADR and RET_HOME on the same day. The price difference, PDIFF, is the natural log of the ratio of the same day ADR price to the underlying stock price in the home country (adjusted for the ADR bundling ratio and translated into US$). US_MKT and HOME_MKT are the daily market returns (based on closing values) for the CRSP value-weighted market index and the respective home country market indices. FX is the daily currency return computed as the price relative of foreign exchange rates (foreign currency to US$) minus one. DIVYLD is the dividend yield calculated as last fiscal year's dividend divided by stock price. YLD_DUM is a binary indicator variable set to one if a firm paid dividends in the year prior to the event. VOL_ADR and VOL_HOME represent daily US$ trading volume (in thousands) for a firm's ADR in the U.S. and the underlying stock in the home country. ILLIQ_ADR and ILLIQ_HOME are two measures of illiquidity, proposed by Amihud (2002), that are calculated as the average ratio of daily absolute stock returns to US$ trading volume for each firm's ADR and underlying stock. INSTHLD measures the proportion of a firm's stock that is held by known institutional investors as indicated in the Spectrum Database.

Table 1 (cont.): Descriptive Statistics on ADR and Home Market Stocks

Panel C: Correlations of Key Variables (Pearson – above diagonal)/(Spearman – below diagonal)

	RET_ADR	RET_HOME	SPREAD	PDIFF	US_MKT	HOME_MKT	FX	DIVYLD	YLD_DUM
RET_ADR	1	0.6301	0.3663	-0.0249	0.2183	0.2873	-0.1201	-0.0013	-0.0070
		(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.6774)	(0.0291)
RET_HOME	0.6711	1	-0.4918	0.0393	0.1449	0.3420	0.0002	-0.0026	-0.0048
	(<.0001)		(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.9487)	(0.4237)	(0.1350)
SPREAD	0.3981	-0.2881	1	-0.0749	0.0712	-0.0877	-0.1349	0.0016	-0.0021
	(<.0001)	(<.0001)		(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.6225)	(0.5125)
PDIFF	-0.1150	0.1424	-0.3381	1	-0.0008	0.0073	-0.0155	0.0399	-0.0100
	(<.0001)	(<.0001)	(<.0001)		(0.8035)	(0.0226)	(<.0001)	(<.0001)	(0.0018)
US_MKT	0.2264	0.1772	0.0784	0.0065	1	0.4245	-0.0281	0.0068	0.0054
	(<.0001)	(<.0001)	(<.0001)	(0.0419)		(<.0001)	(<.0001)	(0.0324)	(0.0926)
HOME_MKT	0.3268	0.4159	-0.0809	0.0305	0.4303	1	-0.0452	0.0008	-0.0084
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)		(<.0001)	(0.7929)	(0.0082)
FX	-0.1138	0.0180	-0.1921	-0.0046	-0.0221	-0.0110	1	0.0062	0.0082
	(<.0001)	(<.0001)	(<.0001)	(0.1511)	(<.0001)	(0.0005)		(0.0520)	(0.0099)
DIVYLD	0.0214	0.0249	-0.0011	0.1200	0.0070	-0.0059	0.0019	1	0.4992
	(<.0001)	(<.0001)	(0.7309)	(<.0001)	(0.0274)	(0.0648)	(0.5473)		(<.0001)
YLD_DUM	0.0238	0.0274	-0.0052	0.1210	0.0078	-0.0140	0.0077	0.7252	1
	(<.0001)	(<.0001)	(0.1049)	(<.0001)	(0.0142)	(<.0001)	(0.0160)	(<.0001)	

The sample comprises 98,389 firm-day observations from all foreign firms with a U.S. exchange listing, for which sufficient ADR price data on CRSP and home market price data on Datastream exist during the two years surrounding the 1997 reduction in U.S. capital gains taxes. The table presents Pearson correlations (above diagonal) and Spearman rank correlations (below diagonal) as well as p-values (in parentheses). See Table 1 Panel B for variable definitions.

Table 2: Summary Statistics by Event Period for Dividend and Non-Dividend Paying Firms

	Variables	Prediction of Differences			Event Period (1)	Non-Event Period (2)	Difference (1) – (2)
		Tax Capi-talization	Lock-in Effect	Tax Irrelevancy			
Non-Dividend Paying Firms (a)	RET_ADR	+	–	0	1.17%	0.12%	1.05%***
	RET_HOME	?	?	0	0.82%	0.13%	0.69%***
	SPREAD	+	–	0	0.35%	-0.01%	0.36%*
	N				411	29,560	
Dividend Paying Firms (b)	RET_ADR	+	–	0	0.81%	0.08%	0.73%***
	RET_HOME	?	?	0	0.84%	0.10%	0.74%***
	SPREAD	+	–	0	-0.03%	-0.02%	-0.01%
	N				711	67,707	
Difference (a) – (b)	RET_ADR	+	–	0	0.36%*	0.04%*	
	RET_HOME	0	0	0	-0.02%	0.03%	
	SPREAD	+	–	0	0.38%**	0.01%	

The sample comprises 98,389 firm-day observations from all foreign firms with a U.S. exchange listing, for which sufficient ADR price data on CRSP and home market price data on Datastream exist during the two years surrounding the 1997 reduction in U.S. capital gains taxes. RET_ADR and RET_HOME are daily stock returns (based on closing prices) for a firm's ADR in the U.S. and the underlying stock in the home country. SPREAD is the difference between RET_ADR and RET_HOME on the same day. The table reports mean values. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 3: ADR Stock Returns, Home Market Stock Returns and Return Spreads (ADR – Home Market) around the 1997 Reduction in U.S. Capital Gains Taxes

$$\text{Dependent Variable}_{i,t} = \beta_0 + \beta_1 \text{DIVYLD}_{i,t} + \beta_2 \text{EVENT}_t + \beta_3 \text{EVENT}_t * \text{DIVYLD}_{i,t} + \beta_4 \text{US\_MKT}_t + \beta_5 \text{HOME\_MKT}_{i,t} + \beta_6 \text{FX}_{i,t} + \beta_7 \text{PDIFF}_{i,t-1} + \sum \beta_j \text{Country Controls}_i + \varepsilon_{i,t}$$

	Dependent Variables					
Independent Variables	Predicted Sign	RET_ADR	Predicted Sign	RET_HOME	Predicted Sign	SPREAD
Intercept	?	0.01	?	0.03*	?	-0.02
		(0.86)		(1.69)		(1.21)
DIVYLD	?	-0.35	?	-0.44	?	0.10
		(0.62)		(0.69)		(0.15)
EVENT	?	0.12	?	0.16	?	-0.04
		(0.84)		(1.13)		(0.56)
EVENT * DIVYLD	**–**	**-8.98****	**0 (–)**	**-0.52**	**– (0)**	**-8.46*****
		(2.34)		**(0.14)**		**(3.58)**
US_MKT	+	39.98***	?	-0.19	+	40.17***
		(15.52)		(0.08)		(16.11)
HOME_MKT	+	66.08***	+	103.54***	–	-37.47***
		(23.12)		(27.56)		(14.10)
FX	–	-51.79***	+	8.32	–	-60.11***
		(9.19)		(1.64)		(19.64)
PDIFF	–	-0.61**	+	0.87*	–	-1.47**
		(2.23)		(1.65)		(1.99)
Country Controls		Yes		Yes		Yes
Number of Firms		266		266		266
Number of Observations		98,389		98,389		98,389
R^2		10.62%		11.91%		4.80%

The sample comprises 98,389 firm-day observations from foreign firms with a U.S. exchange listing during the two years surrounding the 1997 reduction in U.S. capital gains taxes. We use the following three dependent variables: (1) RET_ADR, is the daily stock return (based on closing prices) for a firm's ADR in the U.S., (2) RET_HOME, is the daily stock return (based on closing prices) for a firm's underlying stock in the home country, and (3) SPREAD, is the difference between RET_ADR in the U.S. and RET_HOME in the home country on the same day. EVENT is a binary indicator variable set to one if the observation date is on or between April 30 through May 6, 1997. See Table 1 Panel B for a description of the remaining independent variables. The predicted signs for the main variables of interest reflect the tax capitalization hypothesis. Country indicators are included in the regressions but not reported. The table reports OLS coefficient estimates and, in parentheses, t-statistics based on heteroscedasticity corrected standard errors that are clustered by firm. For expositional purposes we multiply all coefficients by 100. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 4: Sensitivity Analyses of ADR Stock Returns, Home Market Stock Returns and Return Spreads around the 1997 Reduction in U.S. Capital Gains Taxes

$$\text{Dependent Variable}_{i,t} = \beta_0 + \beta_1 \text{DIVYLD}_{i,t} + \beta_2 \text{EVENT}_t + \beta_3 \text{EVENT}_t * \text{DIVYLD}_{i,t} + \beta_4 \text{US\_MKT}_t + \beta_5 \text{HOME\_MKT}_{i,t} + \beta_6 \text{FX}_{i,t} + \beta_7 \text{PDIFF}_{i,t-1} + \sum \beta_j \text{Country Controls}_i + \varepsilon_{i,t}$$

		Dependent Variables		
Independent Variables	N	RET_ADR	RET_HOME	SPREAD
Reduced Sample Period (+/- 3 months)				
EVENT	24,952	0.29**	0.30**	-0.01
		(2.04)	(2.17)	(0.11)
EVENT * DIVYLD		-9.61**	-2.53	-7.08***
		(2.36)	(0.68)	(3.18)
Reduced Event Window (3 days)				
EVENT	98,389	0.10	0.08	0.02
		(0.59)	(0.48)	(0.17)
EVENT * DIVYLD		-8.13*	2.29	-10.42***
		(1.66)	(0.50)	(2.84)
Home Country Returns in US$				
EVENT	98,389	0.12	0.16	-0.04
		(0.85)	(1.13)	(0.57)
EVENT * DIVYLD		-8.75**	-0.95	-7.80***
		(2.28)	(0.25)	(3.10)
Winsorized Returns				
EVENT	98,389	0.09	0.16	-0.07
		(0.68)	(1.19)	(0.98)
EVENT * DIVYLD		-8.55**	-0.84	-7.71***
		(2.24)	(0.24)	(3.47)
Dividend Indicator instead of Dividend Yield				
EVENT	98,389	0.14	0.10	0.04
		(0.67)	(0.49)	(0.40)
EVENT * YLD_DUM		-0.27	0.07	-0.34***
		(1.21)	(0.32)	(3.18)

The sample comprises a maximum of 98,389 firm-day observations from foreign firms with a U.S. exchange listing during the two years surrounding the 1997 reduction in U.S. capital gains taxes. The dependent variables either are RET_ADR, RET_HOME or SPREAD. See Table 1 Panel B for all variable definitions. We report results for the following specifications: (1) a reduced sample period that covers the six months surrounding the 1997 reduction in capital gains taxes, (2) a shortened event window beginning on the event day, May 2, through May 6 (3 trading days), (3) we translate all the local returns into US$ before estimating the regressions, (4) we winsorize the return metrics at the upper and lower .025 percentile, and (5) we replace the continuous dividend yield with a dichotomous indicator set equal to one if a firm paid dividends in the year prior to the event. The table reports only the event indicator (EVENT) and the interaction effect with dividend yield (DIVYLD), but the full set of controls is included. See Table 3 for details. The table reports OLS coefficient estimates and, in parentheses, t-statistics based on heteroscedasticity corrected standard errors that are clustered by firm. For expositional purposes we multiply all coefficients by 100. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 5: Abnormal U.S. and Home Market Trading Volume and Volume Spreads (ADR – Home Market) around the 1997 Reduction in U.S. Capital Gains Taxes

$$\text{Dependent Variable}_{i,t} = \gamma_0 + \gamma_1 \text{PART}_{i,t} + \gamma_2 \text{EVENT}_t + \gamma_3 \text{EVENT}_t * \text{PART}_{i,t} + \gamma_4 \text{US\_MKT\_AVOL}_t + \gamma_5 \text{HOME\_MKT\_AVOL}_{i,t} + \gamma_6 \text{FX}_{i,t} + \sum \gamma_j \text{Country Controls}_i + \upsilon_{i,t}$$

	Dividend Yield (PART = DIVYLD)			Positive Share Appreciation Indicator (PART = APPR_DUM)			Share Appreciation (PART = APPR)		
Variables	AVOL_ADR	AVOL_HOME	AVOL_SPREAD	AVOL_ADR	AVOL_HOME	AVOL_SPREAD	AVOL_ADR	AVOL_HOME	AVOL_SPREAD
Intercept	3.57	-0.67	4.24	-17.67	4.05	-21.72	-35.40	-41.09**	5.69
	(0.21)	(0.06)	(0.25)	(0.69)	(0.15)	(0.67)	(1.11)	(2.35)	(0.18)
PART	-413.12**	-642.44**	229.32	20.01*	-22.15	42.16	107.02**	101.60***	5.42
	(2.22)	(2.07)	(0.69)	(1.70)	(0.61)	(1.19)	(2.03)	(3.70)	(0.10)
EVENT	-33.45	-21.31	-12.14	45.27	-0.16	45.43	-9.71	-0.63	-9.07
	(1.45)	(1.20)	(0.47)	(0.76)	(0.00)	(0.66)	(0.54)	(0.05)	(0.43)
EVENT * PART	**383.78**	**229.56**	**154.22**	**-101.18***	**-24.66**	**-76.52**	**-80.32***	**-81.93****	**1.61**
	(0.86)	**(0.60)**	**(0.31)**	**(1.68)**	**(0.56)**	**(1.09)**	**(1.80)**	**(2.09)**	**(0.03)**
US_MKT_AVOL	89.57***	28.39	61.18***	89.31***	28.52	60.79***	98.05***	35.83**	62.22**
	(4.33)	(1.59)	(2.70)	(4.33)	(1.57)	(2.68)	(4.27)	(2.00)	(2.47)
HOME_MKT_AVOL	21.88***	95.57***	-73.69***	21.81***	95.54***	-73.73***	22.82***	96.51***	-73.69***
	(3.33)	(4.34)	(3.93)	(3.30)	(4.31)	(3.92)	(3.48)	(4.43)	(3.86)
FX	10.87	89.38	-78.51	5.00	82.69	-77.69	49.37	117.57	-68.20
	(0.06)	(0.57)	(0.42)	(0.03)	(0.53)	(0.42)	(0.26)	(0.68)	(0.36)
Country Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# Firms (Observations)		262 (97,002)			262 (97,002)			262 (93,916)	
R^2	1.45%	1.06%	0.54%	1.47%	1.06%	0.58%	2.96%	1.32%	0.54%

The sample comprises a maximum of 97,002 firm-day observations from foreign firms with a U.S. exchange listing during the two years surrounding the 1997 reduction in U.S. capital gains taxes. The dependent variables either are the abnormal trading volume for a firm's ADR in the U.S. (AVOL_ADR), the underlying stock in the home country (AVOL_HOME) or the difference between the two (AVOL_SPREAD). For each firm we calculate the abnormal trading volume by dividing the daily US$ trading volume by the average US$ trading volume in the year leading to the event. We set PART equal to one of the following three variables in order to examine the volume effects of the 1997 budget accord: (1) DIVYLD is the dividend yield calculated as last fiscal year's dividend divided by stock price, (2) APPR_DUM is a binary indicator variable set to one if a firm experienced a positive stock price appreciation in the year leading to the event, and (3) APPR is the year-to-year change in stock price calculated on a daily basis. EVENT is a binary indicator variable set to one if the observation date is on or between April 30 through May 6, 1997. US_MKT_AVOL and HOME_MKT_AVOL represent the aggregate daily abnormal trading volume for the CRSP market index and the respective home country market indices. FX is the daily currency return computed as the price relative of foreign exchange rates (foreign currency to US$) minus one. Country indicators are included in the regressions but not reported. The table reports OLS coefficient estimates and, in parentheses, t-statistics based on heteroscedasticity corrected standard errors that are clustered by firm. For expositional purposes we multiply all coefficients by 100. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 6: Role of Liquidity and Arbitrage – Cross-sectional Analysis of the Reaction to the 1997 Reduction in U.S. Capital Gains Taxes

$$\text{Dependent Variable}_{i,t} = \beta_0 + \beta_1 \text{DIVYLD}_{i,t} + \beta_2 \text{EVENT}_t + \beta_3 \text{EVENT}_t * \text{DIVYLD}_{i,t} + \beta_4 \text{US\_MKT}_t + \beta_5 \text{HOME\_MKT}_{i,t} + \beta_6 \text{FX}_{i,t} + \beta_7 \text{PDIFF}_{i,t-1} + \sum \beta_j \text{Country Controls}_i + \varepsilon_{i,t}$$

Panel A: Partitioning across Average US$ Trading Volume for a Firm's ADR (VOL_ADR)

	25th Percentile as Cut-off Value			50th Percentile as Cut-off Value			75th Percentile as Cut-off Value		
Variables	RET_ADR	RET_HOME	SPREAD	RET_ADR	RET_HOME	SPREAD	RET_ADR	RET_HOME	SPREAD
High Liquidity Sub-Samples									
# Firms (Observations)		166 (74,232)			105 (49,685)			52 (25,093)	
DIVYLD	0.69*	0.70*	-0.01	0.98*	0.40	0.58	0.32	0.82	-0.50
	(1.82)	(1.85)	(0.04)	(1.68)	(0.73)	(1.20)	(0.24)	(0.63)	(0.75)
EVENT	0.14	0.29*	-0.15**	0.25	0.47***	-0.22***	0.41	0.77***	-0.36***
	(0.90)	(1.86)	(2.57)	(1.33)	(2.76)	(2.95)	(1.29)	(2.71)	(3.88)
EVENT * DIVYLD	**-9.39****	**-4.06**	**-5.33****	**-16.82*****	**-9.65***	**-7.17****	**-21.78****	**-19.58****	**-2.20**
	(2.29)	**(1.02)**	**(2.52)**	**(2.78)**	**(1.93)**	**(2.03)**	**(2.20)**	**(2.15)**	**(0.87)**
R^2	13.09%	18.35%	8.20%	14.73%	21.26%	9.69%	21.46%	27.44%	15.02%
Low Liquidity Sub-Samples									
# Firms (Observations)		100 (24,157)			161 (48,704)			214 (73,296)	
DIVYLD	-5.71*	-3.26	-2.45	-1.14	0.63	-1.77*	-0.31	-0.25	-0.06
	(1.74)	(0.99)	(0.51)	(1.07)	(0.66)	(1.74)	(0.46)	(0.38)	(0.09)
EVENT	0.05	-0.10	0.15	0.03	-0.04	0.07	0.10	0.07	0.03
	(0.18)	(0.39)	(0.99)	(0.14)	(0.20)	(0.68)	(0.62)	(0.44)	(0.39)
EVENT * DIVYLD	**-9.80**	**14.41**	**-24.21****	**-3.49**	**5.72**	**-9.22*****	**-7.44***	**2.26**	**-9.70*****
	(1.24)	**(1.39)**	**(2.41)**	**(0.72)**	**(1.15)**	**(2.78)**	**(1.81)**	**(0.58)**	**(3.32)**
R^2	6.40%	5.15%	3.06%	8.08%	7.82%	2.74%	8.63%	9.55%	3.69%
Diff. in EVENT * DIVYLD between Sub-Samples (t-stat)	(0.03)	(1.41)	(2.13)**	(1.52)	(2.05)**	(0.60)	(1.35)	(2.27)**	(2.22)**

(continued)

Table 6 (continued)

Panel B: Alternative Partitions across Firm Variation in Liquidity

	Number of Trading Days of a Firm's ADR (Maximum Number as Cut-off Value)			Illiquidity measured as average Price Impact in U.S. and Home Market (33rd Percentile as Cut-off Value)			Ownership by Institutional Investors (75th Percentile as Cut-off Value)		
Variables	RET_ADR	RET_HOME	SPREAD	RET_ADR	RET_HOME	SPREAD	RET_ADR	RET_HOME	SPREAD
High Liquidity Sub-Samples									
# Firms (Observations)		142 (66,078)			110 (49,728)			59 (25,015)	
DIVYLD	0.49	0.53	-0.04	0.91**	0.77	0.14	0.29	0.23	0.06
	(1.05)	(1.00)	(0.08)	(2.07)	(1.66)	(0.42)	(0.41)	(0.33)	(0.10)
EVENT	0.27	0.40**	-0.13**	0.26	0.53***	-0.27***	0.74***	0.83***	-0.09
	(1.61)	(2.33)	(2.21)	(1.31)	(2.83)	(4.53)	(3.26)	(3.55)	(0.79)
EVENT * DIVYLD	**-13.73*** **	**-8.68***	**-5.05*** **	**-14.36****	**-11.17****	**-3.20****	**-23.43****	**-17.86****	**-5.57***
	(2.91)	**(1.85)**	**(3.16)**	**(2.56)**	**(2.11)**	**(2.03)**	**(2.65)**	**(2.02)**	**(1.73)**
R^2	13.70%	19.49%	9.24%	22.94%	31.09%	15.53%	8.81%	10.70%	5.68%
Low Liquidity Sub-Samples									
# Firms (Observations)		124 (32,311)			156 (48,661)			207 (73,374)	
DIVYLD	-0.58	0.21	-0.79	-0.55	-1.18	0.63	-0.44	-0.22	-0.21
	(0.41)	(0.18)	(0.51)	(0.60)	(0.62)	(0.33)	(0.64)	(0.28)	(0.28)
EVENT	-0.06	-0.17	0.10	0.09	0.02	0.06	-0.14	-0.11	-0.03
	(0.30)	(0.78)	(0.77)	(0.48)	(0.13)	(0.66)	(0.82)	(0.66)	(0.39)
EVENT * DIVYLD	**-4.26**	**13.47***	**-17.73****	**-8.25**	**5.21**	**-13.46****	**-2.94**	**6.22**	**-9.16*** **
	(0.68)	**(1.90)**	**(2.58)**	**(1.56)**	**(0.95)**	**(2.26)**	**(0.65)**	**(1.46)**	**(3.20)**
R^2	7.02%	6.17%	2.72%	6.72%	6.97%	3.64%	11.33%	12.28%	4.70%
Diff. in EVENT * DIVYLD between Sub-Samples (t-stat)	(1.10)	(2.31)**	(1.70)*	(0.78)	(2.14)**	(2.11)**	(2.04)**	(2.47)**	(1.07)

The sample comprises a maximum of 98,389 firm-day observations from foreign firms with a U.S. exchange listing during the two years surrounding the 1997 reduction in U.S. capital gains taxes. The dependent variables either are RET_ADR, RET_HOME or SPREAD. See Table 1 Panel B for all variable definitions. In Panel A, we present results for high and low liquidity sub-samples using the average daily US$ trading volume for a firm's ADR in the U.S. as the partitioning variable. We set the cut-off value equal to the 25th, 50th and 75th percentile of the volume distribution to separate between low (below cut-off value) and high liquidity firms. In Panel B, we present results using three alternative metrics to assign firms to the high liquidity sub-sample: (1) firms with consecutive trading in the U.S. (505 trading days), (2) firms where the average Amihud (2002) illiquidity measure is below the 33rd percentile in at least one market (i.e., U.S. or home country), and (3) firms where the average proportion of institutional holdings as indicated in the Spectrum Database is above the 75th percentile. The table reports only the main and interaction effects of dividend yield (DIVYLD) and the event indicator (EVENT), but the full set of controls is included. See Table 3 for details. The table reports OLS coefficient estimates and, in parentheses, t-statistics based on heteroscedasticity corrected standard errors that are clustered by firm. It also reports t-statistics from a fully interacted model comparing the coefficients on EVENT * DIVYLD across the two sub-samples. For expositional purposes we multiply all coefficients by 100. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

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