TAXES AND PORTFOLIO CHOICE:
EVIDENCE FROM JGTRRA'S TREATMENT OF INTERNATIONAL DIVIDENDS

Mihir A. Desai
Dhammika Dharmapala

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Mihir A. Desai and Dhammika Dharmapala
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ABSTRACT

This paper investigates how taxes influence portfolio choices by exploring the response to the distinctive treatment of foreign dividends in the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA). JGTRRA lowered the dividend tax rate to 15% for American equities and extended this tax relief only to foreign corporations from a subset of countries. This paper uses a difference-in-difference analysis that compares US equity holdings in affected and unaffected countries. The international investment responses to JGTRRA were substantial and imply an elasticity of asset holdings with respect to taxes of -1.6. This effect cannot be explained by several potential alternative hypotheses, including differential changes to the preferences of American investors, differential changes in investment opportunities, differential time trends in investment or changed tax evasion behavior.

Mihir A. Desai
Graduate School of Business Administration
Harvard University
Soldiers Field
Boston, MA 02163
and NBER
mdesai@hbs.edu

Dhammika Dharmapala
Ford School of Public Policy
University of Michigan
Weill Hall 5219
735 South State St.
Ann Arbor, MI 48109-3091
dhammika@umich.edu

1.   *Introduction*

Taxes on assets differ substantially and have the potential to alter what assets investors hold, how they finance their investments and the types of accounts they choose for their investments. Assessing the efficiency consequences of these taxes requires measuring the sensitivity of portfolio choices to tax rates. As Poterba (2001, 2002) notes, empirical efforts to isolate how taxation influences portfolio choice have produced mixed results. Investigating the relationship between cross-sectional heterogeneity in marginal tax rates and asset holdings is complicated by the incomplete nature of most household portfolios and because income levels can influence both risk preferences and marginal tax rates. Investigating how portfolios change after tax reforms must overcome the possibility that such changes may reflect endogenous supply responses or other general equilibrium effects that can confound the influence of taxation on portfolio choices.

This paper seeks to overcome these empirical difficulties by analyzing a tax reform that differentially changed the tax treatment of otherwise similar instruments in a manner that is unlikely to have produced any endogenous supply response. Specifically, the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) extended dividend tax relief to companies domiciled in only a subset of foreign countries, namely those with a suitable tax treaty with the US (hereafter referred to as "treaty countries"). An examination of the international portfolio response of American investors to this tax change promises to illuminate whether taxation significantly influences portfolio choices. Given that the tax reform only affected American investors, it is difficult to imagine that the reform stimulated a supply response by foreign firms of the sort that might otherwise confound such an analysis.

JGTRRA can be interpreted as a natural experiment in which treaty countries constitute a treatment group, with equities held in those countries experiencing a reduced US personal tax rate relative to equities held in the control group of nontreaty countries. This paper employs data on patterns of outbound U.S. foreign portfolio investment (FPI) from the Treasury International Capital (TIC) reporting system to investigate the responses of US investors to this reform. The analysis begins by investigating if treaty countries experienced a disproportionate increase in US equity FPI relative to non-treaty countries in the aftermath of JGTRRA. This analysis reveals a

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significant increase for treaty countries relative to non-treaty countries that corresponds to an elasticity of asset holdings with respect to taxes of about -1.6. This estimated effect is robust to the inclusion of a number of control variables that measure changes in the quality of the financial markets in treaty versus nontreaty countries.

Such an analysis leaves open the possibility that unobservable nontax factors correlated with treaty status resulted in a changed environment for equity FPI. To test for this possibility, it is possible to compare equity FPI originating in the US with equity FPI originating in the rest of the world to see if similar patterns hold for non-US equity FPI. This analysis indicates that non-US equity FPI does not exhibit similar patterns, casting doubt on the alternative explanation that opportunities for equity portfolio investment changed in a manner correlated with treaty status. Similarly, it is possible that American investor preferences changed across treaty status around this time. Controlling for alternative forms of US investment – US debt FPI and foreign direct investment (FDI) by US firms – does not change the baseline results. Finally, differences in underlying time trends in FPI going to treaty and nontreaty countries do not appear to explain these results, as cross-sectional analyses of annual changes in FPI show no differential changes for treaty countries, except in the period immediately around JGTRRA.

A variety of other alternative explanations also cannot account for the results. There is no evidence of a significantly distinctive stock market return environment in treaty countries. Excluding countries with recent (and hence potentially endogenous) tax treaties, transition economies where the dynamics of portfolio investment may be different, and countries that allied with the US in the 2003 Iraq war similarly does not affect the results. One particularly important set of considerations in this setting is changed tax evasion behavior that is coincident with JGTRRA or triggered by it. As discussed below, the fact that information sharing provisions were the dimension along which treaties were designated to be suitable suggests that such an alternative explanation is unlikely. Moreover, excluding tax havens or treaty countries with low levels of tax compliance suggests that changed evasion patterns cannot explain the basic result.

Beginning with Feldstein (1976), the empirical literature analyzing the effects of taxation on portfolio choice has typically used cross-sectional analyses of the link between either income

or estimates of the relevant marginal tax rate and observed portfolio choices.[1] Several studies, including King and Leape (1998), Hubbard (1985), Agell and Edin (1990) and Scholz (1994), emphasize the incomplete nature of most household portfolios and the need to separately isolate effects of taxes on the probability of owning assets and on portfolio shares. This literature has typically emphasized the influence of taxation on the probability of asset ownership with only mixed evidence on the effects of taxation on portfolio shares.

Poterba and Samwick (2002) analyze recent versions of the Survey of Consumer Finances and find significant effects for taxation on both ownership and allocation dimensions, but this effect varies substantially across asset types. Such cross-sectional studies must ensure that other variables that influence portfolio choice are included, in order to avoid confounding the tax rate effects. Of particular concern is the role of income in both determining marginal tax rates and exerting an independent effect on portfolio allocation. Poterba and Samwick (2002) attempt to address this issue by computing a "first dollar" marginal tax rate that excludes investment income, and undertake a number of robustness checks to ensure that their results are not driven by these income effects.

As Poterba (2001) notes, tax reforms hold the promise of circumventing such concerns by investigating changes in portfolios to help control for unobservable factors that might cloud cross-sectional analyses. Scholz (1994) employs the Survey of Consumer Finances panel from 1983 and 1989 to investigate the effects of the Tax Reform Act of 1986 (TRA86). TRA86 was a significant enough to generate strong predictions on portfolio changes across households. Scholz (1994), however, finds limited evidence of changes in household portfolios. Of course, hypothesized responses to such dramatic reforms can be confounded by supply responses or other general equilibrium effects (Poterba, 2001; 2002) as firms change issuance and payout decisions, especially for a reform as wide-ranging as TRA86. Ideally, a tax reform with clear consequences for investor after-tax returns and with no effects on supply decisions would more conclusively isolate tax effects.

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[1] This literature uses a conceptual framework based on theoretical models of portfolio allocation in the presence of taxes (e.g. Domar and Musgrave, 1944; Auerbach and King, 1983).

JGTRRA's changed treatment of international dividends provides an empirical setting that approximates this ideal.[2] First, as described below, the reform had clear consequences for American investor after-tax returns across countries. Second, the division of countries into two separate groups was driven by regulatory concerns and was unrelated to future changes in investment opportunities or other regulatory efforts to change investment in these countries differentially. Finally, given the relatively small share of their stocks held by American investors, it is unlikely that supply responses by foreign firms would be large. It is similarly unlikely that the effects of the reform on US investors' portfolios would have been offset by clientele effects in asset markets. JGTRRA applied only to US investor returns, leaving non-US investor tax rates and asset demands unaffected.

The previous literature has focused on portfolio composition at the household level. For this study, the nature of JGTRRA suggests that an analysis of aggregate FPI flows is the appropriate methodology. Implicitly, this involves using a representative agent approach that examines changes in the international equity portfolio of US investors in the aggregate. This aggregation comes at a considerable cost, as household level heterogeneity in marginal tax rates and firm-level heterogeneity in payout policy is obscured. As discussed below, losing this heterogeneity is likely to bias against finding any results. On the other hand, this representative agent approach to the question of tax and portfolio choice allows the analysis to circumvent the econometric issues associated with the incomplete nature of most household portfolios.[3]

In addition to estimating the impact of taxes on portfolio choice in general, this paper also contributes to the literature on the taxation of international portfolio income. Taxes have been hypothesized to contribute to the limited nature of international diversification. Black (1974) and Stulz (1981) present models where barriers to international investment are conceptualized as taxes and are used to explain patterns of "home bias." Despite this conceptual framing, the role

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[2] In a related vein, Chetty and Saez (2005) use JGTRRA to study how dividend paying behavior responds to taxes. For the difficulty in using large tax reforms to isolate behavioral responses, see the discussion of the Tax Reform Act of 1986 in Auerbach and Slemrod (1997).

[3] The approach used here – with its focus on patterns of investment rather than on explicit measures of household portfolios – is similar to the methodology employed in the literature on the effects of tax burdens on mutual fund inflows (e.g. Bergstresser and Poterba, 2002). The source of identification here is JGTRRA's differential treatment of assets, rather than variations in the investment styles of mutual fund managers. The fundamental question being addressed, namely the sensitivity of investors to after-tax returns, is the same as that in the household portfolio choice literature.

of taxes in contributing to home bias has received little empirical attention.[4] As Graetz and Grinberg (2003) note, a greater emphasis of the effects of taxation on international portfolio flows is required to better inform tax policy in this increasingly important area. In particular, countries contemplating corporate tax integration reforms must consider potential distortions to international portfolio allocations; the results here indicate that such effects are likely to be quantitatively large.

The paper proceeds as follows. Section 2 elaborates on the effects of taxes on FPI in the setting of JGTRRA. Section 3 describes the data and the empirical methodology. Section 4 presents the results. Section 5 discusses the implications and concludes.

2.   *JGTRRA's Treatment of International Dividends*

Prior to JGTRRA, dividends were taxed as ordinary income, at a rate of 38.6% for taxpayers in the top tax bracket. JGTRRA stipulated that dividends would be taxed at the same rate as capital gains and reduced the tax rate on capital gains to a maximum of 15%. This lower rate for dividends applies to dividends paid by domestic corporations and by "qualified" foreign corporations for the years from 2003 to 2008. A foreign corporation is deemed to be "qualified" for this purpose if it satisfies one or more of three tests – the "Possessions Test," the "Market Test," and the "Treaty Test."[5] Under the first test, corporations resident in a US possession (such as Puerto Rico) automatically qualify, as do corporations resident in certain former US territories that are treated as possessions for tax purposes. Under the second test, dividends from corporations whose shares are traded in the US are also eligible for the favorable dividend tax treatment. This includes, for instance, corporations that are cross-listed in the US, or whose shares are tradable in the US through American Depositary Receipts (ADRs).

For all other securities, the "Treaty Test" establishes that a corporation resident in a country with which the United States has a tax treaty meeting certain criteria qualifies for the lower dividend tax rate. In particular, the corporation must be eligible for the benefits of the treaty, and the treaty must contain certain information-exchange requirements, and be deemed "satisfactory" by the US Treasury. The IRS released a list of 52 countries that were deemed to

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[4] One exception to this is the analysis of trading strategies in Christoffersen *et al.* (2005).
[5] See Sheppard (2004), Sheppard and Harty (2004), and Wacker (2004) for more details.

satisfy the "Treaty Test";[6] these countries are referred to below as "treaty" countries, while those excluded from the list are referred to as "nontreaty" countries.[7]

JGTRRA's favorable tax treatment of dividends was applied to an extensive, but by no means exhaustive, subset of foreign corporations. For instance, these 52 countries played host to 82% of US outbound equity FPI holdings in 2001 (based on the full sample of 213 countries in the dataset used in this paper). Even so, a number of significant destinations for US investment – such as Argentina, Brazil, Malaysia, Singapore, and Taiwan – are excluded from the favorable tax treatment of dividends. As the empirical approach relies on a within-country comparison of responses to JGTRRA across the two groups of countries, the absolute amounts of investment are less important than the relative changes across the two groups of countries.

JGTRRA's distinction between treaty and nontreaty countries appears to reflect two concerns among policymakers.[8] Most importantly, the emphasis on information-sharing provisions was thought to help ensure that cash flows afforded relief were, in fact, truly dividends. Second, there was some concern over allowing dividend tax relief to income that may not have been taxed at the corporate level.[9] Moreover, the use of treaty status was thought to be a relatively simple and administratively feasible approach to determining which countries would be eligible for the favorable tax rates. For the purposes of this analysis, the clarity of the distinction and the fact that it remained fixed (with no changes to the list of treaty countries until 2006) are important. Of particular significance is that the distinction appears to have been unrelated to future changes in investment opportunities, or to other regulatory efforts that may have affected investment patterns.

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[6] The initial distinction based on the presence of a suitable treaty was made in early 2003 and was featured in the press, including *The Wall Street Journal*, in the summer of 2003. The IRS clarified the precise list of countries in October 2003 - see IRS Notice 2003-69 ("United States Income Tax Treaties That Meet the Requirements of Section 1(h)(11)(C)(i)(II)"). These countries are also listed in Table 1.

[7] In principle, treaties can be revised to meet JGTRRA's requirements. In November 2006, the IRS issued Notice 2006-101, adding Bangladesh, Barbados, and Sri Lanka to the list of favored countries; however, this occurred after the end of the sample period used in this paper.

[8] The legislative history is not altogether clear on the rationale for this distinction. This discussion is based on exchanges with several policymakers involved in the process. These exchanges suggest that the distinction was also partly an accident. The initial version of the legislation only afforded relief to domestic corporations. After an adverse reaction to this aspect of the proposal, the Treaty test was suggested as a simple way of covering most foreign investment without including all foreign corporations.

[9] Nontreaty status may have been thought to be a rough proxy for those countries with low or zero corporate tax rates. Although most tax havens are in the nontreaty category, many nontreaty countries have relatively high corporate tax rates, so it is not clear that there exists a clear correspondence between treaty status and corporate tax rates.

In this study, JGTRRA is conceptualized as a natural experiment that changed the personal tax treatment of assets located in treaty countries but not that of assets located in nontreaty countries. To clarify the effects of JGTRRA and the underlying empirical methodology, consider a representative US portfolio investor who faces the top US income tax rate (denoted t^{US}_P) and holds shares in a corporation resident in a foreign country F. Let r^F be the pretax rate of return in country F. The foreign corporation thus earns a pretax return r^F that is subject to F's corporate tax (at rate t^F_C). The remaining income is paid out by the foreign corporation to its shareholders, including the US-based investor. These dividends would typically be subject to a withholding tax by country F (at rate t^F_W). In addition, the US personal tax applies to the investor's dividend income (but with a foreign tax credit allowed for withholding taxes paid to F).

To simplify the setup, assume, as is generally true in reality, that the foreign withholding tax rate is no higher than the US personal tax rate on dividends (i.e. $t^F_W \leq t^{US}_P$).[10] Then, assuming that the foreign corporation pays out all its returns as dividends, the US investor would receive an after-tax return of:

$$r^F(1 - t^F_C)(1 - t^{US}_P) = 0.614 r^F(1 - t^F_C) \tag{1}$$

before JGTRRA, given the pre-2003 top rate of 38.6% on ordinary income. Now consider the impact of JGTRRA if F happens to be a treaty country: the US personal tax rate on dividends becomes 15%, and the investor's after-tax return is thus:[11]

$$r^F(1 - t^F_C)(1 - t^{US}_P) = 0.85 r^F(1 - t^F_C) \tag{2}$$

On the other hand, if F happens to be a nontreaty country, then t^{US}_P remains equal to the top rate on ordinary income. Under JGTRRA, this rate fell (albeit much less than did the rate for qualified dividend income) from 38.6% to 35%. Thus, the investor's after-tax return would become:

$$r^F(1 - t^F_C)(1 - t^{US}_P) = 0.65 r^F(1 - t^F_C) \tag{3}$$

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[10] Most withholding tax rates imposed by foreign countries on dividends paid to US shareholders are no higher, and often lower, than 15% - see Anderson (2006, Chart 9.1). Thus, withholding tax rates were *a fortiori* lower than t^{US}_P prior to JGTRRA.

[11] A few treaty countries impose withholding tax rates that exceed 15% - see Anderson (2006, Chart 9.1). For such countries, the post-JGTRRA returns would be $r^F(1 - t^F_C)(1 - t^F_W) < 0.85 r^F(1 - t^F_C)$. Including these countries among the treaty countries merely creates a bias against the paper's findings. Furthermore, in the empirical analysis below, reclassifying these countries as nontreaty countries does not affect the basic results.

A comparison of Equations (1)-(3) shows that the personal tax burden on stock of corporations in treaty countries fell substantially more than did the corresponding burden on stock of corporations in nontreaty countries.[12]

These equations also clarify that this prediction holds even in a setting where corporate taxes are fully capitalized into pretax rates of return, as in the model of Gordon (1986). Suppose that there is a worldwide after-corporate-tax rate of return r^*. Even if t^F_C is fully capitalized – so that $r^F = r^*/(1 - t^F_C)$ – variations in t^{US}_P across countries will still affect US investors' returns from holding assets in different countries. With respect to the capitalization of dividend taxes into stock prices, it is similarly unlikely that US personal taxes would be capitalized into the prices of foreign equities as US entities typically constitute a small fraction of investors in foreign stock markets.[13]

There are a number of caveats associated with the framework outlined above. First, some firms do not pay out all earnings as dividends. Even though these firms' returns will be burdened by dividend taxes if they are expected to pay dividends at some point in the future, the expiration of JGTRRA's provisions in 2008 implies that these dividends may not benefit from favorable tax treatment. To the extent that the returns from stock are derived as capital gains, this would simply make it more difficult to find an effect as there was no variation across countries for the reduced capital gain rate. In addition, the uncertainty over the duration of the tax break created by JGTRRA's expiration in 2008 would also potentially weaken any finding.

Second, the framework sketched above assumes a representative, top-bracket US investor. In reality, some US investors are in lower tax brackets, and much investment occurs through tax-exempt vehicles or in tax-advantaged accounts. The presence of such investors also creates a bias against finding any effect, and the estimated effect can be viewed as a lower bound

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[12] An alternative interpretation involves comparisons with the returns from investing in domestic US firms. For instance, let r^{US} be the pretax rate of return in the US and t^{US}_C the US corporate tax rate. Suppose that $r^F(1 - t^F_C) = r^{US}(1 - t^{US}_C)$; then, prior to JGTRRA, the US investor would be indifferent between investing in a US firm and a corporation resident in F. After JGTRRA, the investor would remain indifferent if F happens to be a treaty country. However, the investor would now strictly prefer to invest in a US corporation if F happens to be a nontreaty country. Under this interpretation, the nontreaty countries constitute a "treatment" group that experiences an increased personal tax rate relative to that for US assets, while the treaty countries constitute a "control" group for which the personal tax rate is unchanged relative to that for US assets. However, the substantive implications of the results (in terms of the *relative* changes in US holdings of assets in the two groups of countries, and the elasticity of asset holdings with respect to the personal tax rate) are identical under both interpretations of the natural experiment.
[13] For instance, Figure 1 shows that, for a typical country, US equity FPI holdings constitute no more than 5-10% of its aggregate stock market capitalization.

as it is averaged across all US investors. Third, the exclusion of certain countries under the "Treaty Test" may not matter in practice if the dividends from corporations resident in those countries qualify for favorable treatment under the "Market Test." Again, this would simply create a bias against finding any effect of JGTRRA on international portfolio choices.[14]

Finally, it is possible that observed responses in security holdings by American investors might reflect changed payout or stock issuance decisions in response to the tax cut. Endogenous changes in firms' payout policies in response to JGTRRA are unlikely as US portfolio investors generally constitute a small fraction of foreign firms' investors. If they did occur, however, they would also likely create a bias against the paper's findings, as firms would presumably change payouts in a way that would mitigate the tax penalty. Endogenous issuance responses are similarly unlikely. Changes in issuance would also be reflected in aggregate market capitalization, which is included as a control.

3. *Data and Empirical Specification*

The Treasury International Capital (TIC) system reports the portfolio holdings of foreign securities by US investors, based on periodic surveys of banks, other financial institutions, securities brokers and dealers.[15] The location of the holdings is defined for each of a large number of countries and territories; the data represent the portfolio holdings of foreign securities by US investors at the end of each of the following years: 1994, 1997, 2001, 2003, 2004 and 2005. The data are divided into three categories – equity FPI (i.e. holdings of foreign stocks), long-term debt FPI, and short-term debt FPI (available only from 2001).[16]

The TIC data are based on the survey responses of a wide range of financial institutions and securities brokers and dealers, and so are highly comprehensive. Of particular importance to this study is that the location of assets (i.e. the country in which the securities owned by US investors are issued) is likely to be reported very accurately.[17] In addition, the data include US

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[14] As described below, ADR securities are counted as foreign securities in the data employed here.

[15] These data are available at www.treas.gov/tic/ and are described in more detail in Bertaut, Griever and Tryon (2006).

[16] The firm-level data from TIC have previously been used to examine the determinants of US investors' equity holdings in foreign firms (e.g. Ahearne, Griever and Warnock, 2004; Ammer *et al.*, 2006); the country-level data have been used to analyze the role of corporate tax rates and corporate governance institutions on the location of US portfolio investment (Desai and Dharmapala, 2007).

[17] Several concerns have been raised for how this data source categorizes FPI *into* the U.S., in particular with respect to custodial arrangements. This difficulty appears less relevant for the case of outbound FPI as there is no reliance

holdings of foreign assets through American Depositary Receipts (ADR's). While there are some limitations of the data, particularly with respect to small investors,[18] the TIC data are the best available source of information on FPI by US investors.

The dependent variable in the basic specification is the log of equity FPI held by US investors in country i in year t, measured in millions of US$. The independent variable of interest seeks to capture those observations (at the country-year level) for which the reduced dividend tax applies. Thus, it is an interaction between an indicator variable ($Treaty_i$) for those countries listed as treaty countries in Table 1 and an indicator ($PostJGTRRA_t$) for the years after the enactment of JGTRRA. As JGTRRA was applied to the 2003 tax year, the latter variable is a dummy for the years 2003, 2004 and 2005.[19] The basic empirical specification is thus:

$$Log \ of \ Equity \ FPI_{it} = \beta(Treaty_i * PostJGTRRA_t) + \mathbf{X}_{it}\gamma + \mu_i + v_t + \varepsilon_{it} \qquad (4)$$

The central hypothesis that Equation (4) tests is whether US equity FPI is higher in treaty countries (relative to nontreaty countries) following JGTRRA: i.e. that $\beta > 0$. The specification in Equation (4) also includes country fixed effects (represented by μ_i) and year effects (represented by v_t); ε_{it} is the error term.

$\mathbf{X}_{it}$ is a vector of time-varying control variables. In the baseline specification, the following controls are included. The log of GDP per capita (in PPP terms, expressed in nominal US$) and the log of population are obtained from the World Bank's *World Development*

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on the reporting of other countries and all reporters are U.S. entities. Bertaut, Griever and Tryon (2006, p. A63) argue that: "The country attribution of the portfolio asset surveys should be extremely accurate. The annual position surveys, by design, attempt to collect information by country of issuer . . . precisely identifying each security issuer's country of residence – from information supplied by survey reporters as well as from commercial data sources – is a relatively straightforward task."

[18] While the data achieve comprehensive coverage of US investors' holdings through institutions and other reporting entities, they may not be as comprehensive for small individual investors' non-institutional holdings of foreign assets (Bertaut, Griever and Tryon, 2006, p. A67). Such holdings, however, are likely to be relatively small in magnitude. Second, the data do not include stock swaps and cross-border derivatives positions (although data collection on the latter began in 2005). Finally, the country of location is defined as the legal residence of the entity issuing the securities, and may not correspond to the country where the associated "real" economic activity is carried out. Thus, US investors' portfolio holdings in small offshore financial centers and tax havens are potentially difficult to interpret. However, most such countries are excluded from the estimating sample due to missing data, and (as described in Section 4 below) the results are robust to the exclusion of the remaining havens.

[19] Strictly speaking, the treatment countries to which the reduced dividend tax rate applies include not only the treaty countries in Table 1, but also US possessions and certain former US territories. However, no FPI data is available for US possessions, and missing data eliminates the former US territories from the estimating sample. Thus, the "Possessions Test" does not play any role in the empirical analysis.

Indicators (WDI) database.[20] These variables control for changes in countries' affluence and size. The log of aggregate stock market capitalization (in nominal US$) controls for changes in the value and amount of equity available for US investors to hold in a given country.[21] As investment decisions may also be affected by stock market performance, an additional control variable is a total stock return index constructed by Morgan Stanley Capital International, and available through Thomson's Datastream database.[22] The index measures annual total returns for each country's stock market, assuming that all dividends are reinvested. In addition, a number of additional control variables are used in various robustness checks, as described in Section 4.

The data on equity FPI is available (for the years specified above) for 1259 country-year observations on 213 countries and territories. The majority of these observations involve zero or negligible amounts of US equity FPI.[23] Moreover, the control variables are not available for many of the observations. In particular, the coverage of the stock return index is limited to those countries with the largest stock market capitalization. Thus, the primary estimating sample is considerably smaller, with 291 observations for the 49 countries listed in Table 1. Of these countries, 38 are treaty countries and the other 11 are nontreaty countries. Summary statistics, using this sample, for the variables used in the analysis are reported in Table 2. This reduced sample includes most countries with substantial stock market activity. It also includes a reasonable mix of treaty and nontreaty countries, with several nontreaty countries that have substantial economies and levels of US investment. The sample also excludes most small tax havens and offshore financial centers, for which the interpretation of FPI is potentially problematic. Finally, because the sample excludes most countries with very small amounts of US equity FPI, the analysis is less subject to random variations in these values over time.

Figure 1 provides a simple descriptive perspective on the empirical test used in this paper. It shows the mean levels of US equity FPI, scaled by aggregate stock market

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[20] This is available at http://econ.worldbank.org. Note that while GDP (and certain other variables) are expressed in nominal terms, the specification includes year effects.

[21] As Kho, Stulz and Warnock (2006) argue, much of this aggregate market capitalization may be tied up in controlling blocks and unavailable for purchase by minority shareholders, especially in countries with weak investor protections. Investor protection changes little over time, and is essentially incorporated in the country fixed effect here.

[22] See www.mscibarra.com for a description of these country level stock returns indices.

[23] Zero values for equity FPI arise either because there is no equity FPI, or because values of FPI under $0.5 million are not specifically reported in the TIC data. In the analysis, the log of FPI is set equal to zero when FPI is zero. Note, however, that zero values of equity FPI are almost entirely absent among the countries in the primary estimating sample.

capitalization, in treaty and nontreaty countries before and after JGTRRA for the 49 countries listed in Table 1. Prior to JGTRRA, treaty countries had a somewhat larger level of US equity FPI, relative to their aggregate stock market capitalization. Following JGTRRA, this difference widened considerably, with FPI scaled by market capitalization in treaty countries increasing slightly and the corresponding ratio in nontreaty countries decreasing. This simple illustration is suggestive that the effects hypothesized above are indeed operative.

4.   Results

4.1   Basic Results

In order to investigate the relevance of the hypothesized effect in the most general setting, the specification reported in Column 1 of Table 3 employs the full sample of 213 countries and territories. This specification estimates Equation (4) with country and year effects, but with no control variables. Robust standard errors that are clustered at the country level are reported in this table and in all of the subsequent longitudinal analysis. The effect of JGTRRA on US equity FPI holdings in treaty countries (relative to nontreaty countries) is positive and highly significant.[24] Column 2 reports the results of the same specification, with the sample restricted to observations for which the stock return index is available. Again, the effect of JGTRRA is positive and significant. In Column 3, a baseline set of controls – GDP, population, aggregate market capitalization, and stock market returns – is introduced. This has little impact on the coefficient of interest, which remains positive and significant.

It is possible that financial market conditions may have changed differentially in treaty and non-treaty countries at the same time as JGTRRA. For example, changes in the quality and liquidity of financial markets in treaty and non-treaty countries may influence the speed of portfolio adjustment. In order to address this possibility, the regression in Column 4 includes two relevant measures from an updated version of the Beck *et al*. (2000) database of financial variables:[25] the value of stocks traded in a given country in a given year, scaled by GDP, and the stock market turnover ratio (i.e. the value of stocks traded in a given country in a given year, scaled by stock market capitalization). The attractiveness of equity to US investors may also be

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[24] As was noted earlier, this sample includes a large number of zero values for equity FPI (which are treated as zeroes when taking the log of FPI). Using a random-effects Tobit specification leads to similar results. Censoring of equity FPI at zero is not as much of a concern in the remainder of Table 3 as there is only one zero value of equity FPI in the sample used in Column 2.

[25] This is available at http://econ.worldbank.org/staff/tbeck

affected by changes in the volatility of stock returns. Thus, a measure of volatility is constructed using the Morgan Stanley stock return data.[26] Changes in the availability of domestic debt financing from a country's banking sector may affect the issuance of new equity by that country's firms. Thus, the ratio of financial deposits to GDP, also obtained from the updated version of the Beck *et al.* (2000) database, is included in the model as a proxy for financial depth. Changes in FPI may also depend mechanically on a country's trade deficit; to control for this, the values of exports and imports relative to GDP are obtained from the World Bank's WDI database. Finally, Desai and Dharmapala (2007) show that foreign countries' corporate tax rates are an important determinant of the pattern of US equity FPI; thus, this variable is obtained from PriceWaterhouseCoopers' *Worldwide Summaries* of corporate taxation for various years.

Column 4 of Table 3 reports the results from a specification that includes these additional controls. The addition of these controls strengthens the estimated effect of JGTRRA in terms of both magnitude and significance with the size of the coefficient increasing from 0.649 in the baseline specification to 0.797.[27] As such, the estimated effect from the baseline regression does not appear to reflect other financial market conditions.

The effect of JGTRRA is fairly large in magnitude, despite the various factors discussed in Section 2 that would tend to bias the estimate downwards. In the baseline specification, the estimated coefficient of 0.649 implies that US equity FPI holdings in the average treaty country rose by over 90%, relative to US equity FPI holdings in the average nontreaty country. The relative decrease in the dividend tax rate for corporations in treaty countries was also large (the rate for treaty countries fell from 38.6% to 15% while the rate for nontreaty countries fell to 35% resulting in a relative decrease of 57%). Consequently, the implied elasticity of equity holdings with respect to the dividend tax rate is about -1.6.[28]

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[26] The volatility measure is computed using monthly data on dollar returns. The standard deviation is an annualized measure based on monthly returns for a two year window, including the current year and the previous year.

[27] The result is unchanged if changes in the quality of a country's communications infrastructure are controlled for, using either the number of telephone mainlines or the number of (fixed and mobile) telephone subscribers. Both variables are from the World Bank's WDI dataset; however, the sample size is reduced due to missing data.

[28] An alternative approach to characterizing the magnitude of the effect is to calculate the elasticity of asset holdings with respect to investors' net-of-tax share of returns. Prior to JGTRRA, a top-bracket US investor received 0.614 cents after tax for each dollar of dividends paid by a corporation. As a result of JGTRRA, this net-of-tax share rose to 0.85 (an increase of 38.4%) for dividends paid by corporations based in treaty countries. The corresponding share for dividends paid by corporations based in nontreaty countries rose to 0.65 (an increase of 5.9%). Thus, the net-of-tax share increased by 32.5% more for treaty countries (relative to nontreaty countries), while US equity FPI

This elasticity is large relative to some of the estimates in the literature on the responsiveness of portfolio shares to taxes. For instance, Poterba and Samwick (2002) find that the effect of a household's marginal tax rate on its direct equity holdings is only statistically significant in some of their annual cross-sections and those implied elasticities are substantially smaller than those found here. On the other hand, the results in this paper are consistent with the estimates in Agell and Edin (1990).[29] The elasticity estimated in Table 3 is similar to the estimates of the sensitivity of FDI to foreign corporate tax rates (e.g. Desai, Foley and Hines, 2003) and to the estimate of the elasticity of US equity FPI to foreign corporate tax rates in Desai and Dharmapala (2007). As such, the measured response is large relative to some studies on portfolio choice but is consistent with results on how taxes influence cross-border capital flows.

In addition to being large in magnitude, the response to JGTRRA's treatment of international dividends also appears to have been rapid. Results in Table 5 below indicate that the differential response of US equity FPI holdings in treaty countries was concentrated in 2003, with some additional adjustment possibly occurring in 2004 and with no subsequent reversal. While this represents a quick response, it appears reasonable given that equity holdings can be readily acquired and liquidated, that JGTRRA created a large tax incentive, and that relatively financially sophisticated investors are involved. Nonetheless, this rapid response stands in contrast to the relatively slow portfolio adjustment process that is hypothesized (for example in Poterba, 2002) to account for the generally small portfolio choice effects of tax reforms that have been studied in the previous literature.

4.2.   Controlling for Unobserved Changes in Investment Preferences of US Investors

It is possible that the relative attractiveness to US investors of treaty and non-treaty countries diverged after JGTRRA for some unobserved reason unrelated to the tax reform. For instance, it is conceivable that American investors came to value the diversification opportunities afforded by treaty countries more than those of nontreaty countries around this time. If so, then it would be expected that this trend would have affected not only FPI by US equity portfolio

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holdings in treaty countries increased in relative terms by over 90%. The implied elasticity of asset holdings with respect to investors' net-of-dividend-tax share is thus about 2.8.

[29] Agell and Edin (1990), using Swedish data, find a tax elasticity of holdings of common stock that is comparable to the estimate here. They use an approach that combines responses along the extensive and intensive margins. In contrast to much of the previous literature, the elasticity measured using JGTRRA is based on changes along the intensive margin in asset holdings.

investors, but also debt FPI by US bondholders and foreign direct investment (FDI) by US multinational firms.[30]

JGTRRA should not have differentially affected incentives to engage in debt FPI across treaty status; the top marginal tax rate on ordinary income (including interest income from debt FPI) fell from 38.6% to 35%, but this change did not differ across treaty and nontreaty countries. Similarly, the favorable dividend tax rates under JGTRRA apply to all US firms regardless of where their foreign investments may be located, so the tax reform should not have affected US firms' incentives to engage in FDI differentially across treaty and nontreaty countries. As such, debt FPI and FDI should not be directly affected by JGTRRA's treatment of international dividends and can be used as controls that capture otherwise unobservable changes in the investment climate for US investors.

Data on FDI are obtained from the Bureau of Economic Analysis (BEA);[31] the measure of FDI is the direct investment position, on a historical cost basis (in millions of US$) of US firms in each country in a given year.[32] Debt FPI is obtained from the TIC database and represents the long-term debt holdings of US portfolio investors in millions of US$.[33] These two controls are included in the specification in Column 5 of Table 3. Adding FDI and debt FPI as controls in the model simply strengthens the estimated effect of JGTRRA on equity FPI, in terms of both magnitude and significance, relative to the baseline specification in Column 3.[34] As such, it is unlikely that unobserved changes to American investment opportunities that are correlated with treaty status are driving the basic results.

4.3.   Testing for Unobserved Changes in the Environment for Equity FPI

In addition to the possibility of differential changes in how American investors viewed the general investment climate between treaty and nontreaty countries, it is also possible that the

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[30] Equity FPI and FDI can be conceptualized as alternative channels through which US investors can achieve international diversification, by either buying foreign stocks or investing in US multinational firms that engage in FDI overseas (see Gordon and Jun (1993), Errunza, Hogan and Hung (1999) and Desai and Dharmapala (2007)).
[31] This is available at http://www.bea.gov
[32] Note that the sample in Column 5 omits one observation with negative reported FDI; excluding such observations from the baseline specification in Column 3 leads to consistent results.
[33] Long-term debt is defined as having an original maturity of over one year. The TIC database also includes short-term debt FPI, but this is not available for all years, so only long-term debt is used in the analysis.
[34] If equity FPI and FDI are chosen jointly, there may be some concern about simultaneity bias in the estimation of the coefficients in Column 5. However, it is reassuring that the results are very similar both with and without the FDI and debt FPI controls (comparing Columns 3 and 5).

environment for equity portfolio investment more specifically may have changed differentially for treaty and nontreaty countries after 2003. For example, changes to disclosure rules or to the legal rights available to minority shareholders may have been improved in treaty countries relative to nontreaty countries. To some extent, such changes would be reflected in the controls for stock market conditions that are included in the baseline specification. However, any unobserved changes in the climate for equity FPI cannot be tested for simply using US investment patterns, as they would not affect US debt FPI or FDI. However, any such changes would presumably be reflected in the patterns of equity FPI by non-U.S. portfolio investors.

While the TIC data is restricted to US investment, the International Monetary Fund (IMF) collects data on global portfolio holdings through its Coordinated Portfolio Investment Survey (CPIS).[35] This dataset includes the aggregate equity holdings of foreign portfolio investors in each country; these holdings are also broken down by the country of origin of the investors. Thus, it is possible to compute non-US equity FPI holdings by simply subtracting US holdings from aggregate worldwide holdings in a given country in a given year. The CPIS data only covers the years from 2001 to 2005. Summary statistics for the CPIS data are reported in the lower panel of Table 2; apart from the difference in time periods, the TIC and CPIS data sources are highly consistent.

Column 1 of Table 4 begins the analysis by reporting the results from the previous specification using CPIS data only to establish if these effects are evident in this shorter sample with slightly different data. The basic result from Table 3 continues to hold, with a positive and significant effect of JGTRRA. Column 2 of Table 4 reports the results from the same specification, but with the dependent variable replaced by *non-US* equity FPI. If the estimated effect in Table 3 is truly a JGTRRA effect, then it would not be expected to hold for non-US investors. Conversely, if the result in Table 3 is driven by unobserved changes in the climate for equity FPI, then these changes should also be reflected in non-US equity FPI. As shown in Column 2 of Table 4, the coefficient on the interaction term for non-US equity FPI is statistically indistinguishable from zero. Thus, it appears unlikely that the estimated effect of JGTRRA on the location of US equity FPI is due to unobserved changes in the environment for equity FPI, rather than to the tax reform.

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[35] This dataset is available at: http://www.imf.org/external/np/sta/pi/cpis.htm

4.4. *Testing for Differential Time Trends in US Equity FPI*

There still remains a class of alternative explanations for the paper's main result that involve US equity FPI in treaty and nontreaty countries following different time trends. For example, it could be argued that US equity FPI has tended to grow over time due to increasing international financial integration, with all or most of the increase being directed towards treaty countries rather than nontreaty countries because of the more favorable investment climate of treaty countries.

To explore this question further, Table 5 presents a series of cross-sectional regressions examining the extent to which annual changes in US equity FPI are related to countries' treaty status.[36] For each pair of years in the dataset, the specification is:

$$\Delta(\text{Log of Equity FPI})_i = \alpha + \beta Treaty_i + \Delta\mathbf{X}_i\gamma_1 + \mathbf{R}_i\gamma_2 + \varepsilon_i \qquad (5)$$

where $\Delta(\text{Log of Equity FPI})_i$ is the difference between the log of US equity FPI in country i in year t and the log of US equity FPI in country i in year $(t - 1)$, or the closest previous year for which data is available. $Treaty_i$ is an indicator variable for those countries on the IRS list for tax-favored status. $\Delta\mathbf{X}_i$ is a vector of changes in the baseline set of control variables – the logs of GDP , population, aggregate market capitalization, and stock market returns, while $\mathbf{R}_i$ is a vector of regional dummies.[37] The constant term is represented by α and the error term is ε_i.

The basic idea underlying these regressions is that if differential time trends for treaty and nontreaty countries are driving the basic result, then the annual changes in US equity FPI should generally be higher for treaty countries than for nontreaty countries, even in years unaffected by the tax reform. In other words, it would be expected that $\beta > 0$, and that the effect is generally statistically significant across all cross-sectional analyses presented in Table 5. In fact, annual changes in US equity FPI are generally unrelated to countries' treaty status, except in 2003, the year that JGTRRA was enacted and came into effect. In 2003, US equity FPI increased more in treaty countries than in nontreaty countries; in other years, however, there appears to be no significant difference in the changes in US equity FPI across treaty and nontreaty countries. This is consistent with a one-time portfolio reallocation towards equity issued in treaty countries as a

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[36] Note that Table 5 and all subsequent tables use the paper's basic TIC dataset, rather than the CPIS data used in Table 4.

[37] These are based on World Bank classifications; the regions are Europe and Central Asia, Asia and the Pacific, the Americas, and the Middle East and North Africa, with Africa as the omitted category.

response to JGTRRA in 2003.[38] More generally, these results cast doubt on the alternative story based on differential time trends for treaty and nontreaty countries, as a distinctive trend for treaty countries is not apparent in the Table 5 results for years other than 2003.[39]

4.5   Testing for Changes in Stock Market Conditions in 2003

Stock market conditions in treaty countries may have changed in 2003 in some discontinuous manner that is not captured by the various stock market control variables used in the basic analysis. While significant changes to issuance decisions or a significant valuation change in response to JGTRRA are unlikely given the scope of U.S. investment abroad, it is possible to conduct some simple tests to see if such effects are operative. Table 6 reports a series of cross-sectional regressions that examine whether changes in stock market variables in 2003 are related to countries' treaty status. The stock market variables are market capitalization, market returns, volatility, the ratio of stock value traded to GDP, and the stock market turnover ratio. Generally, changes in these variables in 2003 are not significantly different for treaty countries relative to nontreaty countries. The treaty effect for the ratio of stock value traded to GDP is of borderline significance, but its sign is the opposite of that required to explain the basic result (i.e. the stock value traded *fell* in treaty countries relative to nontreaty countries). Thus, it does not appear that the paper's central result is driven by differential changes in stock market conditions across treaty and nontreaty countries.

4.6.   Testing for Influential Subsets of Countries and Changed Patterns of Tax Evasion

The previous analyses have considered the possibility that the findings in Table 3 are driven by systematic differences between treaty and nontreaty countries in terms of the investment preferences of American investors, the FPI investment climate, trends in investment generally and market conditions. One final class of alternative explanations is that some other relevant classification of countries overlaps with treaty status, and that this might explain the

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[38] The only other year for which the treaty country variable is of comparable magnitude (albeit statistically insignificant) is 2004, which is consistent with some delayed portfolio response to JGTRRA.

[39] The most general approach to addressing alternative explanations along these lines is to add country-specific time trends to the model. When this is done, the estimated JGTRRA effect is no longer statistically significant. This result is likely attributable to the difficulty of separately identifying both country-specific time trends and the effect of JGTRRA. Given the short panel (with only 6 years of data) and the fact that all of the years affected by JGTRRA are in the latter half of the sample period, the JGTRRA effect can easily be confounded with an increasing time trend for treaty countries. For this reason, the annual cross-sectional regressions may be more illuminating. Moreover, an increasing time trend in equity FPI in treaty countries would be expected to affect non-US as well as US FPI, but (as shown in Table 5) this appears not to be the case.

results in Table 3. In this subsection, these possibilities are considered, with particular attention to changed patterns of tax evasion.

The first three columns of Table 7 explore the possibility that the baseline results of Table 3 are driven by influential subsets of countries. First, the estimating sample includes a number of formerly socialist transition economies, in which US FPI may have grown over time due to institutional changes and growing familiarity, rather than to JGTRRA. Excluding transition economies from the sample leads to consistent results, as shown in Column 1 of Table 8.[40] The signing of a tax treaty may also be in anticipation of significant increases in FPI: countries that have recently signed tax treaties with the US may be precisely those in which future US investment is expected to grow. Thus, Column 2 of Table 7 reports the results using a sample that excludes countries with tax treaties with the US signed after 1990.[41] The basic result is robust suggesting that the main finding is not driven by the possible endogeneity of tax treaties.[42] Finally, it is possible that US investors switched their portfolios towards countries that were part of the "coalition" involved in the 2003 Iraq war, and these may have been disproportionately treaty countries. The specification in Column 3 excludes "coalition" countries from the sample and this exclusion does not affect the basic result.[43]

There are two possible scenarios in which changes in evasion behavior may confound the paper's results.[44] First, it is possible that there has been a decrease in tax evasion over time for reasons unrelated to JGTRRA (such as stronger enforcement). This may manifest itself in US investors who were previously engaging in evasion through tax haven investments abandoning attempts at evasion and switching their portfolios towards other countries, both treaty and nontreaty. As tax havens are predominantly nontreaty countries, this development may generate a spurious *relative* increase in FPI in treaty countries in the latter part of the sample period. There are few tax havens in the estimating sample, so this effect is unlikely to be large. Moreover,

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[40] Transition economies are defined as those classified by La Porta *et al.* (1999) as having "Socialist" legal origins.
[41] This is based on hand-collected data on tax treaty dates, kindly provided by Jim Hines.
[42] More generally, it should be noted that the distinction implemented by JGTRRA is not based entirely on the presence of a treaty, but partly on treaty status and partly on the presence of information-sharing provisions. As such, some countries classified as nontreaty have treaties but these treaties do not have suitable information-sharing provisions.
[43] This test uses the list of coalition countries in the White House press release of March 27, 2003 (available at http://www.whitehouse.gov/infocus/iraq/news/20030327-10.html).
[44] For a discussion of how investors may evade home country taxes on returns from FPI, see for example Gordon and Jun (1993) and Huizinga and Nicodeme (2004).

excluding the remaining tax havens (as defined in Dharmapala and Hines (2006, Table 1, Column 3)) from the sample does not affect the basic result, as shown in Column 4 of Table 7. The annual cross sectional results presented in Table 5 are also inconsistent with this hypothesis of a secular change in tax evasion channeling more investment towards treaty countries.

Second, it is possible that FPI in treaty countries was mismeasured prior to JGTRRA due to unreported investments in treaty countries being used for tax evasion purposes. The reduced tax rates established by JGTRRA may have allowed these investments to emerge into "the open." If this were the case, then the results attributed to a behavioral response to JGTRRA would only represent a correction of mismeasurement. It is inherently difficult to test for this possibility, given the inability to measure the hidden investment prior to JGTRRA. Nonetheless, it is possible to test one prediction that would emerge from such an alternative explanation of the results. If assets in treaty countries were merely becoming visible, the effects documented previously should be reliant on those countries where such evasion was most likely. This characteristic can be measured using the tax compliance index in La Porta *et al*. (1999). Originally constructed by the World Economic Forum, this index represents the extent of tax compliance in 1995 in a cross-section of countries. Excluding those treaty countries that have tax compliance indices one standard deviation or more below the treaty country mean does not change the basic result, as shown in Column 5 of Table 7.

More generally, it should be noted that it is unlikely that investors would have engaged in evasion before JGTRRA through the purchase of stock in *treaty* countries. The treaty countries are defined precisely in terms of having strong information-exchange provisions in their tax treaties with the US; in addition, most of them impose positive withholding taxes on dividends (e.g. Anderson, 2006, Chart 9.1), which reduce the benefits from evasion, and also generate information that may increase the probability that the evasion of US tax is subsequently detected. To the degree that evasion is operative, it appears more reasonable to assume that evasion would occur through investment in tax haven countries with weak or nonexistent information-exchange provisions and zero withholding taxes, and that the effect of reduced evasion after JGTRRA would manifest itself in the form of a transfer of funds from havens to treaty countries. Such a transfer is part of the JGTRRA effect that this paper seeks to estimate, and represents one of the

channels through which JGTRRA increased US equity FPI in treaty countries, rather than being an alternative explanation for the basic result.[45]

5. *Discussion and Conclusion*

This paper establishes a quantitatively large effect of JGTRRA's differential treatment of foreign-source dividends on US investors' portfolio choices. It shows that in an empirical setting where an exogenous tax change is accompanied by limited scope for endogenous supply responses, it is possible to identify large and significant effects of taxes on portfolio choices. In particular, US investors' holdings of lightly-taxed foreign equities increased significantly in a manner that is consistent with an implied elasticity of asset holdings with respect to the tax rate of approximately -1.6. This elasticity is considerably larger than most estimates of the responsiveness of portfolio shares to tax rates.

These results suggest several avenues for further research. First, while taxes have been discussed in the theoretical literature on home bias, there has been limited empirical work on their role in limiting gains from international diversification. These results suggest that taxes can play in a large role in shaping international portfolio choices. Second, JGTRRA's provisions may have changed the incentives for cross-border listings and ADRs. While such potential responses would not confound the results here, they may have provided for interesting changes to the ADR market. Third, exploring the heterogeneity of institutional investor responses to JGTRRA's treatment of international dividends may illuminate how different types of institutions respond to tax incentives.

This paper also has implications for tax policies that seek to achieve corporate tax integration. Integration has been widely supported by economists as a means of reducing distortions to firm payout and financing decisions, as discussed in Hubbard (1993). If dividend relief is not fully extended to foreign dividends, corporate tax integration may give rise to significant distortions in international portfolios with consequent welfare losses. The results in this paper show that these international portfolio effects can be quantitatively large.

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[45] It is also unlikely that investors simply moved equity held in nontreaty countries to holding companies in treaty countries. JGTRRA specifically denies its favorable tax treatment of dividends to foreign personal holding companies, foreign investment companies, and passive foreign investment companies, even if they are located in treaty countries (Sheppard, 2004). Thus, relocating assets from nontreaty to treaty countries would involve some real cost in terms of changed diversification patterns or various other frictions.

References

Agell, J., and P.-A. Edin (1990) "Marginal Taxes and the Asset Portfolios of Swedish Households" *Scandinavian Journal of Economics*, 92, 47-64.

Ahearne, A., W. L. Griever and F. E. Warnock (2004) "Information Costs and Home Bias: An Analysis of U.S. Holdings of Foreign Equities" *Journal of International Economics*, 62, 313-336.

Ammer, J., S. B. Holland, D. C. Smith and F. E. Warnock (2006) "Look at Me Now: What Attracts U. S. Shareholders?" NBER Working Paper #12500.

Anderson, R. E. (2006) *Analysis of United States Income Tax Treaties*, WG&L Publishing.

Auerbach, A. J., and M. A. King (1983) "Taxation, Portfolio Choice, and Debt–Equity Ratios: A General Equilibrium Model" *Quarterly Journal of Economics*, 98, 587–609.

Auerbach, A. J. and J. Slemrod (1997) "The Economic Effects of the Tax Reform Act of 1986," *Journal of Economic Literature*, 35, 589-632.

Beck, T., A. Demirgüç-Kunt and R. Levine (2000) "A New Database on Financial Development and Structure" *World Bank Economic Review* 14, 597-605.

Bergstresser, D. B. and J. M. Poterba (2002) "Do After-Tax Returns Affect Mutual Fund Inflows?" *Journal of Financial Economics*, 63, 381-414.

Bertaut, C., W. L. Griever and R. W. Tryon (2006) "Understanding U.S. Cross-Border Securities Data" *Federal Reserve Bulletin*, 92, A59-A75.

Black, F. (1974) "International Capital Market Equilibrium with Investment Barriers" *Journal of Financial Economics*, 1, 337-352.

Chetty, R. and E. Saez (2005) "Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut" *Quarterly Journal of Economics*, 120, 791-834.

Christoffersen, S. E. K., C. Geczy, D. K. Musto, and A. V. Reed (2005) "Cross-border Dividend Taxation and the Preferences of Taxable and Non-taxable Investors: Evidence from Canada" *Journal of Financial Economics*, 78, 121-144.

Desai, M. A., C. F. Foley and J. R. Hines Jr. (2003) "Chains of Ownership, Tax Competition, and the Location Decisions of Multinational Firms" in H. Herrmann and R. Lipsey, eds. *Foreign Direct Investment in the Real and Financial Sector of Industrial Countries* Berlin: Springer-Verlag, 61-98.

Desai, M. and D. Dharmapala (2007) "Taxes, Institutions, and Foreign Diversification Opportunities" NBER Working Paper #13132.

Dharmapala, D. and J. R. Hines, Jr. (2006) "Which Countries Become Tax Havens?" NBER Working Paper #12802.

Domar, E. D. and R. A. Musgrave (1944) "Proportional Income Taxation and Risk-Taking" *Quarterly Journal of Economics*, 58, 388-422.

Errunza, V., K. Hogan and M-W. Hung (1999) "Can The Gains From International Diversification Be Achieved Without Trading Abroad?" *Journal of Finance*, 54, 2075-2107.

Feldstein, M. (1976) "Personal Taxation and Portfolio Composition: An Econometric Analysis" *Econometrica*, 44, 631–649.

Gordon, R. H. (1986) "Taxation of Investment and Savings in a World Economy" *American Economic Review*, 76, 1086-1102.

Gordon, R. H. and J. Jun (1993) "Taxes and the Form of Ownership of Foreign Corporate Equity" in A. Giovannini, R. G. Hubbard and J. Slemrod (eds.) *Studies in International Taxation*, University of Chicago Press: Chicago and London, 13-44.

Graetz, M. and I. Grinberg (2003) "Taxing International Portfolio Income" *Tax Law Review*, 56, 537-586.

Hubbard, R. G. (1985) "Personal Taxation, Pension Wealth, and Portfolio Composition" *Review of Economics and Statistics* 67, 53–60.

Hubbard, R. G. (1993) "Corporate Tax Integration: A View from the Treasury Department" *Journal of Economic Perspectives*, 7, 115-132.

Huizinga, H. and G. Nicodeme (2004) "Are International Deposits Tax-Driven?" *Journal of Public Economics*, 88, 1093-1118.

Kho, B-C., R. Stulz, and F. E. Warnock (2006) "Financial Globalization, Governance, and the Evolution of the Home Bias" NBER Working Paper #12389.

King, M. A., and J. I. Leape (1998) "Wealth and Portfolio Composition: Theory and Evidence" *Journal of Public Economics*, 69, 155–193.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. Vishny (1999) "The Quality of Government" *Journal of Law, Economics, & Organization*, 15, 222-279.

Poterba, J. M. (2001) "Taxation and Portfolio Structure: Issues and Implications" in L. Guiso, M. Haliassos, and T. Jappelli (eds.) *Household Portfolios* MIT Press: Cambridge, MA, 103-142.

Poterba, J. M. (2002) "Taxation, Risk-Taking and Portfolio Behavior" in A. Auerbach and M. Feldstein, *Handbook of Public Economics*, Volume 3 (Amsterdam: North Holland), 1109-1171.

Poterba, J. M., and A. A. Samwick (2002) "Taxation and Household Portfolio Composition: US Evidence from the 1980s and 1990s" *Journal of Public Economics*, 87, 5-38.

Scholz, J. K. (1994) "Tax Progressivity and Household Portfolios: Descriptive Evidence from the Surveys of Consumer Finances" in J. Slemrod (ed.), *Tax Progressivity and Income Inequality*, Cambridge University Press, New York, 219-267.

Sheppard, H. E. (2004) "Reduced Tax Rates on Foreign Dividends under JGTRRA: Ambiguities and Opportunities" *Journal of International Taxation*, 15, 14-27, 62.

Sheppard, H. E., and S. A. Harty (2004) "Tax Treatment of Foreign Dividends under JGTRRA: Ambiguities and Opportunities" *Journal of International Taxation*, 15, 20-27.

Stulz, R. (1981) "On the Effects of Barriers to International Investment" *Journal of Finance*, 36, 923-934.

Wacker, R. F. (2004) "US Taxation of International Dividends under JGTRRA" *The International Tax Journal*, 30, 19-34.

Figure 1: JGTRRA and the Location of US Equity FPI
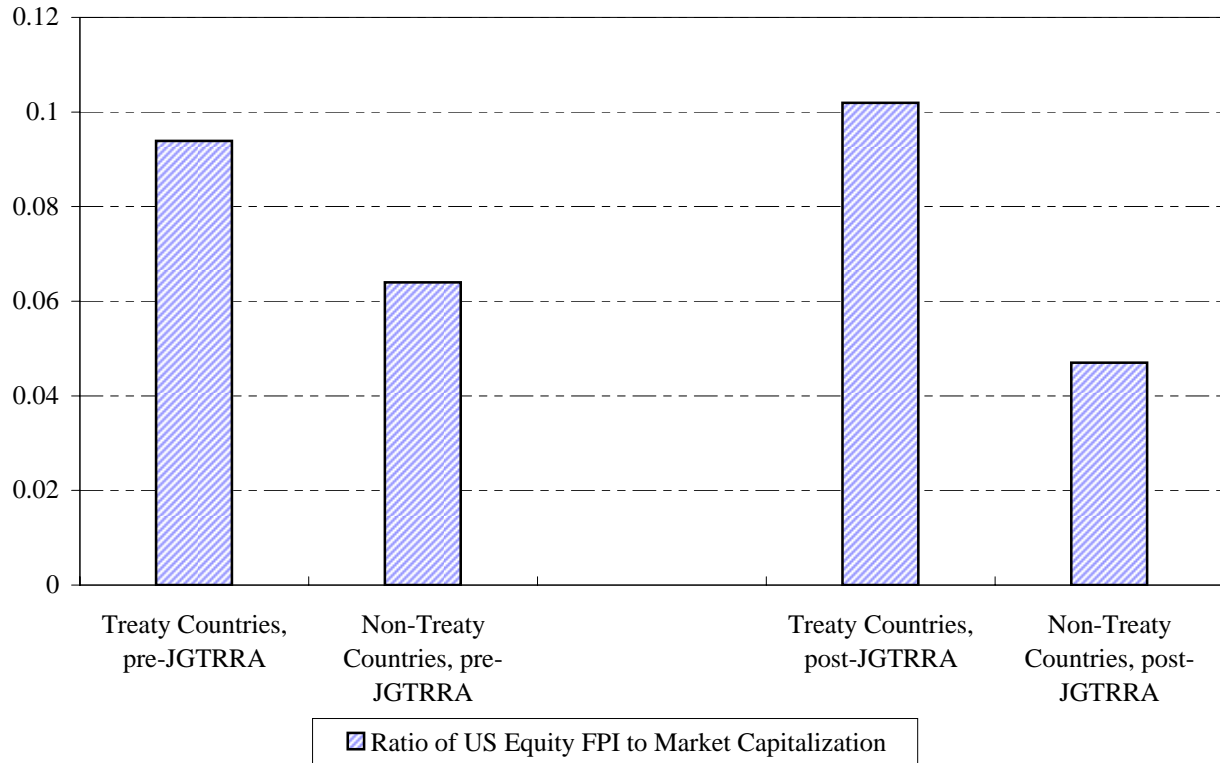
Notes: The figure provides the average ratio of aggregate U.S. Equity FPI to Market Capitalization for Treaty and Nontreaty countries for the years prior and subsequent to JGTRRA. This ratio is a weighted average across countries in each year and then averaged across the three years prior to JGTRRA that are available in the sample (1994, 1997 and 2001) and subsequent to JGTRRA (2003, 2004 and 2005).

Table 1: List of Sample Countries

Note: The sample is based on the availability of data on US equity FPI and the baseline control variables (notably, the stock market return index, which is only available for a limited set of countries). "Treaty" countries are defined based on Internal Revenue Service (IRS) Notice 2003-69 ("United States Income Tax Treaties That Meet the Requirements of Section 1(h)(11)(C)(i)(II)"), issued in October, 2003, and available at: http://www.irs.gov/irb/2003-42_IRB/ar09.html. The sample is based on the availability of data on US equity FPI and the baseline control variables.

Treaty Countries				*Nontreaty Countries*
Australia	Greece	Netherlands	Switzerland	Argentina
Austria	Hungary	New Zealand	Thailand	Brazil
Belgium	India	Norway	Turkey	Chile
Canada	Indonesia	Pakistan	United Kingdom	Colombia
China	Ireland	Philippines	Venezuela	Hong Kong
Czech Republic	Israel	Poland		Jordan
Denmark	Italy	Portugal		Malaysia
Egypt	Japan	Russia		Peru
Finland	Korea (South)	South Africa		Singapore
France	Mexico	Spain		Sri Lanka
Germany	Morocco	Sweden		Taiwan

Treaty Countries (Not in the Sample)			
Cyprus	Kazakhstan	Romania	Tunisia
Estonia	Latvia	Slovak Republic	Ukraine
Iceland	Lithuania	Slovenia	
Jamaica	Luxembourg	Trinidad and Tobago	

Table 2: Summary Statistics

Notes: US equity FPI is from the TIC dataset, and measures US investors' equity portfolio holdings in millions of US$. Long-term debt FPI is also from the TIC dataset, and measures US investors debt portfolio holdings with a maturity greater than one year. US FDI is the direct investment position of US firms in millions of US$ (from the BEA dataset). GDP per capita (in US$, in PPP terms), population and aggregate market capitalization are from the World Bank's WDI database. The stock market return index is drawn from Datastream and is based on MSCI country dollar indices. The volatility of stock market returns is constructed by annualizing a standard devation based on the trailing 24 months of monthly returns. The ratio of stock market value traded to GDP, the stock market turnover ratio, and the ratio of financial deposits to GDP are taken from an updated version of Beck et al. (2000). Exports and imports as a % of GDP are from the World Bank's WDI database. The corporate tax rate is the top statutory corporate rate (from the PWC Worldwide Summaries). (Treaty=1)*(Post-JGTRRA) is an interaction between an indicator variable for those countries listed as treaty countries in Table 1, and an indicator for the years after the enactment of JGTRRA. For the IMF CPIS Dataset: US equity FPI is from the IMF's CPIS dataset, and measures US investors' equity portfolio holdings in millions of US$. Non-US equity FPI is also from the IMF's CPIS dataset, and is obtained by subtracting US equity FPI holdings from worldwide equity FPI holdings. All other variables are as defined above.

Variable	Mean	Standard Deviation	No. of Observations
Primary (TIC) Dataset:			
Log of US Equity FPI	8.743	2.317	291
Log of US Long-term Debt FPI	7.797	2.211	291
Log of US FDI	9.051	1.699	268
Log of GDP per capita (PPP)	9.420	0.836	284
Log of Population	17.150	1.372	285
Log of Aggregate Market Capitalization	25.360	1.712	284
Log of Stock Market Return Index	6.539	1.504	291
Volatility of Stock Market Returns	0.253	0.115	287
Ratio of Stock Market Value Traded to GDP	0.493	0.613	291
Stock Market Turnover Ratio	0.720	0.695	290
Ratio of Financial Deposits to GDP	0.656	0.395	279
Exports as a % of GDP	39.080	27.420	247
Imports as a % of GDP	38.450	26.250	247
Corporate Tax Rate	30.090	7.091	280
(Treaty=1)*(Post-JGTRRA)	0.392	0.489	291
IMF CPIS Dataset:			
Log of Non-US Equity FPI	9.226	2.300	235
Log of US Equity FPI	8.877	2.328	235
Log of GDP per capita (PPP)	9.504	0.830	235
Log of Population	17.210	1.353	235
Log of Aggregate Market Capitalization	25.530	1.645	235
Log of Stock Market Return Index	6.627	1.547	235

Table 3: The Effect of JGTRRA on the Location of US Equity FPI

Notes: The dependent variable is the log of US equity FPI (from the TIC dataset) for each available year. (Treaty=1)* (Post-JGTRRA) is an interaction between an indicator variable for those countries listed as treaty countries in Table 1, and an indicator for the years after the enactment of JGTRRA. Log of GDP per capita (in US$, in PPP terms), log of population and log of aggregate market capitalization are from the World Bank's WDI database. The log of the stock market return index is drawn from Datastream and is based on MSCI country dollar indices. The volatility of stock market returns is constructed by annualizing a standard devation based on the trailing 24 months of monthly returns. The ratio of stock market value traded to GDP, the stock market turnover ratio, and the ratio of financial deposits to GDP are taken from an updated version of Beck *et al*. (2000). Exports and imports as a % of GDP are from the World Bank's WDI database. The corporate tax rate is the top statutory corporate rate (from the PWC Worldwide Summaries). The log of US FDI is the direct investment position of US firms (from the BEA dataset). Log of US long-term debt FPI is from the TIC dataset. Column 1 employs the full sample of 21 countries and territories. In column 2 the sample is restricted to observations for which the stock return index is available. In Column 5, 1 observation with negative FDI is omitted. Robust standard errors (clustered at the country level) in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Dependent Variable:	Log of US Equity FPI				
	(1)	(2)	(3)	(4)	(5)
(Treaty=1)* (Post-JGTRRA)	0.758 ***	0.691 **	0.649 **	0.797 ***	0.798 ***
	(0.166)	(0.332)	(0.257)	(0.283)	(0.265)
Log of GDP per capita (PPP)			1.635 *	1.737	2.430 *
			(0.961)	(1.380)	(1.427)
Log of Population			1.544	0.778	0.656
			(2.449)	(1.653)	(1.534)
Log of Aggregate Market Capitalization			0.714 ***	0.300	0.561
			(0.119)	(0.358)	(0.343)
Log of Stock Market Return Index			0.302 *	0.510 *	0.388
			(0.158)	(0.279)	(0.237)
Volatility of Stock Market Returns				-0.061	
				(0.792)	
Ratio of Stock Market Value Traded to GDP				0.393 *	
				(0.220)	
Stock Market Turnover Ratio				-0.360	
				(0.219)	
Ratio of Financial Deposits to GDP				-0.161	
				(0.352)	
Exports as a % of GDP				0.004	
				(0.014)	
Imports as a % of GDP				0.012	
				(0.016)	
Corporate Tax Rate				-0.016	
				(0.012)	
Log of US FDI					-0.116
					(0.178)
Log of US Long-Term Debt FPI					0.197 *
					(0.105)
Country and Year Effects?	Y	Y	Y	Y	Y
Sample Period	1994-2005	1994-2005	1994-2005	1994-2005	1994-2005
Observations	1259	291	283	225	260
Countries	213	49	48	45	47
R-squared	0.96	0.92	0.96	0.97	0.97

Table 4: The Effect of JGTRRA on Non-US Equity FPI

Notes: The dependent variables are the log of US equity FPI and non-US equity FPI (from the IMF CPIS dataset) for each available year. (Treaty=1)* (Post-JGTRRA) is an interaction between an indicator variable for those countries listed as treaty countries in Table 1, and an indicator for the years after the enactment of JGTRRA. Log of GDP per capita (in US$, in PPP terms), log of population and log of aggregate market capitalization are from the World Bank's WDI database. The log of the stock market return index is drawn from Datastream and is based on MSCI country dollar indices. Robust standard errors (clustered at the country level) in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Dependent Variable:	Log of US Equity FPI	Log of Non-US Equity FPI
	(1)	(2)
(Treaty=1)*(Post-JGTRRA)	0.339 **	0.199
	(0.151)	(0.152)
Log of GDP per capita (PPP)	1.028	2.105 *
	(1.310)	(1.119)
Log of Population	-1.757	-5.567
	(4.158)	(4.112)
Log of Aggregate Market Capitalization	0.010	0.431 **
	(0.170)	(0.193)
Log of Stock Market Return Index	0.677 ***	0.406 ***
	(0.154)	(0.154)
Country and Year Effects?	Y	Y
Sample Period	2001-2005	2001-2005
Observations	235	235
Countries	47	47
R-squared	0.99	0.99

Table 5: Annual Changes in US Equity FPI

Notes: The dependent variable is the change in log of US equity FPI (from the TIC dataset) for each of the periods given. Treaty=1 is an indicator variable for those countries listed as treaty countries in Table 1. Log of GDP per capita (in US$, in PPP terms), log of population and log of aggregate market capitalization are from the World Bank's WDI database. The log of the stock market return index is drawn from Datastream and is based on MSCI country dollar indices. Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Dependent Variable:	Change in Log of US Equity FPI from 1994 to 1997	Change in Log of US Equity FPI from 1997 to 2001	Change in Log of US Equity FPI from 2001 to 2003	Change in Log of US Equity FPI from 2003 to 2004	Change in Log of US Equity FPI from 2004 to 2005
	(1)	(2)	(3)	(4)	(5)
Treaty (=1)	-0.260	0.146	0.351 **	0.269	0.013
	(0.319)	(0.292)	(0.164)	(0.203)	(0.137)
Change in Log of GDP per capita (PPP)	-0.871	2.447 *	1.511	-1.075	0.206
	(2.402)	(1.402)	(1.666)	(0.994)	(1.931)
Change in Log of Population	-0.451	2.118	-7.123	13.184	-1.329
	(3.139)	(2.430)	(6.234)	(10.145)	(9.322)
Change in Log of Aggregate Market Capitalization	0.928 ***	0.291	-0.143	0.311	0.143
	(0.105)	(0.405)	(0.196)	(0.233)	(0.171)
Change in Log of Stock Market Return Index	-0.438 *	1.193 ***	0.739 **	0.620 *	0.617 *
	(0.245)	(0.329)	(0.308)	(0.339)	(0.362)
Constant	1.107 *	-0.500	0.136	-0.145	0.158
	(0.618)	(0.508)	(0.310)	(0.216)	(0.218)
Regional Dummies?	Y	Y	Y	Y	Y
Observations	45	47	48	48	47
R-squared	0.76	0.65	0.46	0.39	0.54

Table 6: Annual Changes in Stock Market Conditions around JGTRRA

Notes: The dependent variables are the change in the log values from 2001 to 2003 of the following stock market variables: market capitalization, market returns, volatility, the ratio of stock value traded to GDP, and the stock market turnover ratio.   Treaty=1 is an indicator variable for those countries listed as treaty countries in Table 1. Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Dependent Variable:	Change in Log of Stock Market Capitalization	Change in Log of Stock Return Index	Change in Log of Volatility of the Stock Return Index	Change in Ratio of Stock Value Traded to GDP	Change in Stock Market Turnover Ratio
	(1)	(2)	(3)	(4)	(5)
Treaty (=1)	0.075	0.092	-0.715	-0.167 *	-0.001
	(0.172)	(0.130)	(0.549)	(0.098)	(0.189)
Constant	0.575 ***	0.532 ***	2.040 ***	0.198 *	0.054
	(0.172)	(0.130)	(0.549)	(0.098)	(0.189)
Regional Dummies?	Y	Y	Y	Y	Y
Observations	48	49	48	49	49
R-squared	0.27	0.12	0.28	0.17	0.01

Table 7: Tests for Influential Subsets of Countries and Changed Patterns of Tax Evasion

Notes: The dependent variable is the log of US equity FPI for each available year. (Treaty=1)* (Post-JGTRRA) is an interaction between an indicator variable for those countries listed as treaty countries in Table 1 and an indicator for the years after the enactment of JGTRRA. Log of GDP per capita (in US$, in PPP terms), log of population and log of aggregate market capitalization are from the World Bank's WDI database. The log of the stock market return index is drawn from Datastream and is based on MSCI country dollar indices. Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Dependent Variable:	Log of US Equity FPI				
	Excluding Transition Countries	Excluding Countries with Recent Tax Treaties	Excluding Iraq War Coalition Countries	Excluding Tax Haven Countries	Excluding Treaty Countries with Low Tax Compliance
	(1)	(2)	(3)	(4)	(5)
(Treaty=1)*(Post-JGTRRA)	0.662 **	0.714 **	0.698 **	0.740 **	0.705 **
	(0.283)	(0.319)	(0.310)	(0.287)	(0.295)
Log of GDP per capita (PPP)	1.959	2.255	1.631	1.908 *	1.861
	(1.470)	(1.787)	(1.149)	(1.015)	(1.502)
Log of Population	1.268	2.016	1.435	0.951	1.576
	(2.578)	(2.969)	(3.705)	(2.682)	(2.767)
Log of Aggregate Market Capitalization	0.673	0.567	0.698 ***	0.696 ***	0.628 **
	(0.428)	(0.349)	(0.135)	(0.128)	(0.316)
Log of Stock Market Return Index	0.325	0.447	0.431 *	0.339 **	0.409 *
	(0.333)	(0.282)	(0.223)	(0.162)	(0.241)
Country and Year Effects?	Y	Y	Y	Y	Y
Sample Period	1994-2005	1994-2005	1994-2005	1994-2005	1994-2005
Observations	253	194	187	255	241
Countries	43	33	32	43	41
R-squared	0.96	0.95	0.95	0.96	0.96