

Tax-Induced Trading of Equity Securities: Evidence from the ADR Market

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ABSTRACT

We examine ex-dividend date trading of American Depository Receipts (ADRs) using a sample of 1,043 dividends over the period 1988 to 1995. ADR dividends are often subject to foreign withholding taxes, creating incentives for certain investors to avoid the distribution. ADRs exhibit negative abnormal ex-dividend day returns, and their prices behave consistently with their related withholding taxes. Abnormal trading volume for taxable issues exceeds 130 percent and 300 percent of normal volume on the cum- and ex-dates, respectively. Abnormal volume is an increasing function of foreign withholding tax rates and decreasing function of transactions costs. This abnormal ex-date trading activity is consistent with tax-motivated trading.

THIS PAPER PROVIDES EMPIRICAL EVIDENCE from a sample of American Depository Receipts (ADRs) that foreign taxes on dividend income are positively associated with abnormal ex-dividend day trading activity. Researchers have long been interested in the question of whether taxes affect investor behavior around ex-dividend days. Such work has implications for corporate financial and distribution policies and for government tax policies. ADRs provide a unique setting in which to examine the effects of taxes on investor trading behavior because of the unique features of the foreign withholding taxes that apply to them.

A number of studies have attempted to isolate the determinants of ex-dividend day pricing and trading activity of U.S. equities, and there is considerable evidence of tax-induced investor behavior around the ex-dividend day for common

*Collaghan and Barry are from the M. J. Neeley School of Business, Texas Christian University. The authors are grateful to Joseph Anthony, Stan Block, Greg Geisler, David Guenther, Sanjay Gupta, Steve Lim, Vassil Mihov, Kathy Petroni, Edmund Outslay, Mel O'Connor, Mo Rodriguez, Chandra Subramaniam, Bob Trezevant, Andy Waisburd, and especially to the editor, Rick Green, and an anonymous referee for numerous helpful comments on earlier drafts. The authors also thank David Cuellar of PriceWaterhouseCoopers, Bob Gordon of Twenty-First Securities Corp., Jim Hille of the Teachers Retirement System of Texas, and Bob Willens of Lehman Brothers for helpful discussions of tax trading strategies. They are also grateful to seminar participants at the 1999 Illinois Tax Symposium, Texas Christian University, Emory University, the University of Massachusetts, the University of Utah, Louisiana State University, Wake Forest University, and Villanova University. Professor Callaghan acknowledges financial support from the Deloitte and Touche Foundation, Michigan State University, the Luther King Capital Management Center for Financial Studies, and the Charles Tandy American Enterprise Center at Texas Christian University.

stocks. For example, Elton and Gruber (1970) observe that stock prices decline from the last cum-dividend date (the cum-date) to the first ex-dividend date (the ex-date) for stocks with low dividend yields by amounts that are smaller than the dividends themselves. They also find evidence in support of a dividend clientele effect since, in their study, stocks with high dividend yields tend to decline by approximately the size of the dividend, indicating that they may have been held by nontaxable entities. Barclay (1987) documents that the price effects observed by Elton and Gruber were not present prior to the adoption of income taxes in 1913.

In contrast, some studies present evidence that is not consistent with an entirely tax-based explanation of ex-date price behavior. For example, Eades, Hess, and Kim (1984) document positive excess returns for taxable distributions, but they also observe similar activity for nontaxable distributions (such as stock splits and stock dividends). Similarly, Shaw (1991) finds abnormal returns for non-taxable master limited partnership distributions around the distribution date. Bali and Hite (1998) observe that while an ex-dividend day price drop that is less than the dividend is consistent with a tax effect, it is also consistent with price effects caused by discreteness in the prices at which stocks trade. Finally, Frank and Jagannathan (1998) study dividend distributions around ex-dates in Hong Kong where neither dividends nor capital gains are taxed, and they find that price declines in Hong Kong are less than the amount of the dividend. Thus, they argue that tax effects alone cannot explain the observed patterns of price declines around dividend distributions.

This paper provides new evidence about the ex-date puzzle by examining trading activity of ADRs around the ex-date. ADRs are securities traded on U.S. exchanges that represent foreign equity. The applicability of the foreign taxes associated with ADR dividend income provides a unique setting in which to study tax-motivated, ex-dividend day trading activity. The countries from which the equity securities that underlie ADRs were issued apply foreign taxes on dividend payments, and the rates vary across countries. To the U.S. investor, dividend payouts from ADRs are subject to the applicable U.S. tax law as well as that of the foreign jurisdiction, while capital gains are subject only to U.S. taxation. Foreign jurisdictions generally do not recognize the U.S. tax status of tax-exempt U.S. institutions. That is, foreign taxes apply to U.S. investors regardless of their tax status in the United States. Thus, compared to domestic equity, ADRs are securities traded on U.S. exchanges with a relative tax disadvantage for U.S. tax-exempt institutions. This fact adds a reason to expect additional tax-motivated, ex-date activity beyond that which might be observed with purely domestic securities. Moreover, the foreign tax rate for a given dividend distribution is known and is constant across U.S. investors regardless of the investor's tax status within the United States. Therefore, it is comparatively easy to measure the tax incentive (across securities) for various investors to trade, and thus to include taxes in tests of the determinants of abnormal trading activity.

The dividend received deduction is available to U.S. corporations under U.S. tax law. For corporations, it creates a preference for dividend income that is opposite the preference of individual investors in U.S. domestic securities that, from a tax perspective, generally prefer capital gains. However, this deduction is

not available for dividends received from foreign investment, including ADRs. Thus, the incentive to capture dividends based on the dividend received deduction, which exists for domestic securities, does not exist with respect to distributions from ADRs. Therefore, contrary to the case of U.S. domestic equity, examining ADRs results in a sample of distributions such that, when a tax incentive exists to trade because of distributions, different U.S. investors do not possess opposite tax incentives. In other words, from a tax perspective, all U.S. investors prefer capital gains or are indifferent between ADR dividend income and capital gains. In no case is there a tax preference for ADR dividend income relative to capital gains.

In this paper, we examine the price and trading behavior of a sample of 1,043 ADR dividend distributions that occurred over the period 1988 to 1995. We observe that, in broad terms, ADR distributions are similar to U.S. dividend distributions with respect to price changes around the ex-date. For our sample of distributions subject to foreign tax, the mean (median) ex-date price declines about 30 percent (25 percent) less than the amount of the dividend except for the quartile of distributions with the lowest dividend yields.

Some of the distributions are subject to foreign taxes and some are not. We exploit this variation in tax status across distributions to provide evidence that abnormal trading volume is a function of the tax penalty associated with foreign dividend taxes. For a sample of 922 distributions subject to foreign taxes, we observe high levels of abnormal trading volume in the days on either side of the ex-date, especially in the post period. Specifically, on average, the distributions subject to foreign taxation are associated with a greater than 130 percent increase above normal trading volume on the last cum-dividend date and a greater than 300 percent increase above normal trading volume on the ex-date. Abnormal volume continues to be significant for the six days beginning with the ex-date, and it averages more than 200 percent above the normal daily volume for the first five days in that period. We do not observe this same level of abnormal trading activity for our sample of distributions not subject to foreign taxes. In cross-sectional tests, we also observe that abnormal volume is positively associated with the foreign tax rate, negatively associated with transactions costs (as measured by the bid-ask spread), and positively associated with an indicator variable we refer to as "*High Penalty*," which proxies for situations in which the tax penalty associated with the dividend exceeds the relevant transaction costs. Together, these results are consistent with our prediction that a tax penalty on ADR dividend payouts creates an incentive for investors to engage in tax-motivated trading.

The remainder of this paper is organized as follows: Section I describes ADRs and their tax features. Section II discusses tax incentives to trade around ex-dates. Section III provides a description of the sample. Methods and results are presented in Section IV, and concluding remarks are provided in Section V.

I. ADRs and Taxes on Their Dividends

An ADR is a U.S. dollar-denominated financial instrument issued by an American bank (depositary) that represents share ownership of a particular foreign

security. Investment in ADRs generates two types of income, dividend income and capital gains. As an agent of the issuer, the depositary distributes dividend payments in U.S. currency net of foreign, nonresident, withholding tax. Some foreign governments do not impose dividend withholding taxes, but most do. In many instances, this withholding tax represents the final tax liability owed to the foreign jurisdiction. However, in some jurisdictions, the investor may file for a partial or full refund of these withholding taxes. Dividend income is taxable in both the U.S. and foreign jurisdictions, while capital gains, when realized, are taxable only in the United States. (See the Appendix for a more detailed discussion of foreign tax issues related to distributions included in the sample.)

To reduce or eliminate the effect of the double taxation of dividends, a taxpayer in the United States is entitled to a foreign tax credit for taxes withheld by the foreign jurisdiction. Although the credit provides a dollar-for-dollar reduction of the U.S. income tax liability, it is subject to limitations described in Internal Revenue Code Section 904. In general, as long as the foreign tax rate does not exceed the investor's U.S. marginal tax rate, the credit will directly offset the U.S. tax liability, thus resulting in a single level of taxation equivalent to the investor's U.S. marginal tax rate.

When the foreign tax rate exceeds the investor's U.S. marginal tax rate, the excess is not available to offset the U.S. tax liability in the current year, resulting in an effective tax rate that is greater than the investor's U.S. marginal tax rate. This creates a tax penalty on dividends relative to capital gains since capital gains are subject to U.S. taxation only. The magnitude of the penalty is a function of the level of foreign taxes levied on the dividend relative to an investor's U.S. effective tax rate on dividend income and capital gains. Depending on the magnitude of the penalty and applicable transaction costs, investors may find it profitable to avoid ADR dividend income by engaging in a dividend-trading strategy.

For corporations, the U.S. tax structure does not make a distinction in tax rates between dividend income and capital gains. As a practical matter, however, the "dividend received deduction" reduces the effective tax rate on dividends by 70 percent and thus makes corporations a natural clientele for dividend income. This deduction does not apply to foreign dividends, including dividends received from ADRs. Thus, while corporations may have an incentive to "capture" dividends on U.S. equities, they do not have that same incentive regarding the dividends of ADRs.

In addition to the foreign taxes on dividend income, both ADR dividend income and related capital gains are taxed in the U.S. for all taxpayers except for U.S. tax-exempt entities. To the extent that such U.S. taxable investors prefer capital gains over dividends from a U.S. tax perspective, it may also affect both their choice of securities in which to invest and their desire to avoid dividends. Accordingly, there may be some level of abnormal trading volume around ex-dates even for ADR issues that are not subject to foreign dividend taxes.

U.S. tax-exempt investors, such as pension funds, face unique tax consequences when they include ADRs in their portfolio. Often, the charters of these pension funds preclude them from holding foreign securities and foreign currencies. However, ADRs are dollar denominated and often listed on U.S. exchanges, and

so the charters sometimes treat investment in ADRs as U.S. securities, thus providing a vehicle through which the pension funds can invest in non-U.S. equity. However, this opportunity comes with a potential tax cost. While pension funds are not subject to U.S. income tax,¹ foreign governments do not recognize the tax-exempt status of these institutions in the United States. Thus, capital gains remain nontaxable in the foreign jurisdiction, but dividends are subject to withholding (and taxation) at the applicable nonresident rate. U.S. tax law does provide a foreign tax credit that mitigates the effect of two-country taxation, but this tax credit does not benefit tax-exempt entities since they have no U.S. tax liability to which to apply the credit. Thus, ADR investment can result in a level of taxes that could otherwise be avoided by maintaining a portfolio of only domestic securities or converting dividend income to capital gains using a dividend trading strategy.² Overall, these institutions simultaneously have incentives to hold high-yield domestic securities, and to either avoid the purchase of high-yield ADRs or to avoid the receipt of dividends on the ADRs that they hold or plan to purchase. Ironically, tax planning becomes important to these U.S. tax-exempt institutions.

To assist the pension funds and other U.S. tax-exempt entities in avoiding foreign dividend taxes, some securities firms offer services to facilitate trades of ADRs securities by the entities. Securities firms can apply capital losses against ordinary income for U.S. tax purposes, and they can also fully utilize foreign tax credits from foreign taxes on ADR dividend income. Thus, they can offer services to mitigate the effects of foreign dividend taxes that would otherwise be borne by U.S. pension funds and other U.S. tax-exempt institutions.³

In sum, the presence of a tax penalty on dividend payouts varies with investor type. The incentives to capture or avoid dividends on ADRs can be quite different from the incentives associated with domestic dividends. Furthermore, across investors, the incentive to avoid ADR dividend income ranges from indifference

¹The earnings are generally taxed to the beneficiary upon distribution.

²Other factors may create a preference for capital gains relative to dividend income. For example, a corporation is permitted a three-year carryback and five-year carryforward of non-deductible capital losses to offset net capital gains in any of those years (Internal Revenue Code Section 1212). Individuals, on the other hand, are permitted a \$3,000 deduction for net capital losses. Any remaining loss is carried forward indefinitely to offset future capital gains or to be used at a rate of up to \$3,000 per year. Recognition of capital gains in the current period may be desirable to an investor carrying forward large amounts of capital losses that they do not expect to use in the near future. Investors may also wish to avoid foreign withholding altogether. Dividends are distributed by the depositary net of foreign withholding. Therefore, the withheld funds are not immediately available to the investor. Investors who avoid the dividend may be able to defer or avoid paying taxes on this income altogether, depending on the investors' cumulative tax position. Administrative and compliance costs related to foreign dividends may also provide an incentive to convert dividends to income that is only taxed domestically.

³Changes in tax rules in the United States over time have made tax arbitrage more difficult, especially after 1997. The Tax Reform Act of 1997 disallowed foreign tax credits for dividend withholding taxes unless the recipient of the dividend held the security at least 16 days during the 30-day period beginning 15 days prior to the ex-dividend date. (See Internal Revenue Code Section 901(k)) However, security dealers are specifically exempted from this requirement.

between dividend income and capital gains to a strong aversion to dividend income that is predicted primarily for, but not limited to, U.S. tax-exempt investors. Although a tax penalty on ADR dividend income may not exist for all investors, from a tax perspective, there are no clear situations where ADR dividend income is preferred by U.S. investors over capital gains. In general, tax induced ex-dividend day trading is likely to be driven by the presence of U.S. tax-exempt investors for whom foreign taxes create a potentially substantial tax penalty prompting them to avoid ADR dividend distributions.⁴ For the U.S. taxable investor (corporations and individuals), the relative preference for capital gains over dividend income on ADRs, when it exists, may not be apparent due to tax treaties that reduce the effective foreign tax rate on dividends. Those taxable investors may be able to capture the dividend at a favorable price.

II. Ex-Date Prices and Trading

Previous research has long debated whether ex-dividend day prices reflect marginal taxes or some other exogenous factor. Elton and Gruber (1970) develop a model of long-term investors consistent with a tax clientele effect, and they present empirical evidence consistent with tax effects associated with dividend payments. Subsequent studies have empirically examined ex-dividend day price behavior, and many of them have attributed the observed behavior to taxes on dividends. Included in these studies are Green (1980), Miller and Scholes (1982), and Kalay (1982). Lakonishok and Vermaelen (1986a, 1986b) provide related evidence by examining abnormal ex-dividend date trading volume, and they developed dividend-related trading rules that depend on taxes and transaction costs. Others have challenged the tax-based interpretations of ex-dividend day pricing behavior, including Shaw (1991), Eades et al. (1984), Karpoff and Walkling (1988), Bali and Hite (1998), and Frank and Jagannathan (1998). Much of this work has shown that price changes can differ from dividends even in the absence of taxes on dividends, or in ways that reflect features of the rules associated with trading, such as price quotations in eighths.

Most of the studies of ex-date price behavior make price predictions that rely on assumptions about the identity and tax status of the marginal trader and the presence of arbitrage traders. However, it is difficult to predict price effects with U.S. securities because the population of investors includes many different types of traders subject to a variety of tax structures. Some prefer capital gains due to the lower tax rates on long-term capital gains than on dividends, while others can have a tax-based preference for dividend income (e.g., corporations taking advantage of the dividend received deduction). Some investors are tax exempt

⁴ Identification of the dominant investors and their tax status is important in understanding the overall incentive to engage in tax-motivated trading strategies. For our sample, institutional investors hold approximately 72 percent of the outstanding shares. *Pension and Investments* (February 4, 1991, p. 25) estimates institutional holdings of all ADRs at 80 percent.

and are indifferent from a tax perspective concerning whether income is in the form of capital gains or dividends. Dealer-brokers have yet again a distinct set of tax management opportunities because they can deduct capital losses to a degree not available to other participants in the markets. This diversity in tax status likely results in profitable short-term trading opportunities for some groups of investors that may enable them to achieve a gain for themselves, while simultaneously reducing the tax burden on others.

Given the potential for alternative interpretations of the evidence, it is natural to look for settings in which tax effects may be more clearly identified and addressed. Accordingly, Michaely and Murgia (1995), Green and Rydqvist (1999), and McDonald (2001) examine several types of securities that trade outside the United States with unique tax features and found evidence consistent with tax effects on ex-date pricing behavior.

We examine ADRs in this study because the ADRs are a U.S. security whose tax characteristics provide a natural experiment in which to investigate tax implications of dividends. Most ADRs are subject to foreign withholding taxes, and the withholding taxes do not depend on the tax status of the U.S. recipient of the dividend. Moreover, the withholding rate also does not depend on the tax circumstances of the U.S. holder of the ADR. For instance, if a U.S. pension fund is holding an ADR for which dividends are paid and foreign withholding taxes apply, the pension fund will be subject to the foreign withholding tax regardless of its tax-exempt status in the United States. Furthermore, because a pension fund is not subject to U.S. taxes, it is unable to offset its foreign withholding tax payments against its U.S. tax bill. Thus, compared to domestic equity, ADRs are securities traded on U.S. exchanges with a relative tax disadvantage for U.S. tax-exempt institutions. This fact adds a reason to expect additional tax-motivated ex-date activity beyond that which might be observed with purely domestic securities. Also, the foreign tax rate for a given dividend distribution is known and is constant across U.S. investors regardless of the investor's tax status within the United States. Therefore, it is comparatively easy to measure the tax incentive (across securities) for various investors to trade, and thus to include taxes in tests of the determinants of abnormal trading activity.

III. Sample

To test for tax-induced trading activity, we constructed a sample of ADR distributions from the 2000 Center for Research in Security Prices (CRSP) database consisting of all regular cash distributions of NYSE-, AMEX-, and Nasdaq-listed ADRs over the period 1988 to 1995. We did not use distributions occurring before 1988 to avoid the substantial U.S. tax rate changes that occurred between 1986 and 1988. The CRSP database provided information necessary to identify the events (ex-dividend days) and to obtain all volume data and price information. We obtained tax information from the *World Corporate Tax Guide* (Ernst and Young, 1995), *IRS Publication 901*, the applicable tax treaties, press releases announcing the distributions, and 20-F filings.

Table I
Sample Description

This table provides information regarding the foreign tax jurisdiction and foreign tax rate applicable to dividend distributions for both the *initial* and *final* sample. Caution: The tax rate listed is the tax rate applicable to individual distributions and may not represent the tax rate for all distributions from that country. *See the Appendix for a detailed discussion of the applicable tax rates for the sample distributions.* The *initial* sample includes all ADR dividend distributions identified in the CRSP database occurring over the period 1988 to 1995 for which sufficient information exists to compute dividend yield. (Twenty-three observations were dropped because data were not available to compute dividend yield. Two additional observations were dropped because they were listed less than six months on the exchange.) The *final* sample is formed by eliminating dividend distributions related to thinly traded ADRs from the *initial sample*. We define an ADR as “thinly traded” if its median daily trading volume during the estimation period was in the bottom 50th percentile (median volume < 6,275 shares) among ADRs, or if the ADR traded on fewer than 90 percent of the trading days during the estimation period. The estimation period used to identify thinly traded ADRs consists of the periods from 45 to 15 days prior to the ex-dividend day and from 15 to 45 days after the ex-dividend day.

Foreign Tax Rate	Country	Initial Sample		Deletions		Final Sample	
		Securities	Dividend Distributions	Dividend Distributions	Securities	Dividend Distributions	
0%	Argentina	11	27	9	7	18	
15%	Australia	16	172	131	10	41	
0%	Bermuda	2	10	7	1	3	
15%	Brazil	1	3	0	1	3	
23.5–35%	Chile	15	82	14	14	68	
10%	China	2	6	1	2	5	
8%	Colombia	1	5	5	0	0	
15%	Denmark	3	10	5	2	5	
15%	Finland	1	8	8	0	0	
15%	France	6	41	25	5	16	
10%	Germany	2	10	7	2	3	
0%	Hong Kong	2	17	4	1	13	
15%	Indonesia	4	3	1	2	2	
0%	Ireland	4	27	27	0	0	
25%	Israel	1	34	14	1	20	
15%	Italy	11	33	19	8	14	
15%	Japan	25	341	272	9	69	
15%	Korea	3	5	5	0	0	
7.5%	Luxembourg	3	18	1	2	17	
0%	Mexico	17	48	4	15	44	
15%	Netherlands	9	80	42	4	38	
0–15%	New Zealand	4	19	8	2	11	
15%	Norway	4	12	2	3	10	
0%	Peru	1	1	0	1	1	
35%	Philippines	1	5	2	1	3	
25%	Portugal	1	3	1	1	2	
15%	South Africa	24	268	120	16	148	
15%	Spain	9	120	45	8	75	
15%	Sweden	10	54	33	6	21	
15%	U.K.	93	750	361	40	389	
0%	Venezuela	1	4	0	1	4	
Total		287	2,216	1,173	162	1,043	

Table I describes the sample. We treat each distribution (or ex-dividend day) as a single observation. We eliminated observations if the security was listed on the exchange less than six months prior to the distribution (23 observations) or if the data necessary to compute dividend yield were missing (2 observations). This results in an initial pool of 2,216 distributions.

Some ADRs trade at very low volumes and frequently have nontrading days. Such ADRs would not be comparable to samples used in earlier studies that focus on abnormal trading volume, such as Lakonishok and Vermaelen (1986b). We eliminated observations if (1) the median trading volume during the window over which we estimated the security's normal trading volume fell into the bottom 50th percentile (median daily volume < 6,275 shares) of ADR distributions identified above, or (2) if the security failed to trade (or had missing volume data) on more than 10 percent of the trading days during that same period. The window we used to estimate "normal volume" is defined as the combined period occurring from 45 to 15 days prior to the ex-date and from 15 to 45 days following the ex-date. Most distributions that failed to meet either of these criteria failed to meet both criteria. Eliminating these observations makes the sample more comparable with other volume studies such as Lakonishok and Vermaelen (1986b), who divide their sample into four dividend yield groups that are further subdivided into four trading size groups based on average daily trading volume. Of these 16 subsamples, they document an *average* daily trading volume of 12,070 shares for the most thinly traded sample, which is twice our cutoff of 6,275 for inclusion in the sample. Furthermore, the 6,275-share volume cutoff means that the excluded observations had volumes of about 10 percent or less than the average volumes of NYSE-AMEX-Nasdaq securities during our observation period. The resulting pool, or *final sample*, consists of 1,043 cash distributions.

Table I also details the countries in which the underlying equity securities were issued and the foreign tax rates associated with the distributions. When an ADR distribution is made, the depositary distributes dividend payments in U.S. currency, net of foreign, nonresident, withholding tax. While it is more common that this represents the final tax liability owed to the foreign jurisdiction, in some instances, the shareholder may apply for a full or partial refund of the withholding. (See the Appendix for more details regarding the tax law in specific countries.) We define the tax rate for a given distribution as the effective foreign tax rate assuming the shareholder applies for any refund that may be applicable. However, the process of getting a refund can be lengthy and relatively costly (Reid, 1994). Thus, all empirical tests are also estimated defining the tax liability as the withholding rate, which assumes that shareholders forgo any refund for which they must apply. The final sample consists of 162 ADRs with 1,043 cash distributions. Sixty-three percent were traded on the NYSE, 3 percent on the AMEX, and 34 percent on the Nasdaq. This sample includes ADRs from 27 countries that are subject to foreign tax rates on dividend income ranging from 0 to 35 percent.

IV. Analyses and Results

A. Descriptive Statistics

In Table II, we present statistical characteristics for the full sample and for partitions of the sample based on the foreign tax rate applicable to the distributions. We refer to distributions for securities from countries that assess foreign, nonresident taxes on ADR dividend distributions as “taxable” distributions, and we refer to distributions not subject to foreign tax as “nontaxable” distributions.

Securities in the taxable sample are generally associated with significantly lower normal trading volumes relative to the nontaxable sample. There is a striking difference between mean and median values of normal trading volume, especially with respect to the normal trading volume of nontaxable distributions. Much of the difference in means can be attributed to the presence of ADRs issued by Teléfonos de México (Telmex) in the nontaxable sample. Telmex trades at particularly high volumes. As documented in Table II, parametric and nonparametric tests indicate that the taxable sample exhibits significantly higher

Table II
Sample Characteristics

This table presents descriptive statistics for a sample of 1,043 ADR dividend distributions occurring over the period 1988 to 1995. Statistics are also provided for taxable and nontaxable partitions of the sample. Taxable (Nontaxable) refers to the presence (absence) of foreign dividend taxes related to the dividend distribution. *Dividend Yield* is calculated as the amount of the dividend distribution divided by the share price thirty days prior to the ex-dividend day. *Normal Trading Volume* is measured as the average volume over the periods occurring 45 days to 15 days prior to the ex-dividend day, and 15 days to 45 days after the ex-dividend day. *Bid/ask spread* is measured as the average over the 6-day window occurring over the last 3 days the security sells cum-dividend through the first 3 days the security sells ex-dividend, divided by share price 30 days prior to the ex-date. *Share Price* is measured as the share price 30 days prior to the ex-date.

	<i>Dividend Yield</i>	<i>Normal Trading Volume</i>	<i>Bid/Ask Spread</i>	<i>Share Price</i>
Final sample (<i>n</i> = 1,043)				
Mean	0.021	195,316	0.019	32.13
Median	0.017	61,467	0.015	24.63
Std. dev.	0.024	555,890	0.014	24.90
Not subject to foreign tax—“nontaxable” (<i>n</i> = 117)				
Mean	0.017	598,686	0.029	22.82
Median	0.014	116,403	0.022	20.13
Std. dev.	0.011	1,443,329	0.021	15.38
Subject to foreign tax—“taxable” (<i>n</i> = 926)				
Mean	0.021	144,129	0.018	33.32
Median	0.017	57,259	0.015	25.37
Std. dev.	0.026	250,197	0.012	25.62
Difference, Nontaxable vs. Taxable				
Mean	– 0.004	454,557	0.011	– 10.50
T-statistic	– 3.35	3.40	5.61	– 6.30
Median	– 0.003	59,144	0.007	– 5.12
Z-statistic	– 1.99	4.44	6.76	– 4.30

dividend yields and share prices than the nontaxable sample. Share price is measured as the closing price 30 days prior to the ex-date.⁵

Bid-ask spread, as a percentage of price, is used to proxy for transaction costs. The mean (median) bid-ask spread over the six-day window occurring three days prior to the ex-dividend day through the first three days the security sells ex-dividend, divided by daily closing price, for the full sample is 0.019 (0.015). Both the mean and median bid-ask spreads for the nontaxable sample are significantly greater than for the taxable sample.

B. Price Behavior

Elton and Gruber (1970) examine all stocks listed on the NYSE that paid a dividend during the period April 1, 1966, to March 31, 1967. They observe that, for low dividend yield stocks, prices decline from the cum-date to the ex-date by amounts that are smaller than the dividends themselves. For high dividend yield stocks, Elton and Gruber observe a price decline approximately equal to the size of the dividend. Table III presents comparable data for our sample of ADR distributions in dividend yield quartiles.

In Panel A, all distributions subject to foreign dividend tax are partitioned into dividend yield quartiles. We observe a mean (median) ex-date price decline that is approximately 70 percent (75 percent) of the amount of the dividend for all quartiles except for Quartile 1, the lowest dividend yield quartile. In Panel B, we hold the tax rate constant by examining only those dividends that were subject to a 15 percent foreign tax rate. This group constitutes approximately 80 percent of our total sample. For this subsample of taxable distributions, again there is a mean (median) price drop of around 70 percent (75 percent) of the dividend amount in the three highest dividend yield quartiles. The low yield quartile has a mean price decline of 85 percent of the dividend amount, and a median price decline that is about 44 percent of the dividend amount. In both Panel A (taxable sample) and Panel B (15 percent taxable sample), by quartile, neither the mean nor the median values of price decline for any quartile are significantly different from any other quartile at p -values ≤ 0.05 . Furthermore, except in the case of Quartile 1, $(PB - PA)/Div$ is significantly (p -value ≤ 0.05) less than one.⁶

Elton and Gruber (1970) generally find that the percentage decline in price on the ex-day is positively associated with dividend yield. Furthermore, for the highest dividend yield deciles, they document a price decline that approximates the dividend. They attribute this to a clientele of tax-exempt investors holding the

⁵When closing price is not available, we use the average of the bid and ask prices.

⁶We observe that a single dividend of less than one cent for one of the securities in Quartile 1 had a $(PB - PA)/Div$ ratio of more than 223. We excluded that one exceptional item from the results reported in Table III. Including this outlier resulted in a mean price decline of 1.82 for the taxable sample (Panel A) and 2.22 for the 15 percent taxable sample (Panel B), declines that are much larger than the dividend. Dropping a second extreme observation in this quartile that had a value of $(PB - PA)/Div$ of more than 50 and was for a dividend occurring on the same date as the previously mentioned extreme dividend, the average price decline for the quartile would be about 64 percent (Panel A) and 67 percent (Panel B) of the dividend, values which are similar to the values reported for the other three quartiles.

Table III
**Ex-dividend Day Price Drop Relative to the Dividend Payout Arranged by
 Dividend Yield Quartiles**

Similar to Table III in Elton and Gruber (1970) in which ex-day price declines are documented for a sample based on all securities traded on the NYSE, this table documents the ex-day price drop for our sample of ADR dividend distributions subject to foreign taxes. The data are arranged by dividend yield quartiles. Panel A documents the ex-day price drop for 926 distributions which were subject to any level of foreign tax, while Panel B specifically isolates the 819 distributions subject to a 15 percent foreign tax. *Dividend Yield* is computed as the amount of the dividend divided by the closing share price 30 days prior to the distribution. The price drop is computed as $(P_B - P_A)/Div$, where P_B is the closing price on the cum-day, P_A is the closing price on the first day the security sells ex-dividend, and Div is the amount of the dividend. For each quartile in Panel A and Panel B, closing stock price 30 days prior to the dividend and the mean bid-ask spread are given. *Bid/ask spread* is measured as the average over the 6-day window occurring over the last 3 days the security sells cum-dividend through the first 3 days the security sells ex-dividend, divided by share price. Means, medians, and standard deviations are presented for all variables.

Quartile		<i>Dividend Yield</i>	$\frac{P_B - P_A}{Div}$	<i>Price</i>	<i>Bid/Ask</i>
Panel A: All Distributions Subject to Foreign Tax ($n = 926$)					
4	Mean	0.048	0.71	26.62	0.021
	Median	0.037	0.77	18.75	0.016
	Std. dev.	0.043	0.55	22.84	0.018
3	Mean	0.022	0.62	32.23	0.017
	Median	0.022	0.80	24.56	0.014
	Std. dev.	0.003	2.84	24.63	0.009
2	Mean	0.014	0.77	31.68	0.016
	Median	0.014	0.74	25.25	0.014
	Std. dev.	0.002	1.22	21.52	0.008
1 ^a	Mean	0.006	1.13	44.50	0.014
	Median	0.006	0.55	35.88	0.012
	Std. dev.	0.002	6.15	31.65	0.008
Panel B: Distributions Subject to 15% Foreign Tax ($n = 819$)					
4	Mean	0.046	0.58	26.81	0.021
	Median	0.036	0.76	18.88	0.016
	Std. dev.	0.041	2.60	22.57	0.018
3	Mean	0.021	0.79	31.72	0.017
	Median	0.021	0.75	24.38	0.015
	Std. dev.	0.003	0.95	24.49	0.009
2	Mean	0.013	0.69	32.04	0.017
	Median	0.013	0.66	26.37	0.014
	Std. dev.	0.002	1.40	20.40	0.009
1 ^a	Mean	0.005	0.85	43.48	0.017
	Median	0.005	0.44	33.44	0.014
	Std. dev.	0.002	7.20	31.04	0.010

^aIn both Panels A and B, one observation is dropped in the calculation of the ratio $(P_B - P_A)/Div$. means, medians, and standard deviations. That observation had a dividend less than one cent and a price change of 1 9/16 (\$1.5625), resulting in a ratio for that observation of 223. No other observation had a ratio value within two orders of magnitude of that value.

high-yield securities. In general, we do not observe this same pattern for our sample of ADRs. In fact, we see very little difference in the ex-day price drop among the three highest dividend yield quartiles, and the price drop across those quartiles generally approximates between 55 percent and 75 percent of the dividend. We attribute the contrast between our results and those of Elton and Gruber to the fact that even investors exempt from U.S. taxes are unable to avoid the taxes that would be withheld if they received these dividend payments.

We further examined this point by separately considering the 117 dividend distributions classified as not subject to foreign taxes. Since these distributions are not subject to foreign dividend taxes, a U.S. tax-free institution can receive the dividends without any tax effect. Thus, for tax purposes, these distributions are equivalent to U.S. dividends (except for the corporate dividend received exclusion). We placed these 117 dividends into quartiles based on dividend yield. For all quartiles, the hypothesis that the mean of the ratio of price decline to dividend was equal to one could not be rejected at conventional levels of significance. Hence, the results are consistent with those of Elton and Gruber (1970) for U.S. equities. However, these quartiles each had only 29 or 30 observations; therefore, the results should be treated with caution.

Table IV further documents share price behavior surrounding the ex-date by examining abnormal daily returns for a 15-day window centered on the ex-date for the taxable and nontaxable samples. Abnormal returns are estimated using an OLS market model corrected for heteroskedasticity. We estimated the parameters for the market model across days -45 through -15 and days $+15$ through $+45$ relative to the ex-day, using both a NYSE value-weighted and a NYSE equal-weighted market portfolio. Both market portfolios yield essentially the same results. Table IV reports abnormal daily returns using an equal-weighted market portfolio.

As expected, we observe negative and significant (p -value = 0.00) abnormal daily returns on the ex-day for both partitions of the sample. The abnormal negative returns for the taxable and nontaxable partitions are 1.6 percent and 1.3 percent, respectively. Over the 15-day window centered on the ex-dividend day, the abnormal return for the taxable sample is significantly different (p -value ≤ 0.10) from the nontaxable sample only on day -3 , the ex-day day 0 through day $+2$, and day $+6$. Overall, we find that ADRs exhibit ex-dividend day price activity consistent with that documented for domestic securities listed on the major exchanges.

C. Trading Volume—Univariate Analysis

We examine volume associated with ex-dates using univariate daily analyses and multivariate analyses over windows surrounding the ex-date. In Panel A of Table V, we present average daily abnormal trading volume by tax status for each day in the 15-day window beginning 7 days prior to the ex-date and ending 7 days following the ex-date. Abnormal trading volume for each distribution is computed as $AVol = (Vol - NVol)/NVol$, where Vol is daily trading volume and $NVol$ is an estimate of normal trading volume for each ADR. We estimate normal trading volume as the average daily volume over the combined days in two periods

Table IV
Daily Abnormal Returns

This table documents daily abnormal returns for 1,043 ADR dividend distributions occurring over the period 1988 to 1995. The sample is partitioned based on the foreign tax associated with the distribution. The (non) taxable partition includes all distributions (not) subject to foreign tax. Abnormal returns are presented for a 15-day window centered on the ex-day. Daily abnormal returns are estimated using a market model as in Brown and Warner (1985). The parameters for the market model are estimated in days -45 through -15 and days $+15$ through $+45$ relative to the ex-day. The model was estimated using both value-weighted and equal-weighted daily returns. Results are reported using equal-weighted daily returns. Means and t -statistics (in parentheses) are presented for each day.

-7	-6	-5	-4	-3	-2	Cum-Day	Ex-Day	0	1	2	3	4	5	6	7
Panel A: Distributions Not Subject to Foreign Tax—"Nontaxable" (n = 117)															
-0.000 (0.10)	-0.000 (-0.10)	0.001 (0.33)	0.002 (0.58)	-0.005 (-1.71)	0.005 (1.68)	0.003 (1.38)	-0.013 (-4.80)	0.001 (0.32)	0.002 (0.68)	-0.006 (-2.39)	0.003 (0.82)	0.008 (2.28)	0.000 (0.19)	0.000 (-0.21)	-0.001
Panel B: Distributions Subject to Foreign Tax—"Taxable" (n = 926)															
0.000 (0.12)	-0.000 (-0.10)	0.000 (0.21)	0.001 (0.69)	0.002 (3.24)	0.001 (1.17)	0.000 (0.25)	-0.016 (-16.58)	0.001 (1.89)	0.002 (2.33)	0.000 (0.45)	0.000 (0.47)	0.001 (1.06)	0.002 (2.85)	0.000 (0.62)	0.000

Table V
Daily Abnormal Trading Volume

This table documents daily abnormal trading volume for 1,039 ADR dividend distributions (four taxable observations were eliminated due to missing information) occurring over the period 1988 to 1995. In Panel A, the sample is partitioned based on the foreign tax associated with the distribution. The (non) taxable partition includes all distributions (not) subject to foreign tax. Panel B documents daily abnormal trading volume, by dividend yield quartile, for the 815 ADR dividend distributions in the sample that were subject to 15 percent foreign tax (four observations were eliminated due to missing information). Abnormal trading volumes are presented across a 15-day window centered on the ex-dividend day. Abnormal trading volume ($AVol$) is computed as $(Vol - NVol)/NVol$, where Vol is daily trading volume and $NVol$ is an estimate of normal trading volume for the ADR. Normal trading volume is estimated as the average daily volume over two periods consisting of days -45 through -15 and days $+15$ through $+45$ relative to the ex-day. Two methods were used in deriving statistical tests, one using nonstandardized and one using standardized observations. (For a detailed description, see Brown and Warner (1985) or Lakonishok and Vermaelen (1986b).) Both statistics yield essentially the same results. For each trading day, mean abnormal trading volume and t -statistics (in parentheses) based on the standardized procedure are presented.

						Cum-Day		Ex-Day																					
						-1		0		1		2		3															
						-2		-1		0		1		2															
Panel A: Daily Abnormal Volume by Tax Status																													
Distributions Not Subject to Foreign Tax – “Nontaxable” ($n = 117$)																													
-0.13	-0.02	0.83	0.22	0.16	0.11	0.17	0.17	0.29	0.21	-0.09	0.01	-0.11	-0.02	-0.01															
(-1.36)	(0.45)	(1.77)	(1.34)	(1.94)	(1.37)	(1.64)	(1.45)	(1.54)	(1.38)	(-1.13)	(0.48)	(-0.39)	(0.09)	(0.40)															
Distributions Subject to Foreign Tax – “Taxable” ($n = 922$)																													
0.22	0.44	0.21	0.56	0.71	0.55	1.38	3.23	2.23	2.01	2.10	1.55	0.10	-0.01	0.10															
(3.53)	(3.66)	(3.02)	(2.55)	(2.82)	(3.75)	(5.25)	(5.76)	(6.06)	(6.40)	(6.27)	(5.22)	(1.91)	(0.25)	(3.08)															
Difference Between Taxable and Nontaxable Distributions																													
0.35	0.46	-0.62	0.34	0.55	0.44	1.21	3.06	1.94	1.80	2.19	1.54	0.21	0.01	0.11															
(1.72)	(1.15)	(-2.07)	(0.43)	(0.74)	(1.05)	(1.65)	(1.95)	(1.87)	(2.08)	(2.32)	(1.80)	(0.86)	(0.00)	(0.73)															

Table V—Continued

-7	-6	-5	-4	-3	-2	Cum-Day -1	Ex-Day 0	1	2	3	4	5	6	7
Panel B: Daily Abnormal Volume by Dividend Yield Quartile														
Dividend Yield Quartile 4 (mean = 0.048)														
0.41	0.09	0.02	1.46	1.22	0.24	0.98	2.00	1.51	0.77	0.85	1.22	0.08	0.00	0.08
(2.35)	(1.59)	(0.72)	(1.54)	(1.32)	(1.30)	(2.82)	(1.94)	(3.12)	(4.04)	(2.08)	(2.88)	(0.96)	(0.54)	(1.52)
Dividend Yield Quartile 3 (mean = 0.022)														
0.24	0.58	0.57	0.39	0.63	1.02	1.43	3.62	3.17	2.83	1.71	0.96	0.15	0.01	0.02
(2.76)	(2.37)	(2.01)	(2.75)	(1.26)	(2.17)	(2.25)	(2.72)	(3.02)	(3.16)	(3.56)	(3.71)	(1.80)	(0.49)	(1.05)
Dividend Yield Quartile 2 (mean = 0.014)														
0.08	1.10	0.18	0.41	0.56	0.66	1.97	4.59	2.63	2.40	4.27	3.15	0.07	-0.05	0.07
(1.34)	(2.26)	(1.71)	(1.41)	(2.69)	(2.76)	(3.28)	(3.69)	(3.38)	(3.61)	(3.60)	(2.85)	(0.74)	(-0.82)	(1.09)
Dividend Yield Quartile 1 (mean = 0.006)														
0.07	0.22	0.17	0.13	0.23	0.06	0.65	0.57	0.48	2.31	1.84	1.22	-0.04	-0.06	0.21
(1.23)	(2.51)	(1.57)	(1.38)	(1.76)	(0.80)	(1.67)	(2.24)	(1.83)	(2.11)	(2.02)	(2.36)	(-0.60)	(-1.14)	(2.09)

that include days -45 through -15 and days $+15$ through $+45$ relative to the ex-day. Including days before and after the ex-dividend day serves two purposes. First, it allows for a longer window for computing normal volume while avoiding situations where this estimation window for a particular distribution would otherwise overlap a previous or subsequent ex-date. Second, it allows for the possibility of shifts in the trading pattern of the individual security. Finally, we compare the average abnormal daily volume for each day based on all ex-day events with the same tax status.⁷

We used two methods to test for abnormal trading activity, one using nonstandardized and one using standardized observations. Detailed descriptions of these methods are in Brown and Warner (1985) and Lakonishok and Vermaelen (1986b).⁸ Both methods yield essentially the same results. T -statistics presented in Table V are derived using the standardized procedure.

For taxable distributions, we document high levels of abnormal trading volume in the days on either side of the ex-date. With the exception of day $+6$, daily abnormal trading volume is consistently positive and significant (p -value = 0.00) beginning on day -7 and continuing through day $+7$ relative to the ex-date. Most striking are a greater than 130 percent increase in trading activity on the cum-day, a greater than 300 percent increase above normal levels on the ex-date, and abnormal volume that varies between 155 percent and more than 220 percent on the four days following the ex-date. While there is some evidence of abnormal volume around the ex-date even in the sample of nontaxable dividends, the level of abnormal activity in the nontaxable sample is far lower than in the taxable sample. In general, the taxable sample consistently exhibits significantly higher levels (p -value ≤ 0.10) of daily abnormal trading activity relative to the nontaxable sample on day -1 through day $+4$. In our sample, abnormal daily trading volume is more pronounced following the ex-date. The fact that we do observe abnormal

⁷ Lakonishok and Vermaelen (1986b) use a second *calendar time method* to reduce the problem of time clustering of the data. It is unlikely that time clustering is an issue with our sample of ADRs. For our sample of 1,043 ADR distributions, there are only two instances where six ex-days fall on the same calendar day, and five instances where five ex-days fall on the same calendar day. Furthermore, within each of those seven cases of clustering, both taxable and nontaxable distributions are represented. Thus, it is unlikely that controlling for time clustering would significantly alter the results.

⁸ Consistent with Lakonishok and Vermaelen (1986b), we compute the standardized t -statistic as

$$\hat{t} = \frac{\sum_{t=1}^T SAV_t / T}{\sigma(SAV)},$$

where

$$SAV_t = \frac{AVol_t}{\sigma(AVol_t)},$$

$\sigma(AVol_t)$ is the estimated standard deviation computed in the period -45 to -15 and $+15$ to $+45$ relative to the ex-day, and $\sigma(SAV)$ is the standard deviation of the mean standardized abnormal volume.

trading activity in the nontaxable sample, albeit at a much lower level than the taxable sample, suggests that foreign taxes on dividends alone cannot fully explain the abnormal trading activity.⁹

In reality, the incentive to engage in dividend trading strategies is also a function of both the dividend yield and the costs of avoiding or capturing the dividend. Thus, in Panel B of Table V, we focus on one dimension of the tax penalty, the foreign tax rate. Accordingly, by using only the 815 observations with a 15 percent foreign tax rate, we examine the effect of dividend yield while holding the tax rate constant. The three top dividend yield quartiles consistently exhibit significant increases in trading volume surrounding the ex-dividend day. Even the lowest dividend-yield quartile exhibits significant increases in trading activity over the five-day period beginning with the ex-date, but it is not as pronounced as that of the three higher yield quartiles. Overall, trading volume does not appear to be a monotonic increasing function of dividend yield. It appears that once a threshold has been achieved, foreign taxes provide sufficient incentive to engage in tax motivated trading.

Table V documents *daily* abnormal trading volume. However, because tax-induced trading could occur over several days, we also examine abnormal trading volume for several windows surrounding the ex-date including 1-, 2-, and 5-day windows occurring prior to and following the ex-date, as well as 2-, 4-, and 10-day windows centered on the ex-date. Regardless of the window selected, we consistently observe significantly higher trading volume for the taxable sample than for the nontaxable sample. Furthermore, this activity appears more pronounced in the period following the ex-date than in the period prior to the ex-date.

Overall, we consistently observe greater excess trading activity associated with taxable distributions relative to nontaxable distributions. This abnormal trading activity is generally consistent with the notion that the tax penalty associated with foreign taxes induces tax-motivated trading in the days surrounding the ex-date. While these analyses provide insight into the events around the ex-dividend day, they allow for only two levels of tax treatment (taxable and non-taxable) and do not consider other factors that may affect trading. The interaction between the taxes and dividend yield and nontax costs are better captured in the multivariate analyses that follow.

D. Trading Volume—Multivariate Analysis

The foreign tax rate for a given dividend distribution is known and constant across U.S. investors regardless of the investors' U.S. tax status. This enables us to measure the associated foreign tax penalty across distinct securities.

⁹ Our modest evidence of abnormal volume even for the nontaxable sample is consistent both with (1) the market microstructure model of Frank and Jagannathan (1998), in which investors who plan to buy have a preference for waiting until the ex-date, while investors who wish to sell have a preference to sell before the ex-date; and also with (2) Lakonishok and Vermaelen (1986b), who document abnormal trading activity in the days surrounding the ex-dividend day that is attributed to differences in the U.S. taxation of dividends income versus capital gains.

Therefore, these ADRs provide a unique setting that allows us to jointly test both tax and nontax factors affecting trading activity.

The variables we would expect to affect trading volume associated with foreign taxes include the tax rate, the dividend yield, the interaction between those two variables (or their product), transactions costs, and tax circumstances within the United States. A tentative regression to address those variables could be of the form

$$\begin{aligned} AVol_{i,t} = & \beta_0 + \beta_1 (Tax_{i,t} * Dividend\ Yield_{i,t}) + \beta_2 Tax_{i,t} + \beta_3 Dividend\ Yield_{i,t} \\ & + \beta_4 Transaction\ Costs_{i,t} + \beta_5 RRA93_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (1)$$

where

$AVol_{i,t}$ is the abnormal trading volume around the ex-day t for security i ;

$Tax_{i,t}$ is the foreign tax rate related to dividend distribution of security i at time t ;

$Dividend\ Yield_{i,t}$ is computed as the dividend for security i at time t divided by the share price at day $t - 30$;

$Transaction\ Costs_{i,t}$ is the average bid–ask spread for security i measured over the six-day window occurring three days prior to ex-date t through the first three days the security sells ex-dividend;¹⁰ and

$RRA93_{i,t}$ is an indicator variable that takes on a value of 1 if the distribution occurred after December 31, 1992, and 0 otherwise.

Abnormal trading volume ($AVol$) is computed in the same manner it was for the univariate tests except that in the tests described below, it is summed across a window of time rather than being a single day's abnormal volume. The interaction between Tax and $Dividend\ Yield$ is a proxy for the total tax cost associated with the distribution. The variable $RRA93$ is a dummy variable included to control for any effect of the Revenue Reconciliation Act of 1993, which resulted in increased ordinary income tax rates and an increased preference for capital gains relative to dividend income for certain investors.¹¹

We do not employ the tentative regression model represented by equation (1) in the analyses that follow because we observe a high degree of multicollinearity among its independent variables. In particular, the estimates of Tax , $Dividend$

¹⁰ We also examined results using 5-day and 11-day windows. The length of the window did not affect our conclusions.

¹¹ While the Revenue Reconciliation Act of 1993 increased rates on ordinary income, capital gains rates were not affected. This change increased the incentive to convert ordinary income to capital gains. The act was signed into law on August 10, 1993, but it was applied retroactively back to the beginning of 1993. Discussions of the proposed tax changes and the likely retroactive application were in the press for much of the year. The ideal cutoff date for assigning this variable a value of one would be the date investors traded under the belief that their taxes would be impacted by the change. However, it is not clear what that ideal date would be given the time lag and uncertainty between proposal and passage of the Act. Therefore, we used both the effective date (January 1, 1993) and the date that President Clinton signed the Act (August 10, 1993) for assigning values to the indicator variable $RRA93$. The results were slightly stronger using the date the Act was signed as a cutoff for assigning the variable, but the results we present use the effective date of the Act.

Yield, and their interaction term (*Tax * Dividend Yield*) are highly correlated. Therefore, in our analyses, we estimate the following two models:

$$\text{Model 1 : } A\text{Vol}_{i,t} = \beta_0 + \beta_1 \text{Tax}_{i,t} + \beta_2 \text{Dividend Yield}_{i,t} + \beta_3 \text{Transaction Costs}_{i,t} \\ + \beta_4 \text{RRA93}_{i,t} + \varepsilon_{i,t}, \quad (2)$$

$$\text{Model 2 : } A\text{Vol}_{i,t} = \beta_0 + \beta_1 (\text{Tax}_{i,t} * \text{Dividend Yield}_{i,t}) + \beta_2 \text{Transaction Costs}_{i,t} \\ + \beta_3 \text{RRA93}_{i,t} + \varepsilon_{i,t}, \quad (3)$$

The results are presented in Table VI.

We estimated the regressions defined in Model 1 and Model 2 using several different windows for measuring abnormal trading volume. In Panel A, we present results for abnormal trading volume over both the two-day and five-day windows immediately preceding the ex-day. Panel B presents results for windows centered on the ex-day. In Panel C, we present abnormal trading volume results for windows that occur after the security begins to trade ex-dividend.

In Model 1, we regress abnormal trading volume (*AVol*) on the tax rate, dividend yield, our proxy for transactions costs, and the *RRA93* dummy variable. We expect abnormal trading volume to be positively associated with the level of foreign tax and the dividend yield, but this activity is constrained by transaction costs. Thus, we expect a positive coefficient on tax and dividend yield, and a negative coefficient on our proxy for transaction costs. The Revenue Reconciliation Act of 1993 increased the difference in U.S. tax rates for ordinary income relative to capital gains, which effectively increased the incentive to convert ordinary income to capital gains. Therefore, we expect the *RRA93* dummy variable (which is assigned a value of 1 for distributions affected by the Act), to be associated with higher levels of abnormal trading volume.

In general, we find that for Model 1, the coefficient on *Tax* is positive and significant (*p*-value ≤ 0.05) for each of the test windows. The coefficients on *Transaction Costs* are generally negative and significant with *p*-values ≤ 0.10 . Furthermore, as evidenced by the positive and highly significant coefficient on *RRA93*, the level of abnormal trading activity is more pronounced following the increase in U.S. tax rates associated with *RRA93*.

In Model 2, we drop the separate independent variables (*Tax* and *Dividend Yield*) from the regression, and instead include the product (*Tax * Dividend Yield*) as a proxy for the total tax penalty associated with the distribution. In this case, the regression coefficient on *Tax * Dividend Yield* is positive and significant (*p*-value ≤ 0.10) for all test windows. Consistent with our expectations and with Model 1, the coefficient on *Transaction Costs* is negative and significant (*p*-value ≤ 0.05), and the coefficient on *RRA93* is positive and significant (*p*-value ≤ 0.01) across all test windows. Overall, the regression results of Models 1 and 2 are consistent with tax-induced, abnormal ex-day trading activity that is constrained by transaction costs.

Table VII more closely examines situations in which we would specifically expect dividend trading strategies to be employed. As illustrated in Table I, many

Table VI—Continued

	<i>Intercept</i>	<i>Tax * Dividend Yield</i>	<i>Tax</i>	<i>Dividend Yield</i>	<i>Transaction Costs</i>	<i>RRA93</i>	<i>R-squared</i>
Model 1	–1.77		0.17 (4.57)	5.74 (0.79)	–26.37 (–1.62)	3.56 (6.37)	0.06
Model 2	0.71	1.06 (1.77)			–40.24 (–2.53)	3.60 (6.34)	0.05
10-day window							
Model 1	0.71		0.11 (5.15)	2.77 (0.64)	–25.61 (–2.59)	2.50 (8.07)	0.09
Model 2	0.85	0.62 (1.65)			–34.35 (–3.49)	2.53 (8.02)	0.07
Panel C: Window following the Ex-dividend Date							
2-day window							
Model 1	–2.82		0.27 (4.40)	8.68 (0.75)	–39.63 (–1.46)	5.43 (6.06)	0.05
Model 2	0.98	1.55 (1.70)			–60.50 (–2.31)	5.49 (6.04)	0.04
5-day window							
Model 1	–1.20		0.17 (5.15)	0.40 (0.07)	–35.98 (–2.35)	3.78 (7.72)	0.08
Model 2	1.33	0.72 (1.45)			–50.48 (–3.30)	3.82 (7.68)	0.06

foreign tax treaties have reduced the foreign tax rate to 15 percent, which raises the question of whether it is profitable to engage in dividend trading strategies in light of the transaction costs. The regressions in Table VI use a continuous measure of transaction costs. In reality, the tax penalty must exceed a threshold before trading strategies are profitable. Thus, the regressions presented in Table VII attempt to deal with this issue by specifically identifying situations in which the tax penalty associated with the distribution exceeds the relevant transaction costs.

The sample is partitioned depending on whether the penalty (*Tax * Dividend Yield*) exceeds an estimate of the transaction costs associated with trading. If the penalty is less (greater) than the related transaction costs, *HighPenalty* is coded as 0 (1) indicating that transaction costs are (are not) a barrier to profitable trading. In other words, for securities coded 1, the tax penalty justifies the transaction costs, and we would expect increased trading volume.

We use two distinct definitions of *HighPenalty*. *HighPenalty1* is assigned a value of 1 when *Tax * Dividend Yield* exceeds *Transaction Costs*, where *Transaction Costs* is measured as the average bid–ask spread over the six-day window occurring three days prior to the ex-dividend day through the first three days the security sells ex-dividend. Otherwise, *HighPenalty1* is set to 0. We base a second tax penalty variable on transaction costs research by Bessembinder and Kaufman (1997). Bessembinder and Kaufman posit that quoted bid–ask spreads

Table VII

Regressions of Abnormal Trading Volume on Measures of the Tax Penalty

This table reports OLS regression results of abnormal ex-dividend day trading volume on proxies of profitable trade opportunities. The sample consists of 1,039 dividend distributions from ADRs over the period 1988 to 1995 (four taxable observations were eliminated due to missing information). The model is estimated as

$$AVol_{i,t} = \beta_0 + \beta_1 High\ Penalty_{i,t} + \beta_2 RRA93_{i,t} + \varepsilon_{it}$$

Abnormal trading volume ($AVol$) is computed as $(Vol - NVol)/NVol$, where Vol is trading volume over the defined window and $NVol$ is an estimate of normal trading volume for the ADR. Normal trading volume is estimated as the average daily volume over two periods that include days -45 through -15 and days $+15$ through $+45$ relative to the ex-day. $High\ Penalty$ proxies for profitable trading opportunities. Two estimates of $High\ Penalty$ are used. $High\ Penalty 1$ is an indicator variable that takes on a value of 1 when $Tax * Dividend\ Yield$ exceeds $Transaction\ Costs$, otherwise 0. $Transaction\ Costs$ are measured as the average bid-ask spread over the six-day window occurring three days prior to the ex-dividend day through the first three days the security sells ex-dividend. $High\ Penalty 2$ is an indicator variable that takes on a value of 1 when $Tax * Dividend\ Yield$ exceeds 23 basis points, otherwise 0. $RRA93$ takes on a value of 1 if the ex-day was subsequent to 1992, otherwise 0. Regression coefficients and t -statistics (in parentheses) are estimated for several windows occurring prior to the security selling ex-dividend, centered on the ex-dividend event, and subsequent to the ex-dividend event. Robust standard errors with a correction for heteroskedasticity are used.

Intercept	<i>High Penalty1</i>	<i>High Penalty2</i>	<i>RRA93</i>	R-squared
Panel A: Windows Prior to the Ex-dividend Event: 5-day Window -5 to -1				
-0.75	0.99 (3.87)		1.23 (4.46)	0.02
-0.27		0.82 (2.85)	1.27 (4.40)	0.03
Panel B: Windows Centered on the Ex-dividend Event: 10-day Window -5 to $+4$				
-1.88	2.44 (8.19)		2.59 (8.37)	0.08
-0.22		1.16 (3.74)	2.54 (8.16)	0.07
Panel C: Window following the Ex-dividend Event: 5-day Window 0 to $+5$				
-2.81	3.77 (8.88)		3.97 (8.01)	0.08
-0.17		1.50 (3.07)	3.81 (7.78)	0.06

likely overestimate transaction costs. They estimate one-way transaction costs for large firms and large trades on NYSE-listed securities to be as low as 23 basis points. We consider this to be the minimum barrier to profitable trade. Therefore, we assign the second tax penalty dummy variable, $High\ Penalty 2$, a value of 1 when $Tax * Dividend\ Yield$ exceeds 23 basis points; otherwise, it is set to 0.

In the case of each of the tax penalty variables, the general functional form of the regression model we test is

$$\text{Model 3 : } AVol_{i,t} = \beta_0 + \beta_1 HighPenalty_{i,t} + \beta_2 RRA93_{i,t} + \varepsilon_{i,t}. \quad (4)$$

We again estimated the regression for 5-day windows on either side of the ex-dividend event and for a 10-day window centered on the ex-dividend day. The regression coefficients on both *High Penalty1* and *High Penalty2* are positive and significant (*p*-value ≤ 0.01) for all windows examined. The variable *RRA93* is also positive and highly significant. These results provide further evidence that investors engage in dividend trading strategies when the tax benefits of those strategies exceed their trading costs.¹²

V. Summary and Conclusions

In this paper, we examine a sample of dividends issued by ADRs. ADR distributions are subject to foreign taxes, and the tax rates do not vary according to the U.S. tax status of the recipient. Accordingly, we show that the cum-dividend prices of ADRs—including the high yield ADRs—reflect the unavoidability of the foreign dividend taxes. We also provide evidence of tax-induced trading activity in these securities. The ADRs experience a level of abnormal trading volume surrounding the ex-dividend dates that is much larger than that observed around

¹² We define the tax rate for a given distribution as the effective foreign tax rate assuming the shareholder applies for any refund that may be applicable. All empirical tests are also estimated defining the tax liability as the withholding rate, which assumes that shareholders forgo any refund that they must apply for. Redefining the tax variable did not qualitatively change the reported results. To control for the possibility that the results are driven by trading behavior in a single year or a shift in trading behavior over time, we added two separate sets of variables to the model. First, we added dummy variables to control for the year in which the distribution took place. Tax rules in the U.S. change to some degree every year, and institutional circumstances can also change over time. For instance, Koski and Michael (2000) document the strong incentives that Japanese insurers had to capture dividends (including those on foreign securities) prior to 1989; beginning in early 1989, Japanese insurance regulations relaxed the requirements that had provided that incentive. Since such institutional changes or tax rulings can be placed into effect from time to time, we reestimated the regression results accounting for the year of distribution.

Upon reestimation of the regression results presented in Table VI, the variables *Tax* and *Transaction Cost* (bid–ask spread) remain significant. Similarly, we find that the coefficient on the variables *HighPenalty* and *RRA93*, presented in the Table VII regression models, remain significant and in the predicted direction. Thus, the finding that taxes are associated with abnormal ex-dividend day volumes does not appear to be the result of a single dominant year.

Of the 1,043 dividend distributions in our sample, almost 38 percent are from ADRs of British securities. We reestimated the regressions in Tables VI and VII without the U.K. distributions, and the results remain substantially the same. Finally, we examined the effects of the exchanges on which the ADRs are listed by adding dummy variables to indicate that the ADR was listed on the NYSE or NASDAQ (as opposed to the AMEX, where both exchange dummy variables were set to zero). Neither the NYSE nor NASDAQ dummy variables were significant upon reestimation of the regressions in Tables VI and VII. The coefficients on *Tax* and *Transaction Costs* remain significant and in the predicted direction.

ex-dates of U.S. common stocks. The volume is much greater for ADR distributions subject to foreign taxes than for distributions not subject to foreign taxes, and it is affected by the tax rates and by transaction costs in the expected directions. Moreover, the level of abnormal trading is greater in the latter years of our sample following the imposition of higher U.S. ordinary income tax rates under the Revenue Reconciliation Act of 1993.

We observe (inconclusive) evidence of abnormal trading volume even for dividends that are not subject to foreign taxes. Recognizing that these dividends are also subject to U.S. taxes, except in the case of the U.S. tax-exempt investor, we interpret this activity as consistent with trading motivated by U.S. taxes. It is also consistent with Frank and Jagannathan's (1998) evidence based on the Hong Kong market that suggests taxes might not tell the whole story of abnormal trading activity related to ADR dividends. Nevertheless, our evidence shows much greater abnormal trading around the ex-dates of taxable ADR dividends than for the nontaxable sample. Taxes appear to be an important determinant of price and trading behavior in the case of dividends issued from ADR securities.

Appendix

A. Withholding Taxes

In general, when nonresident shareholders are subject to taxation on dividend income, the foreign jurisdiction will withhold taxes on the dividend income. This is true regardless of whether the security is directly owned or owned via an ADR. This withholding represents full satisfaction of the tax liability to the foreign jurisdiction. Withholding taxes are "in lieu of" taxes, meaning they are in lieu of paying an actual net income tax (Internal Revenue Code Section 903). Given the difficulty in enforcing tax compliance for nonresidents, the withholding tax enables the foreign jurisdiction to collect on the tax liability of the foreign investor. In some instances, the shareholder may file in the foreign jurisdiction to claim the withholding against their final liability. However, the administrative costs, and the fact that the withholding often approximates the final tax liability, frequently make it undesirable to do so.

B. Overview of Tax Systems

The tax burden that ultimately applies to distributions from corporate earnings depends on the type of tax system in place. Because distributed profits of the corporation are potentially subject to both corporate level taxes and personal income taxes when distributed to the shareholder, there is an increased tax burden on distributed profits over retained profits. A tax system in which the personal and corporate tax systems remain essentially separate, and no offsetting measures are taken to reduce this burden, is generally referred to as a "classical system." Classical tax systems can be found, for example, in the United States, Switzerland, and the Netherlands.

On the other hand, many countries have “integrated” corporate and individual income taxes by reducing the corporate tax on distributed income, enacting some form of dividend relief at the individual level, or both. In practice, the relief is generally achieved by reducing or exempting the dividend income paid to shareholders from taxes, or by permitting a tax credit for corporate taxes paid on the distributed income. A tax system that uses the latter approach is known as an “imputation system.” Imputation can be “full” or “partial,” depending on whether the credit is given for all or for some part of the corporate tax paid on the distribution.

C. Imputation Credits

Some governments apply imputation credits to a portion or to all of the withholding taxes on dividend income, including dividends received via ADRs. However, McDonald (2001) argues that most countries that offer imputation credits make them available only to domestic investors, and he cites the case of Germany where such an asymmetric tax credit is available. The German tax code generally grants German shareholders an imputation tax credit that makes a given dividend 42.86 percent more valuable to a German investor than to a foreign investor. German investors thus have incentives to “capture” German dividends, and the resulting price effects can create incentives for foreign investors to trade, gaining more from avoiding the dividend than they would from receiving it. The foreign investor would gain from selling the German stock cum-dividend and purchasing it ex-dividend as long as the price decline between the cum- and ex-dates is larger than the dividend. Such a decline can be expected since the dividend is more valuable to a German investor than the face value of the dividend.

The Australian tax code provides another example of an imputation-related dividend strategy. In specific situations, the Australian tax code grants Australian citizens credits on dividends that are unavailable to foreign investors. These credits create incentives to capture dividends that would otherwise be received by foreigners (such as U.S. holders of ADRs issued by Australian companies). Recognizing that Australian citizens were undertaking dividend capture arbitrage strategies and reducing withholding taxes collected from foreign investors, the Australian government in 1997 tightened the rules that govern the receipt of tax credits for dividends mainly by extending the holding period necessary to receive the credits. Prior to the changes in tax rules in 1997, Australians easily could receive dividend credits by purchasing securities from foreign holders of the securities (including holders of ADRs) and reselling the securities ex-dividend. In fact, the transactions could be undertaken almost simultaneously using nonstandard settlement dates. Citizens of Australia still receive favorable tax treatment, but the holding periods required for receipt of dividend tax credits were lengthened in 1997.

When imputation credits are available to foreign investors, they generally are not applied “at the source” (i.e., prior to the withholding) but rather require that the investor file a return to receive a refund of the amount due the investor under

the imputation credit. The refund may be for all or a portion of the tax withheld from the dividend. However, Reid (1994) reports that the process of getting a refund can be costly and arduous. For instance, he argues that it can take years for Italian officials to even acknowledge the receipt of a claim.

D. Tax Status for Sample Distributions

The sample includes distributions that occurred over the sample period 1988 to 1995. We first obtained tax information from the *World Corporate Tax Guide* (Ernst and Young, 1995), *IRS Publication 901*, and the applicable tax treaties. However, as detailed below, there are instances where the tax liability for distributions can vary among distributions from one country or even among distributions from a single company. Therefore, we used press releases announcing the distributions, annual reports, and 20-F filings to verify the tax treatment applied to each distribution. Four scenarios for taxation are discussed below for distributions in our sample to nonresident shareholders of ADRs.

1. *Distributions subject to withholding tax (no credit or refund available)*. In many foreign tax jurisdictions, distributions to nonresident shareholders are subject to foreign withholding tax. This withholding represents full satisfaction of the tax liability to the foreign jurisdiction. If a refund or credit is generally attached to dividend distributions in that country (most commonly attributable to an integrated tax system), it is not available to nonresident shareholders. Thus, for our empirical tests, we define the tax status as the final tax liability that is equivalent to the foreign withholding rate. This applies to distributions from Portugal, the Philippines, Brazil, Italy, Indonesia, Denmark, Japan, the Netherlands, Norway, South Africa, Sweden, Luxembourg, and the United Kingdom.

Within this group, distributions from Italy and the United Kingdom have unique characteristics worthy of further clarification. First, Italian distributions have been classified as subject to 15 percent withholding tax. This is a reduced withholding rate available to U.S. residents if they file the appropriate evidence of U.S. citizenship with the Italian authorities. We assume that this reduced withholding rate applies for our sample. In the absence of evidence of U.S. citizenship, the withholding rate is 32.4 percent, and the shareholder may later file for a refund of the excess withheld over the 15 percent treaty rate.

For U.S. shareholders holding U.K. ADRs, the effective withholding rate is 15 percent. The distribution is considered to be equal to the declared dividend plus a credit for the advanced corporate tax paid by the corporation, and a 15 percent withholding tax is applied against this amount. The tax implications are generally detailed in the dividend announcement. For example, in 1996, British Petroleum announced that the "tax credit would raise the value of the dividend announced by the Board from \$0.766 to \$0.958, but the 15 percent withholding tax would reduce it to \$0.814 per ADR. Subject to certain limitations, that withholding tax, currently worth approximately \$0.144 per ADR..." (*PR Newswire, 1996*).

2. *Distributions subject to withholding tax (refund available)*. Both Spain and France withhold taxes on dividend distributions to U.S. shareholders at a rate

of 25 percent, but they allow shareholders to file for a refund of the excess over 15 percent. Germany similarly withholds at 25 percent, but two refunds are available to U.S. shareholders. The first (10 percent) refund applies to all U.S. shareholders, while the second (5 percent) refund applies only when an imputation credit is available to German resident individual shareholders. The three German distributions in the sample all carried these imputation credits. The net result of both refunds is a 10 percent tax liability on the gross dividend. For our empirical tests, refunds were assumed and distributions were assigned a 10 percent tax rate. (A tax rate of 25 percent was assigned in sensitivity tests.)

3. *Withholding on distributions dependent on company specific attributes.* The actual tax status on the Mexican distributions depends on the source of the distribution. If the distribution was (was not) paid out of income previously taxed at the corporate level, it will (will not) be exempt from tax, and withholding, at the shareholder level. The annual reports and/or 20-F filings were obtained for all Mexican companies represented in the sample. In every instance, the dividends were paid out of previously taxed income and, consequently, were not subject to foreign withholding taxes. Therefore, distributions from Mexican ADRs were classified as not subject to foreign taxes.

In 1987, the Australian government introduced a dividend imputation system. Dividends paid to U.S. nonresident shareholders out of income that has not borne corporate taxes are known as "unfranked" and are subject to 15 percent withholding tax. Conversely, dividends paid out of income that has borne corporate taxes are known as "franked" and are not subject to withholding tax. The 20-F filing for each Australian company represented in the sample was reviewed to determine whether the dividend was "franked" or "unfranked." The tax status was classified accordingly.

Foreign shareholders of Chilean ADRs are generally subject to a 35 percent withholding tax on distributions. However, this rate is reduced by the availability of a tax credit. The amount of the credit is dependent on whether or not the income being distributed was previously taxed at the corporate level. It is also a function of the proportion of profits being distributed to shareholders. If a full credit is available, the effective withholding rate was reduced to 27.8 percent prior to 1991, and 23.5 percent beginning in 1991. Again, the tax status of the individual distributions in the sample was verified with SEC filings. In each case, a full credit was available and the sample was appropriately classified. (Two distributions could not be verified and were assumed to have a full credit.)

Dividends paid by an Israeli company to foreign shareholders are currently subject to withholding of Israeli income tax at a rate of up to 26.25 percent. The applicable withholding tax rate will depend on the particular facilities that have generated the earnings that are the source of the dividend, and, accordingly, the applicable rate may change from time to time. In particular, a reduced rate is applied when the income is attributable to and accrued during the benefits period of an "Approved Enterprise." Again, the foreign withholding rate was identified for each Israeli distribution in the sample. The rates ranged from 15 percent to 25 percent.

4. *The Case of New Zealand.* New Zealand imposes a 15 percent withholding tax on dividends paid to U.S. shareholders. New Zealand has an imputation system

that permits its residents to claim a credit against their New Zealand tax liability equal to a share of the tax paid by the corporation on its income. U.S. shareholders are not entitled to claim this credit. However, when this credit is available to New Zealand residents, the benefit of the credit is passed on to non-resident shareholders in the form of a supplemental dividend equal to the amount of the credit. Thus, with a fully imputed dividend, the supplemental dividend effectively eliminates the 15 percent withholding tax. Only one sample distribution was accompanied by a supplemental dividend. Distributions were classified accordingly.

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