Cross-Country Evidence on the Relation between Capital Gains Taxes, Risk, and Expected Returns*

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Abstract

This study empirically examines the prediction in Sikes and Verrecchia (2012) that the relation between capital gains tax rates and expected rates of return varies in the cross-section and over time with firm risk and market risk. Specifically, we test whether the general positive relation between expected returns and the capital gains tax rate becomes weaker or even reverses when (i) a firm's systematic risk is high, (ii) the aggregate market risk premium is high, or (iii) the risk-free rate is low. Using an international panel from 25 countries over the 1990 to 2004 period, we find evidence supporting these predictions. The results are particularly pronounced in countries with substantive changes in tax rates, a tradition of low tax evasion, less integrated capital markets, and less institutional ownership as well as around substantive changes in the three risk proxies. We corroborate our findings in a single country setting, using the 1978, 1997, and 2003 changes to the capital gains tax rate in the United States as events. Our results underscore the importance of macroeconomic and firm-specific factors in the determination of the effect of capital gains taxes on expected returns and show that the valuation effects can sometimes be in the opposite direction of what is generally expected.

JEL Classification: G12, G15, G32, H24, K34, M41

Key Words: Tax capitalization, Personal taxes, Market risk, Cost of capital, International accounting

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1. Introduction

Does firm risk and macroeconomic risk affect the general relation between capital gains tax rates and asset prices and hence, expected pretax rates of return? Prior studies document a positive relation between investor-level capital gains tax rates and expected pretax rates of return (e.g., Guenther and Willenborg 1999; Lang and Shackelford 2000; Dhaliwal, Krull and Li 2007). The logic behind such a positive relation is as follows: an increase in the capital gains tax rate reduces investors' expected after-tax cash flows, and thus the price that they are willing to pay for firms' shares. In turn, the reduction in price increases firms' expected pretax rates of return (hereinafter referred to simply as expected returns or cost of capital).

However, the relation is likely more nuanced and does not necessarily have to be positive. Sikes and Verrecchia (2012) theoretically show that in a diversified market setting with many firms whose cash flows co-vary and in which some risks are non-diversifiable, the relation between capital gains tax rates and expected returns varies both in the cross-section and over time based on firm-level and economy-wide risk attributes. Specifically, they outline three scenarios in which the relation between capital gains tax rates and expected returns will be less positive or even negative: (i) when a firm's systematic risk is high, (ii) when the aggregate market risk premium is high, or (iii) when the risk-free rate in the economy is low.

In this paper, we empirically test these predictions using a large international panel dataset. In addition, we examine institutional settings where the mitigating forces of firm-level risk and aggregate risk are most likely to occur. Understanding the exact nature of the relation between capital gains taxes and expected returns is important for policymakers, firms, and investors because the general belief is that reducing the capital gains tax rate stimulates growth and investment among firms relying on external equity financing.[1] Yet, as our analysis shows, macroeconomic conditions might weaken or even induce opposite cost of capital effects and hence can lead to a disincentive to invest.

The predictions in Sikes and Verrecchia (2012) are based on the following trade-off. In a diversified market, an increase in the capital gains tax rate has two opposing effects. First, it reduces investors' expected after-tax cash flows leading to the aforementioned positive relation between capital gains tax rates and expected returns. Second, and this is new, it also reduces investor-level risk because taxing capital gains and losses induces the tax authority to absorb some of the risk associated with firms' residual cash flows.[2] Holding all else constant, when risk declines, investors are willing to pay a higher price for firms' shares, thereby lowering firms' expected returns. In scenarios when a firm's systematic risk or the aggregate market risk premium is high, investors put more weight on the risk reduction component of capital gains taxation. As a result, the effect of risk reduction will attenuate and possibly even dominate the impact of lower expected after-tax cash flows. The general positive relation between capital gains taxes and expected returns becomes less positive or even negative.

A third scenario arises when the risk-free rate of return is low. In asset pricing models such as the CAPM, a risk-free asset (e.g., sovereign bonds) serves as an alternative to investments in risky firm shares. Higher capital gains tax rates increase the relative attractiveness of the risk-free investment, thereby reducing the demand for and the prices of the

1 For example, the motivation behind the Jobs and Growth Tax Relief Reconciliation Act of 2003 in the United States, which cut both the maximum statutory individual dividend and capital gains tax rates, was to reduce cost of capital and thus stimulate economic growth (108th Congress report, 2003). The Secretary of the Treasury at the time, John Snow, argued that "Because the President's proposal lowers the cost of capital […], it encourages investment and a higher long-term growth rate. Lower capital taxes mean more capital, which means higher productivity, which means faster growth and higher wages for everyone'' (Snow, 2003).

2 The tax authority absorbs risk by allowing investors to offset their taxable gains with taxable losses and thus sharing in both investors' gains as well as losses. For example, in the United States, individual investors can deduct up to US$ 3,000 of net capital losses against ordinary income per year, and carry-forward any remainder indefinitely.

risky assets.[3] However, when the risk-free rate is close to zero, the after-tax return on the risk-free asset is small. Thus, in those situations, an increase in the capital gains tax rate does little to shift demand away from the risky asset and thereby decrease its price because investors can still earn more from investing in the risky asset as opposed to the risk-free asset. At the same time, the risk reduction effect of capital gains taxation is present.

We empirically test the above predictions using panel data of tax rates and expected returns from 25 countries with positive capital gains tax rates over the 1990 to 2004 period. We conduct the analysis in a cross-country setting because it provides us with both substantial cross-sectional and inter-temporal variation in individual tax rates, market risk premiums, and risk-free rates. It also lets us isolate institutional settings in which the mitigating factors of tax capitalization are most likely to occur. Following prior literature, we use two conceptually different proxies for expected returns: ex ante (realized) buy-and-hold returns (*RET*) and implied costs of capital (*COC*) (e.g., Hail and Leuz 2006, 2009; Dhaliwal, Li, and Trezevant 2003; Dhaliwal, Krull, Li, and Moser 2005; Dhaliwal, Krull, and Li 2007).[4] We measure both proxies in a way that they capture investors' expected returns at the time of observation. To separate between the different scenarios, we employ three conditioning variables. We calculate a firm's systematic risk using a two-factor market model in which we regress a firm's excess returns on the local market index and the world market index (e.g., Hou, Karolyi, and Kho 2011). Our measure of systematic risk is the coefficient on the local market index returns. We measure the

3 This result assumes that interest income earned from owning sovereign bonds is taxed at a rate other than the capital gains tax rate. For instance, in the United States, interest income is taxed at the ordinary income tax rate, which generally exceeds the capital gains tax rate.

4 We compute the average of four commonly used measures of implied cost of capital (i.e., those suggested in Claus and Thomas 2001; Gebhardt, Lee, and Swaminathan 2001; Ohlson and Juettner-Nauroth 2005, as implemented in Gode and Mohanram 2003; and Easton 2004). The individual models differ with respect to the use of analyst forecast data, the assumptions regarding short-term and long-term growth, the explicit forecasting horizon, and whether and how inflation is incorporated into the steady-state terminal value.

market risk premium as the yearly median value of firms' systematic risk in a country. Local interest rates on short-term treasury bills serve as our proxy for the returns on the risk-free asset.[5]

We start our analyses by confirming prior literature's findings of an on average positive relation between capital gains tax rates and expected returns (e.g., Guenther and Willenborg 1999; Lang and Shackelford 2000; Dhaliwal et al. 2007), however not before we eliminate Japan, a country with continuously low risk-free interest rates, from the realized returns tests. We then test each of the three predictions in Sikes and Verrecchia (2012) in a cross-sectional time-series regression using our international panel. Consistent with theory, we find that the positive relation between capital gains tax rates and expected returns is attenuated and sometimes even negative when a firm's systematic risk is high, when the market risk premium is high, and/or when the risk-free rate is low. In terms of economic magnitude, the effects are substantial, but not too big to be implausible. For instance, a one percentage point increase in the capital gains tax rate results in a *decrease* in realized returns of 11 basis points for high systematic risk firms, 40 basis points in countries with high market risk premiums, and five basis points in countries and periods with low risk-free rates.[6] The results are robust to various alternative model and sample specifications, including firm fixed effects, controlling for the lock-in effect (e.g., Feldstein, Slemrod and Yitzhaki 1980; Landsman and Shackelford 1995; Klein 2001; Ivkovich, Poterba and Weisbenner 2005), or alternative tax rates (Becker, Jacob, and Jacob 2013).

In an attempt to strengthen our identification, we next focus on settings where *a priori* we expect the mitigating forces of firm-level risk and market risk to be more pronounced.

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5 We rerun the analyses with alternative proxies for market risk (i.e., return variability and implied market premiums) and real instead of nominal risk-free rates, and find very similar results (see Appendix 2).

6 For comparison, the benchmark firms with low systematic risk and in countries with low market risk premiums or medium to high risk-free rates experience an *increase* in realized returns of about six basis points.

Consistently, we find stronger results in countries with substantive changes in capital gains tax rates over the sample period, in countries with a tradition of low tax evasion and high tax morale, and with less integrated capital markets. We also observe more pronounced negative relations in countries with an overall lower proportion of institutional (and hence potentially tax-exempt) stockholdings, and with less foreign institutional ownership. These findings ease concerns about the proportion of investors in a country who are actually subject to the local capital gains tax rate and thus the extent to which capital gains taxes affect asset prices, and whether, internationally, tax rates are effectively enforced. Furthermore, we conduct a pre-post comparison surrounding substantive changes in firm risk, market risk, and risk-free rates. Our results continue to hold, notably around substantive increases as well as decreases in the risk proxies and, in the analyses of changes in firms' systematic risk, after controlling for separate fixed effects for each country-year combination.

Finally, we corroborate the cross-country results in a single-country setting, which eliminates many of the potentially confounding factors of the international panel but comes at the cost of only very limited variation in tax rates and conditioning factors. Specifically, we examine three regulatory changes to the capital gains tax rate in the United States: the Revenue Reconciliation Act of 1978 (RA78), the Taxpayer Relief Act of 1997 (TRA97), and the Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA03). Because the market risk premium and the risk-free rate varied substantially and in a manner that allows us to isolate their effects across the three events, we can use this setting to examine the mitigating role of the risk variables on the general relation between capital gains tax rates and expected returns.[7] When we

[7] The mean market risk premium (measured as monthly median firm beta) was 1.19, 0.88, and 0.73, and the mean annualized one-month Treasury bill rate was 8.3%, 5.1%, and 1.7% in the 48 months surrounding the enactment of RA78, TRA97, and JGTRRA03, respectively. Thus, we have events with high market risk (RA78), low risk-free rates (JGTRAA03), and no special macroeconomic conditions (TRA97) for comparison.

compare the relation between capital gains tax rates and expected returns across events, we find it to be negative when the market risk premium is high (around RA78) or the risk-free rate is low (around JGTRRA03), but insignificantly positive in the intermediate case (TRA97). The relation is significantly less positive around RA78 and JGTRRA03 than around TRA97. This pattern is consistent with time-series variation in the valuation effects of capital gains taxation and points to the macroeconomic conditions as moderating factors, as predicted by theory.

In summary, our study empirically shows that the extent to which capital gains taxes are impounded into price and thus affect expected returns varies significantly in the cross-section and over time with firm and market risk. A better understanding of the factors that mitigate tax capitalization is critical for policy makers who are considering capital gains tax rate changes as well as firms and investors interested in the valuation and real investment effects of such changes. Prior literature's findings that increasing (decreasing) the capital gains tax rate leads to higher (lower) expected returns are average results. However, we show that for firms with high systematic risk and in economies where the market risk premium is high or the risk-free rate low, increasing capital gains tax rates can have no or the opposite effect. This finding is important as it goes against the conventional wisdom of tax capitalization. Our study also contributes to the evidence on how tax rate changes are incorporated into international asset prices (e.g., Dhaliwal, Krull, and Li 2011; Becker, Jacob and Jacob 2013) in that we show that the degree of market integration, ownership structure as well as a country's general tax morale are important factors for capital gains taxes to have an effect.

In Section 2, we discuss prior literature and develop the conceptual underpinnings of our empirical predictions. Section 3 presents the results of the cross-country analyses, first in the panel dataset, then for specific subsets of countries and around substantive changes in the three conditioning variables. In Section 4, we report the results of the single-country tests that center around changes to the capital gains tax rate in the United States. Section 5 concludes.

2. Conceptual Underpinnings and Prior Literature

According to Miller and Scholes (1978, 1982), shareholder taxes are irrelevant in the determination of asset prices because taxable investors are infra-marginal. In contrast, in the after-tax Capital Asset Pricing Model (CAPM) developed by Brennan (1970) and Gordon and Bradford (1980), it is the weighted average tax rate of all investors in the economy that is relevant in determining the extent to which shareholder taxes are capitalized, not the tax rate of a hypothetical marginal investor. In the presence of taxable investors, share prices can indeed reflect investor-level taxes. The general line of argument is that higher capital gains and/or dividend tax rates reduce expected after-tax cash flows, thereby decreasing the price that investors are willing to pay for a firm's shares. Consequently, firms' expected returns increase. The resulting positive association between shareholder-level tax rates and expected returns has been widely acknowledged.[8]

Following this intuition, prior literature provides evidence of capital gains tax capitalization (see, e.g., Shackelford and Shevlin (2001) and Hanlon and Heitzman (2010) for overviews). For instance, several studies examine the reduction in the maximum statutory individual-level capital gains tax rate from 28 to 20 percent in the United States in May 1997 (TRA97). TRA97 is an ideal setting to test for the effects of tax capitalization because the tax rate cut was unexpected and the act made few changes other than to cut the capital gains tax rate. Studying returns in the week of the announcement but prior to the effective date of the tax cut,

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[8] For instance, Scholes et al. (2009) write in their textbook that "[Lowering] the tax on dividends for a firm paying out 100% of its earnings reduces the firm's cost of capital. Lowering the capital gains tax rate for a non-dividend paying firm also lowers its cost of capital" (p. 108).

Lang and Shackelford (2000) find that non-dividend-paying stocks, their proxy for stocks whose shareholders have accrued the largest capital gains, outperform dividend-paying stocks. Similarly, Dai, Maydew, Shackelford and Zhang (2008) find that announcement week returns are higher than average weekly returns, and that the returns of non-dividend-paying stocks exceed those of dividend-paying stocks.[9] Blouin, Hail, and Yetman (2009) show that American depositary receipts (ADRs) of low-dividend-yield firms outperform those of high-dividend-yield firms and that this price reaction translates to international markets when the barriers to arbitrage are low.[10] Using a 1993 tax law change in the United States that provided a 50 percent capital gains tax rate exclusion for share offerings, Guenther and Willenborg (1999) find a significant increase in prices of qualified initial public offerings. Another set of studies focuses on JGTRRA03 in the United States, which changed both the dividend tax rate (from 38.1 to 15 percent) and the capital gains tax rate (from 20 to 15 percent), and therefore presents less clean of an event. Dhaliwal, Krull, and Li (2007) find a decrease in measures of implied cost of capital following JGTRRA03.[11] All the above studies have in common that they find evidence of a positive relation between capital gains tax rates and expected returns. However, they primarily

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[9] Dai et al. (2008) also find evidence of the lock-in effect around TRA97 following the effective date of the rate cut. The lock-in effect reflects the shock to the supply side from a change in the capital gains tax rate. That is, lower tax rates should lead to a sudden surge in the supply of stocks, causing downward pressure on prices. Because the resulting negative (short-term) relation between capital gains tax rates and expected returns might act as a confounding factor, we explicitly control for this possibility in our analysis (see Appendix 2).

[10] Also using the announcement date of TRA97, Ayers, Li and Robinson (2008) find that the buy-sell order imbalance for trades increases more for small trades (their proxy for individual trades) than for large trades (their proxy for institutional trades), consistent with tax capitalization.

[11] Dhaliwal, Krull, and Li (2007) find that the decrease in expected returns is more pronounced for non-dividend-paying firms than for dividend-paying firms. Dai, Shackelford, Zhang and Chen (2013) suggest that this surprising result is due to non-dividend paying firms being highly financially constrained. Auerbach and Hassett (2007) also study the effects of JGTRRA03 on asset prices and find that non-dividend firms experienced significantly larger price increases surrounding key dates related to the act. They conclude that non-dividend firms benefit disproportionately from a dividend tax rate cut that is expected to last a sufficient amount of time because the present value of future taxable dividends is greater for these firms. We also examine TRA97 and JGTRRA03 and present results in Section 4.

focus on (short-term) average effects, and ignore macroeconomic factors or the conditioning role of firm risk. They also do not consider time-series variation in the documented relation.

Our paper explicitly accounts for cross-sectional and time-series variation in tax capitalization. Doing so, we build on prior work on the risk-sharing properties of capital gains taxes. Domar and Musgrave (1944) were the first to propose that a proportional tax with a full loss offset provision results in the government being a partner in a taxpayer's investment. Domar and Musgrave (1944) measure risk as the expected value of negative returns and conclude that a proportional tax with a full loss offset provision results in increased risk-taking by taxpayers. Tobin (1958) and Atkinson and Stiglitz (1980, Lecture 4) reach similar conclusions. All of these studies, however, focus on risk-sharing in a single-person decision problem rather than a financial market in which investors hold diversified portfolios. Guenther and Sansing (2010) suggest that via capital gains taxes, the tax authority absorbs some of the risk associated with firms' residual cash flows (i.e., the tax authority takes more of the gains but also shares in more of the losses). However, Guenther and Sansing (2010) cannot assess the interrelations between capital gains tax rates, expected returns, and a firm's systematic risk and/or the market risk premium because in their model the cash flows of the two firms comprising the economy are independent. Consistent with the prediction that via a capital gains tax the government absorbs some of the risk associated with firms' residual cash flows, Dai, Shackelford, and Zhang (2013) find that stock return volatility increased following the cuts to the capital gains tax rate enacted in the United States in 1978 and 1997.

Unlike Guenther and Sansing (2010), Sikes and Verrecchia (2012) set up their model as an economy with many firms whose cash flows covary and in which some risks are non-diversifiable. These features allow them to outline three scenarios in which the general positive relation between capital gains tax rates and expected returns will be less positive or even negative: (i) when a stock's systematic risk is high, (ii) when the market risk premium is high, or (iii) when the risk-free rate of return is low. The predictions related to firm-level risk and market risk stem from a trade-off between two opposing forces. The first force is the traditional notion that increasing the capital gains tax rate reduces expected after-tax cash flows, thus decreasing share prices and increasing expected returns. The second force is the notion that an increase in the capital gains tax rate increases the amount of the risk associated with firms' residual cash flows that the tax authority absorbs. As a result, individual investors bear less risk, leading to higher share prices and lower expected returns. While the net effect of these opposing forces on expected returns is ambiguous and ultimately an empirical question, Sikes and Verrecchia (2012) offer clear predictions when they are most likely to occur. For a firm with relatively low systematic risk or in an economy with a relatively low market risk premium, the traditional tax capitalization effect dominates the risk absorption effect, thus leading to a *positive* relation between capital gains tax rates and expected returns. However, for a firm with high systematic risk or in an economy with a high market risk premium, the risk absorption effect following a capital gains tax rate increase has a relatively larger impact on expected returns and could dominate the effect of lower expected after-tax cash flows. In other words, the relation will become *less positive* or even *negative*.

A third scenario arises when the risk-free rate of return is low. In asset pricing models such as the CAPM, a risk-free asset serves as an alternative to risky investments in firm shares. The risk-free asset becomes more attractive the higher the capital gains tax rate. However, in times of very low risk-free rates, the after-tax return on the alternate investment is small, and thus an increase in the capital gains tax rate does little to drive down prices because investors have no incentive to shift from the risky asset to the risk-free asset. In other words, investors still reap higher returns from investing in firms' shares as opposed to the risk-free asset. At the same time, the risk absorption effect is still at play. As a result, the relation between capital gains tax rates and expected returns will again become less positive or negative. In the next two sections, we empirically test the predictions related to the three scenarios.

3. Cross-Country Evidence: Analysis of International Tax Rate Panel

3.1. Sample and Data Description

We begin with a sample of 44 countries over the period 1990-2004. Appendix 1 outlines our collection of individual-level capital gains tax rates (*CGRATE*) and dividend tax rates (*DIVRATE*) for the years 1990-2004 for these countries. In our tests, we use the sample of 25 countries with positive capital gains tax rates.[13] The sample excludes countries with less than 20 individual firm observations, country-years with inflation rates above 25 percent, and firms with market value below US$ 10 million.

Following prior literature, we use two different proxies for firms' expected returns: historical buy-and-hold returns (*RET*) and the implied cost of capital (*COC*) (e.g., Hail and Leuz 2006, 2009; Dhaliwal, Li and Trezevant 2003; Dhaliwal, Krull, Li and Moser 2005; Dhaliwal, Krull, Li 2007). We calculate annual buy-and-hold returns beginning in the tenth month after a firm's fiscal year-end, and we calculate the implied cost of capital in the tenth month following a firm's fiscal year-end. We use the average of four commonly used measures of implied cost of capital (i.e., those suggested in Claus and Thomas 2001; Gebhardt, Lee, and Swaminathan 2001; Ohlson and Juettner-Nauroth 2005, as implemented in Gode and Mohanram 2003; and Easton

[13] We exclude Turkey from the sample of 25 countries due to its high inflation even though it has a 50 percent capital gains tax rate from 1990 through 1992.

2004). We use the tax rates that are effective in the calendar year that is ten months following a firm's fiscal year-end (i.e., the calendar year in which we estimate *COC* and the calendar year that is the starting point for the *RET* calculation).

We calculate a firm's systematic risk (*BETA*) using a two factor model in which we regress a firm's monthly excess return on the local market index and a world market index over the 60 months prior to the tenth month after a firm's fiscal year-end. We require at least 24 months of data for the computation of *BETA*. Our measure of systematic risk is the coefficient on the local market index.

Conceptually, the market risk premium equals the rate by which risky stocks outperform the risk-free asset. However, there is widespread disagreement on how to measure the equity risk premium and in particular on how long a period one has to consider (see, e.g., Siegel and Thaler 1997; Welch 2000; Dimson, Marsh, and Staunton 2003; Damodaran 2012; Holthausen and Zmijewski 2014). Because our empirical tests rely on time-series variation, we cannot use the long-run average of aggregate stock returns minus risk-free rates in the analyses. Rather, we use the country-year median of firms' systematic risk (*MKTBETA*). In Appendix 2, we repeat the analyses using different proxies for the market risk premium, including country-year median implied cost of capital and the standard deviation of market returns. The results are very similar and none of the inferences change.

The risk-free rate (*RFR*) equals the country-year median of monthly values, which we collect from Datastream and the World Bank (i.e., the nominal local yields on short-term treasury bills, central bank papers, or interbank loans).[14] Similar to the tax rates, we use the *MKTBETA* and *RFR* from the calendar year that is ten months after a firm's fiscal year-end.

[14] In Appendix 2, we confirm that the results for our cross-country tests reported in the paper are robust to using real, as opposed to nominal, rates.

The first two columns of Table 1 present the mean *RET* and mean *COC* for each of the 25 countries in our final sample over the 1990-2004 sample period, along with the number of observations from each country for each of these variables. In columns (3) and (4), we present the mean *MKTBETA* and mean *RFR* for each of the 25 countries over the sample period.

In the last five columns in Table 1, we provide data on the partitioning variables that we use to identify countries where we expect for the general positive relation between capital gains tax rates and expected returns as well as the moderating effects of high systematic risk, a high market risk premium, or a low risk-free rate to be strongest. In column (5), we present an indicator variable that denotes whether a country experienced a yearly increase or decrease of at least five percentage points in its capital gains tax rate over the sample period (*ΔCGRATE*). Fifteen of the 25 countries in our final sample experienced such a change. Next we present a measure of the level of tax morale in a country. Following Djankov, Ganser, McLiesh, Ramalho, and Shleifer (2010), we use tax evasion scores from the World Economic Forum (Global Competitiveness Report 2001/2002), where higher values are associated with lower evasion (*TAXEVA*). Values of *TAXEVA* that are above the sample median are italicized and bolded. In column (7), we present each country's time-series mean of foreign direct investment collected from the World Bank (*FDI*). In columns (8) and (9), we present each country's median firm-level total institutional ownership as a percentage of market capitalization (*INSTOWN*) and median firm-level foreign institutional ownership as a percentage of market capitalization (*FINSTOWN*), both collected from Factset (source: Ferreira and Matos 2008). Values of *FDI*, *INSTOWN*, and *FINSTOWN* in columns (7), (8), and (9), respectively, below the sample median are italicized and bolded. We expect for the results to be stronger for countries where a greater proportion of investors are local individual investors who are subject to the capital gains tax rate.

Thus, we expect for the results to be stronger for countries with low *FDI* and low *FINSTOWN*. Moreover, because some institutional investors are tax-exempt (e.g., pensions and endowments in the United States) or are taxed at different rates than individual investors, we also expect for the results to be stronger for countries with low *INSTOWN*.

3.2. Average Relation between Capital Gains Taxes and Expected Returns

We first test the basic relation between expected returns and capital gains tax rates to confirm that the general positive relation documented in prior studies holds in our sample. We estimate the following Ordinary Least Squares (OLS) regression model:

$$RET \text{ or } COC = \beta_0 + \beta_1\, CGRATE + \beta_2\, DIVPEN + \sum \beta_j\, Controls_j + \sum \beta_i\, Fixed\ Effects_i + \varepsilon. \quad (1)$$

We first regress *RET* or *COC* on *CGRATE* or *DIVRATE*, firm-level controls, and country, Campbell (1996) industry, and year fixed effects. Then we estimate the model above where we include *CGRATE*, the dividend tax penalty (*DIVPEN*), which equals (*DIVRATE – CGRATE*)/(1 – *CGRATE*) (Dhaliwal, Li and Trezevant 2003; Dhaliwal, Krull, Li and Moser 2005; Dhaliwal et al. 2007), firm-level controls, and country, Campbell (1996) industry, and year fixed effects. Consistent with capital gains and dividend tax capitalization, we expect positive coefficients on *CGRATE*, *DIVRATE* and *DIVPEN*. The firm-level controls include *BETA*, the natural log of a firm's market capitalization (*SIZE*), and the ratio of a firm's accounting book value of equity to its market value of equity (*BMR*). According to Fama and French (1992, 1993), returns are positively related to *BETA* and *BMR* and negatively related to *SIZE*. In addition to controlling for risk, *BMR* also captures differences in growth opportunities (LaPorta et al. 2002) as well as differences in accounting rules (Joos and Lang 1994). In the regressions where *COC* is the dependent variable, we also control for earnings variability (*EARNVAR*), which equals the standard deviation of a firm's annual earnings per share over the last five years scaled by total assets per share, and forecast bias (*BIAS*), which equals one-year-ahead analyst forecast error scaled by forecast-period stock price. We include earnings variability to control for cross-country differences in macroeconomic variability and we expect a positive relation between it and expected returns. We control for forecast bias because if forecasts are overly optimistic and market participants understand this bias and adjust prices accordingly, estimates generated from implied cost of capital models will be upwardly biased (Botosan and Plumlee 2005). Except for the tax variables, *RFR*, and *MKTBETA*, we truncate all variables at the 1st and 99th percentiles. We cluster the standard errors by firm.

Panel A of Table 2 presents descriptive statistics for the variables used in our analysis. We have 151,369 observations in the *RET* sample and 49,449 observations in the *COC* sample. With the exception of *COC*, *EARNVAR*, and *BIAS*, we calculate the descriptive statistics using our *RET* sample. The statistics are similar for the *COC* sample with the exception that the firms in the *COC* sample are larger and have lower *BTM* ratios, as is expected since analyst forecast data is required to calculate the *COC* measures.

Panel B of Table 2 presents Spearman (Pearson) correlations above (below) the diagonal. Consistent with the general prediction of a positive association between the capital gains tax rate and expected returns (Scholes et al. 2009), *CGRATE* is positively correlated with *COC*. Inconsistent with this prediction, it is negatively correlated with *RET*; however, we show in Table 3 that this is completely driven by Japan, which consistently has a low risk-free rate. Consistent with prior literature (Fama and French 1992, 1993), *RET* is negatively correlated with *SIZE* and positively correlated with *BMR*. However, inconsistent with prior literature, *RET* is negatively correlated with *BETA* and *MKTBETA*. As expected and consistent with prior literature, *COC* is positively correlated with *RFR*, *BETA*, *MKTBETA*, *BMR*, *EARNVAR*, and *BIAS*, and negatively correlated with *SIZE* (Fama and French 1992, 1993; Hail and Leuz 2006, 2009).

Table 3 presents the results of estimating equation (1). The first four columns present the results using *RET* as the dependent variable. Inconsistent with the general positive relation between capital gains and dividend tax rates and expected returns, the coefficients on *CGRATE*, *DIVRATE* and *DIVPEN* are negative and significant in the first three columns. We suspect that a large country with a low risk-free rate could be responsible for the result. Thus in column (4) we exclude Japan and the coefficients on *CGRATE* and *DIVPEN* are positive and significant as expected.[15] Consistent with prior literature, the coefficients on *BETA* and *BMR* are positive and significant in columns (1)-(4).

The last four columns of Table 3 present the results using *COC* as the dependent variable. The coefficients on *CGRATE*, *DIVRATE*, and *DIVPEN* are positive and significant. Consistent with prior literature, the coefficients on *BETA*, *BMR*, *EARNVAR*, and *BIAS* are positive and significant and the coefficient on *SIZE* is negative and significant in all four columns.

3.3. Mitigating Role of Firm Risk, Market Risk, and Risk-Free Rates

We now turn to testing our three predictions. We estimate the following OLS regression model:

$$RET \text{ or } COC = \beta_0 + \beta_1\, CGRATE + \beta_2\, CGRATE{*}RISK + \beta_3\, RISK + \beta_4\, DIVPEN + \sum \beta_j\, Controls_j + \sum \beta_i\, Fixed\ Effects_i + \varepsilon. \quad (2)$$

[15] In robustness tests (not tabulated), we estimate the regression excluding each of the other 24 countries in our sample one at a time. No country other than Japan results in the coefficient on *CGRATE* becoming positive after the respective country is excluded.

The variable *RISK* in equation (2) represents one of three different indicator variables ($BETA_{HIGH}$, $MKTBETA_{HIGH}$, RFR_{LOW}) that are based on the risk-related moderating variables. The indicator variable $BETA_{HIGH}$ equals one for firms whose systematic risk is above the yearly median for the 25 countries with positive capital gains tax rates, and equals zero otherwise. The indicator variable $MKTBETA_{HIGH}$ captures whether a country has a high annual market risk premium. $MKTBETA_{HIGH}$ equals one if a country's annual *MKTBETA* is above the sample-period median and equals zero otherwise. RFR_{LOW} equals one if a country's annual *RFR* is below the 30th percentile of the sample-period distribution, and equals zero otherwise. Although we use a 30th percentile cutoff, because of the variation in the number of firms within a country, this cutoff results in nearly half of our observations being in the low risk-free rate group and the other half being in the high risk-free rate group.[16] We interact each of these indicator variables with *CGRATE* to test whether the relation between the capital gains tax rate and expected returns is less positive (or even negative) when a firm's systematic risk is high, the market risk premium is high, or the risk-free rate is low. In line with Guenther and Sansing (2010), we demean the continuous *CGRATE* variable (using the sample mean) when computing the interaction term.[17] The control variables are *DIVPEN* and the same firm-level controls as in equation (1). We also include country, industry, and year fixed effects in the regressions, and we cluster the standard errors by firm. The coefficient β_1 captures the effect of the capital gains tax rate on expected returns for the "benchmark" firms. When *RISK* equals $BETA_{HIGH}$, $MKTBETA_{HIGH}$, or RFR_{LOW}, β_1 represents the effect of the capital gains tax rate on expected returns for low systematic risk firms, firms in low market risk premium countries, or firms in countries with high risk-free rates, respectively. When all three are included, β_1 represents the effect of the capital gains tax rate on

[16] The exact percentage varies between 45 and 51 percent depending on the specification.
[17] We do this for all regressions presented in the paper that include an interaction term.

expected returns for low systematic risk firms that are in countries with low market risk premiums and high risk-free rates. Consistent with the general positive relation between capital gains tax rates and expected returns, we expect for β_1 to be positive. When *RISK* equals $BETA_{HIGH}$, $MKTBETA_{HIGH}$, or RFR_{LOW}, β_2 represents the difference in the effect of the capital gains tax rate on expected returns between low and high systematic risk firms, between firms in countries with low as opposed to high market risk premiums, or between firms in countries with high as opposed to low risk-free rates, respectively. Consistent with the prediction that the relation between capital gains tax rates and expected returns is less positive or even negative when systematic risk is high, the market risk premium is high, or the risk-free rate is low, we expect for β_2 to be negative. The sum of β_1 and β_2 represents the effect of the capital gains tax rate on expected returns for either high systematic risk firms, firms in countries with high market risk premiums, or firms in countries with low risk-free rates.

Table 4 presents the results. In columns (1), (2), and (3), we individually test the predictions related to high systematic risk, high market risk premiums, and low risk-free rates, respectively. We combine the three predictions in column (4). In the first set of four columns, *RET* is the dependent variable. The results across all four columns are consistent with the predictions in Sikes and Verrecchia (2012). In columns (1)-(3), the relation between *RET* and *CGRATE* is negative and significant for the benchmark firms. However, the relation is significantly more negative for high systematic risk firms, and in countries with high market risk premiums or low risk-free rates. When we combine the tests of the three predictions together in column (4), the results are the same with the exception that the coefficient on *CGRATE* is positive but insignificant. Moreover, high systematic risk and high market risk premiums not only attenuate the positive relation, they cause it to be negative and significant.

The second set of columns in Table 4 presents the results with *COC* as the dependent variable. We do not find support for the prediction related to high systematic risk in column (1); rather, we find that the relation between *COC* and *CGRATE* is positive and significant for both high and low systematic risk firms and the difference between the two groups is insignificant. Consistent with the prediction related to high market risk premiums, column (2) shows that the relation between *COC* and *CGRATE* is positive and significant in countries with low market risk premiums and negative and significant in countries with high market risk premiums. Moreover, consistent with the prediction related to low risk-free rates, column (3) shows that the relation between *COC* and *CGRATE* is positive and significant for countries with high risk-free rates and significantly less positive in countries with low risk-free rates. We combine the predictions together in column (4). The relation between *COC* and *CGRATE* is positive and significant for the benchmark firms. In support of the predictions, we find that the relation is significantly less positive in countries with high market risk premiums or low risk-free rates.

The results for the control variables are consistent across the eight columns and consistent with prior literature, with the exception that the coefficient on *DIVPEN* is negative and significant and the coefficient on *SIZE* is insignificant when *RET* is the dependent variable.

Overall, with the exception of the *COC* results for the prediction related to high systematic risk, the results in Table 4 support the prediction in Sikes and Verrecchia (2012) that the relation between capital gains tax rates and expected returns is significantly less positive, and in some cases negative, for firms with high systematic risk and in countries with high market risk premiums or low risk-free rates.[19]

In interpreting the economic magnitude of the results, we focus on the results in column (4). When *RET* (*COC*) is the dependent variable, the coefficient on *CGRATE* suggests that a one

[19] In Appendix 2, we conduct a number of robustness tests of Models 1-3 in Table 4.

percentage point increase in the capital gains tax rate leads to a 0.06 (0.06) percentage point increase in *RET* (*COC*) for the benchmark firms. This represents a 0.48 (0.56) percent change for the average firm. For firms with high systematic risk, a one percentage point increase in the capital gains tax rate results in a 0.11 (0.07) percentage point *decrease* in *RET* (increase in *COC*), which is a 0.85 (0.61) percent change for the mean firm. For firms in countries with a high market risk premium, a one percentage point increase in the capital gains tax rate results in a 0.40 (0.01) percentage point *decrease* in *RET* (increase in *COC*), which is a 3.0 (0.06) percent change for the average firm. For firms in countries with low risk-free rates, a one percentage point increase in *CGRATE* results in a 0.05 (0.02) percentage point *decrease* in *RET* (increase in *COC*), which is a 0.38 (0.20) percent change for the average firm. These are lower bound estimates of the effect of the capital gains tax rate and of the three risk-related moderating effects on expected returns because the average change in the capital gains tax rate exceeded one percentage point. The capital gains tax rate increased in 20 country-years of our sample with an average increase of 8.4 percentage points, and decreased in 27 country-years of our sample with an average decrease of 8.6 percentage points.

3.4. Partitioning on Tax Rate Changes, Tax Evasion, and Investor Base of Countries

In Table 5, we conduct cross-sectional tests based on the variables in Table 1 that identify when capital gains taxes should have a greater impact on expected returns. In these subsets of our base sample, we expect that the general positive relation between capital gains tax rates and expected returns as well as the risk-related moderating effects to be stronger. Panels A and B present the results with *RET* and *COC* as the dependent variable, respectively. We first discuss the results using *RET* as the dependent variable.

In column (1), we restrict the sample to the 15 countries in Table 1 that experienced a substantive change in their capital gains tax rates at some point over the sample period. As expected, the coefficient estimates on *CGRATE* and the interactions are larger using this sample of firms. The relation between *CGRATE* and *RET* is positive and significant for the benchmark firms, and significantly less positive for firms with high systematic risk, and in countries with high market risk premiums or low risk-free rates. In fact, an un-tabulated F-test shows that the relation is actually negative and significant in countries with high market risk premiums. We also estimate the regression using the observations from the ten countries that did not experience a substantive change in their capital gains tax rates (not tabulated) and conduct tests of differences between the coefficients across the two partitions. As expected, the main effect of *CGRATE* is significantly more positive and the coefficients on the interactions are significantly more negative in countries that experience a substantive change in their *CGRATE*.

In column (2), we present the results for the 13 countries in Table 1 considered to have low tax evasion (*TAXEVA*). Among these countries, we find a negative but insignificant relation between *RET* and *CGRATE* for the benchmark firms. Consistent with our predictions, the coefficients on each of the interactions is negative and significant. Moreover, un-tabulated F-tests show that the relation between *CGRATE* and *RET* is negative and significant for high systematic risk firms, and in countries with either high market risk premiums or low risk-free rates. We also estimate the regression over the 12 countries considered to have high *TAXEVA* (not tabulated) and present the p-values from the tests of differences between the coefficients across the two partitions. As expected, the p-values show that the coefficient on *CGRATE* is significantly more positive and the coefficients on the interactions are significantly more negative for the low *TAXEVA* countries.

Because the after-tax CAPM shows that the extent to which investor-level taxes are priced depends on the weighted average tax rate of all investors in an economy (Brennan 1970; Gordon and Bradford 1980; Guenther and Sansing 2010, and Sikes and Verrecchia 2012) we expect for the results to be stronger in countries where a greater proportion of investors in the country are subject to the individual-level capital gains tax rate. We test whether this is the case in the last three columns of Panel A. Ideally we would like know the average ownership percentage of local individual investors within each country. However, such data is unavailable. Thus, we use three different proxies for relatively high ownership by local individual investors. Our first proxy is low foreign direct investment (*FDI*). Column (3) presents the results of testing our three predictions over the 12 countries with low *FDI* in Table 1. We find a positive and significant relation between capital gains tax rates and expected returns for the benchmark firms. The coefficients on the interaction terms show that the relation is significantly less positive for high systematic risk firms, in countries with high market risk premiums, and in countries with low risk-free rates. Moreover, consistent with the results in the first two columns, not only is the relation significantly less positive in countries with high market risk premiums, an un-tabulated F-test shows that it is negative and significant. We also estimate the regression for the 13 countries with high *FDI* in Table 1 (not tabulated) and test for the differences between the coefficients across the two partitions. As expected, the coefficient on *CGRATE* is significantly more positive and the coefficients on the interactions are significantly more negative for the low *FDI* countries.

The next ownership group that we consider is institutional investors. In the United States, pensions and endowments are exempt from taxation. Moreover, there is heterogeneity with respect to tax-sensitivity within the other institutional legal types (banks, insurance companies, investment advisers, and investment companies) in the United States (e.g., Sikes 2014; Blouin, Bushee, and Sikes 2013). Blouin et al. (2013) estimate that only 44.7 percent of 13F institutional investors in the United States over the period 1987-2010 are sensitive to individual-level capital gains taxes; however, due to their smaller portfolio sizes, tax-sensitive institutions only account for 11.2 percent of the total equity managed by 13F institutions.[20] If the tax treatment of institutional investors in other countries is similar to that in the United States (i.e., the majority of institutional investors are not subject to individual-level capital gains tax rates), then we expect for the general positive relation between capital gains tax rates and expected returns as well as the moderating effects of our three variables to be stronger in countries in which there is lower institutional ownership. In column (4), we test our three predictions using the sample of 13 countries with low total institutional ownership (*INSTOWN*) in Table 1. The coefficient on *CGRATE* is negative and significant, which is inconsistent with the general positive relation. However, consistent with two of the predictions, the relation is significantly more negative for high systematic risk firms and in countries with low risk-free rates. We also estimate the regression using the 12 countries with high *INSTOWN* (not tabulated). The p-values from the tests of differences between the coefficients show that the coefficient on *CGRATE* is significantly more positive for the high *INSTOWN* countries, which is inconsistent with our expectation. However, consistent with our expectation, the coefficients on each of the three interactions are significantly more negative for the countries with low *INSTOWN*.

[20] A 13F institution refers to an institution that files Form 13F with the Securities and Exchange Commission (SEC). In the United States, all institutional investment managers who exercise investment discretion of $100 million or more in Section 13(f) securities must file with the SEC. Institutional investment managers file Form 13F on a quarterly basis and must report holdings of more than 10,000 shares or holdings valued in excess of $200,000.

In column (5), we present the results using the sample of 13 countries with low foreign institutional ownership (*FINSTOWN*) in Table 1. Consistent with our expectations, the coefficient on *CGRATE* is positive and significant, and the coefficient on each of the interactions is negative and significant. Un-tabulated F-tests show that the relation is negative and significant for firms in countries with high systematic risk or low risk-free rates. We also estimate the regression for the 12 countries with high *FINSTOWN* (not tabulated). The p-values reported in column (5) from tests of differences between the coefficients on *CGRATE* and on the interactions show that the coefficient on *CGRATE* is significantly more positive and the coefficient on $CGRATE*MKTBETA_{HIGH}$ is significantly more negative for the countries with low *FINSTOWN*, consistent with our expectations. There is no difference between the two partitions with respect to the predictions related to high systematic risk or low risk-free rates.

In Panel B we present the results using *COC* as the dependent variable. In all five columns, the coefficient on *CGRATE* is positive and significant, consistent with the general positive relation. Consistent with our predictions related to high market premiums and low risk-free rates, the coefficients on the interactions $CGRATE*MKTBETA_{HIGH}$ and $CGRATE*RFR_{LOW}$ are negative and significant in all columns, with the exception of column (4) where the coefficient on $CGRATE*MKTBETA_{HIGH}$ is negative but insignificant. Moreover, not only is the relation between *CGRATE* and *COC* significantly less positive, an un-tabulated F-test shows that it is negative and significant in countries with low evasion and a high market risk premium. However, we do not find support for our prediction related to high systematic risk when *COC* is the dependent variable.

As we did with *RET* as the dependent variable, we also estimate the regression for countries without substantive changes in their capital gains tax rates, and for countries with high

TAXEVA, high *FDI*, high *INSTOWN*, or high *FINSTOWN* (not tabulated). In Panel B, we report the p-values from the tests of differences between the coefficients on the main effect of *CGRATE* and on interactions across the two partitions. As expected, we find that the coefficient on *CGRATE* is significantly more positive in cases where we expect for capital gains taxes to have a greater effect on expected returns when we partition the sample on substantive capital gains tax rate changes, *FDI*, or *FINSTOWN*. We also find that the coefficient on the interaction $CGRATE*MKTBETA_{HIGH}$ is significantly more negative in all cases where we expect for capital gains taxes to have a greater effect on expected returns, with the exception of the partition based on *INSTOWN*. The differences between the groups are not as great for the tests related to high systematic risk or low risk-free rates. The only case where we find that the results for the predictions related to high systematic risk and low risk-free rates are stronger where we expect for capital gains taxes to have a greater impact on expected returns is for the partition based on *INSTOWN*.

3.5. Analysis Around Substantive Changes in Firm Risk, Market Risk, and Risk-Free Rates

In order to better identify the predicted effects, we next center our analysis around substantive changes in either a firm's systematic risk, a country's market risk premium, or a country's risk-free rate. We define a substantive increase (decrease) in *BETA* as a change in a firm's *BETA* from below (above) the sample median in one year to above (below) the sample median in the following year. We classify a substantive increase (decrease) in *MKTBETA* or *RFR* as one where a country experiences a year-on-year change in its *MKTBETA* or its *RFR* that is above (below) the 85^{th} (15^{th}) percentile of such year-on-year changes across the sample period. For both the *RET* and *COC* samples, the mean substantive increase (decrease) in *MKTBETA* is 27 (-24) percent and the mean substantive increase (decrease) in *RFR* is 30 (-42) percent. We examine the four years on either side of a substantive change. We classify the four years prior to the change as pre-change years and the four years following (beginning with the change year) as post-change years. We allow for multiple changes as long as each change has one pre-change year and one post-change year prior to overlapping with the year of the other change. We include *DIVPEN* and the same firm-level controls that are included in Table 4 in all estimations, but suppress them in the table.

We present the results for substantive changes in *BETA* in Panel A of Table 6. For this test, $BETA_{HIGH}$ equals one in the period surrounding the substantive change when the firm's systematic risk is above the median and zero for the period when it is below the median. Firm variation allows for the inclusion of country-year fixed effects. Thus, we include country-year and industry fixed effects, and cluster the standard errors by firm.[21] We present the results for substantive increases and for substantive decreases separately. The first (second) set of two columns presents the results using *RET* (*COC*) as the dependent variable. With the exception of the test of substantive increases in systematic risk when *COC* is the dependent variable, we find that the relation between *CGRATE* and either *RET* or *COC* is significantly less positive in the years when a firm's *BETA* is above the median, consistent with our expectation.

Panels B and C presents the results for the predictions related to the market risk premium and risk-free rate, respectively. In addition to *DIVPEN* and the firm-level controls, we include *MKTBETA* or *RFR*, and country, industry, and year fixed effects in all estimations but suppress them in the table, and we cluster the standard errors by firm. In all four columns of Panel B, we

[21] When we include country-year fixed effects, the variables *CGRATE* and *DIVPEN* are still specified because the country-year fixed effects are based on calendar years but *CGRATE* and *DIVPEN* are based on fiscal years. Because we do not know the effective date of the capital gains tax rate changes in countries other than the United States, we assign the tax rates on a fiscal year-end basis to be consistent with how we define our other variables. As we explain in Section 3.1, we use the tax rates that are effective in the calendar year that is ten months following a firm's fiscal year-end (i.e., the calendar year in which we estimate *COC* and the calendar year that is the starting point for the *RET* calculation).

find that the relation between *CGRATE* and either *RET* or *COC* is significantly less positive in the years when *MKTBETA* is higher, consistent with our expectation. In Panel C, consistent with our expectation, with the exception of the test of substantive increases when *RET* is the dependent variable, the results show that the relation between *CGRATE* and either *RET* or *COC* is significantly less positive in the years when the *RFR* is lower.

4. Single-Country Evidence: Changes in Capital Gains Tax Rates in the United States

4.1. Sample and Data Description

In this section, we test the predictions in Sikes and Verrecchia (2012) around three different changes to the capital gains tax rate in the United States. The Revenue Reconciliation Act of 1978 (RA78) reduced the maximum statutory tax rate on capital gains from 35 to 28 percent. The Taxpayer Relief Act of 1997 (TRA97) reduced the maximum statutory tax rate on capital gains from 28 to 20 percent. The Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA03) reduced the maximum statutory tax rate on capital gains from 20 to 15 percent. The market risk premium and risk-free rate varied across these three periods.[22] We focus our analysis on the 48 month periods surrounding each of these tax rate changes. For RA78 and JGTRRA03, we center the 48 month period around each act's enactment month (November 1978 and May 2003). For TRA97, rather than use the enactment month (August 1997), we use May 1997 to be consistent with prior studies that test for a tax capitalization effect

[22] We also considered two other capital gains tax rate changes. The Economic Recovery Tax Act of 1981 (ERTA81) reduced the rate from 28 to 20 percent, and the Tax Reform Act of 1987 (TRA86) increased the rate from 20 to 28 percent. We decided to exclude these two changes from our main analysis because both acts were massive overhauls of the tax code, thus potentially making it difficult to identify the specific effects attributable to the capital gains tax rate changes. Moreover, these tax rate changes were phased in over several years. We conduct tests using these two rate changes and the results are consistent with our expectations (not tabulated).

in the week surrounding the announcement of the 1997 capital gains tax rate cut (Lang and Shackelford 2000; Ayers et al. 2008; Dai et al. 2008; Blouin et al. 2009).[23]

Panel A of Table 7 reports the mean *MKTBETA* and mean *RFR* for each of the 48 month periods. *MKTBETA* equals the monthly median of firms' systematic risk (*BETA*). We estimate *BETA* by regressing a firm's monthly excess return (raw return minus one-month Treasury bill rate) on the local value-weighted market index over the prior 60 months. We require a firm to have at least 24 observations in the calculation of *BETA*. *BETA* equals the coefficient on the local value-weighted market index. The mean *MKTBETA* was 1.19, 0.88, and 0.73 surrounding RA78, TRA97, and JGTRRA03, respectively. We also consider two other proxies for market risk premium. The first is the implied equity risk premium from Appendix 5 in Damodaran (2012).[24] The implied equity risk premium equals 5.7 percent, 2.7 percent, and 3.7 percent surrounding RA78, TRA97, and JGTRRA03, respectively. The second is the standard deviation of the return on the local value-weighted market index over each of the three 48 month periods. The standard deviation of the return on the value-weighted market index equals 0.05, 0.04, and 0.04 surrounding RA78, TRA97, and JGTRRA03, respectively. In summary, *MKTBETA*, the implied risk premium from Damodaran (2012), and return variability tell a consistent story that the market risk premium was highest surrounding RA78. *RFR* equals the monthly median of one-month Treasury bill nominal rates. The mean annualized *RFR* was 8.3 percent, 5.1 percent, and 1.7 percent in the 48 months surrounding RA78, TRA97, and JGTRRA03, respectively.

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[23] In un-tabulated robustness tests, we confirm that the results reported in the paper are similar if we center the 48 month period for TRA97 around August 1997 instead of May 1997.

[24] We use the implied premium at the end of 1978 for RA78, and the implied premiums at the end of 1996 and 2002, respectively, for TRA97 and JGTRRA03. The implied premiums are almost identical if we instead use a weighted average implied premium (e.g., weight the 1977 implied premium by 1/12 and the implied premium at the end of 1978 by 11/12 in calculating the implied premium around RA78, and similarly weight the 1996 and 2002 implied premiums by 7/12 and the implied premiums in 1997 and 2003 by 5/12 in calculating the implied premiums surrounding TRA97 and JGTRRA03, respectively).

We consider the period surrounding RA78 to be one of a high market risk premium and a high risk-free rate, whereas the period surrounding TRA97 is one of a medium market risk premium and medium risk-free rate. Finally, we consider the period surrounding JGTRRA03 to be one of a medium market risk premium and a low risk-free rate.[25] To test the predictions related to high market risk premiums and low risk-free rates, we estimate the following OLS regression model:

$$RET = \beta_0 + \beta_1\ CGRATE + \beta_2\ CGRATE{*}Earlier\ Event + \beta_3\ Earlier\ Event$$
$$+ \sum \beta_j\ Controls_j + \sum \beta_i\ Industry\ Fixed\ Effects_i + \varepsilon. \quad (3)$$

We regress monthly buy-and-hold returns (*RET*) on the *CGRATE* effective in the particular month, an indicator variable (*Earlier Event*) that equals one for the earlier event (i.e., RA78 when comparing RA78 to either TRA97 or JGTRRA03, and TRA97 when comparing TRA97 to JGTRRA03) and zero otherwise, an interaction of *CGRATE* and *Earlier Event*, *BETA*, *SIZE*, *BMR*, and industry fixed effects. We compare the effect of *CGRATE* on *RET* in the 48 months surrounding each of the changes. The coefficient β_1 captures the effect of *CGRATE* on *RET* in the later period under comparison, whereas β_2 captures the difference in the effect of *CGRATE* on *RET* between the two different periods. The sum of β_1 and β_2 captures the effect of *CGRATE* on *RET* in the earlier period under comparison. When comparing RA78 and JGTRRA03 to TRA97, we expect for the relation between *CGRATE* and *RET* to be significantly less positive around RA78 and JGTRRA03 because these periods are characterized by a high *MKTBETA* and low *RFR*, respectively, whereas TRA97 is characterized by a medium *MKTBETA*

[25] If we were to use real as opposed to nominal interest rates, the relative ranking across the three periods changes. The real risk-free rate was highest in the 48-month period surrounding the TRA97 and lowest in the 48-month period surrounding the RA78. Based on these rankings, our prediction that the relation between the *CGRATE* and *RET* would be more negative around RA78 than around TRA97 would remain the same. There would no longer be tension with respect to whether the relation is more negative around RA78 or JGTRRA03 because RA78 has the highest *MKTBETA* and the lowest real interest rate.

and medium *RFR*. When comparing RA78 to JGTRRA03, it is an empirical question whether the high *MKTBETA* or low *RFR* effect will dominate. We only use *RET* as a proxy for expected returns in these tests because we do not have analyst forecast data, which is necessary to calculate *COC*, for the 1978 period. *RFR* and *CGRATE* are measured the same month as *RET*. *BETA* is measured using data from the 60 months prior to this month. *SIZE* and *BMR* are defined as in the cross-country analysis and are measured as of the quarter ending immediately prior to the monthly observation. In order to be in the sample, a firm has to have at least one monthly observation in each of the 24 month periods preceding and following each of November 1978, May 1997, and May 2003. We exclude November 1978, May 1997, and May 2003. We cluster the standard errors by firm and year. Except for the tax rates, *MKTBETA*, *RFR*, and the *Earlier Event* indicator, we truncate all variables at the 1^{st} and 99^{th} percentiles. Panel B of Table 7 provides the descriptive statistics.

4.2. Comparison of Tax Rate Relation Across the Three Tax Rate Events

Table 8 presents the results of the estimation of equation (3) for the different comparisons. Columns (1) and (2) present the results comparing RA78 to TRA97, without and with controls for *MKTBETA* and *RFR*, respectively. The results are consistent with our predictions in both columns. We find that the relation between *CGRATE* and *RET* is positive but insignificant surrounding the enactment of TRA97 and negative and significant surrounding the enactment of RA78. We also find that the difference in the effect of *CGRATE* on *RET* across the two periods is statistically significant. These results are consistent with the prediction related to high market risk premiums, and corroborate the results for high *MKTBETA* in Tables 4-6 using the cross-country analyses.

Columns (3) and (4) present the results of the comparison of the effect of *CGRATE* on *RET* surrounding RA78 as opposed to surrounding JGTRRA03. Consistent with the prediction of a low risk-free rate attenuating the general positive relation between the capital gains tax rate and expected returns, the coefficient on *CGRATE* is negative and significant in column (3) where we do not control for *MKTBETA* and *RFR*, and negative but not quite significant in column (4) where we control for *MKTBETA* and *RFR*.[26] We find that the relation between *CGRATE* and *RET* surrounding RA78 is negative and significant in both columns, consistent with the results in columns (1) and (2). When we control for *MKTBETA* and *RFR* in column (4), we find that the relation between *CGRATE* and *RET* was significantly more negative surrounding RA78 than JGTRRA03, consistent with the high *MKTBETA* effect dominating the low *RFR* effect.

In columns (5) and (6), we examine the effect of *CGRATE* on *RET* surrounding TRA97 as opposed to surrounding JGTRRA03, without and with controls for *MKTBETA* and *RFR*, respectively. Consistent with the results in columns (1) and (2), the relation between *CGRATE* and *RET* is insignificant surrounding TRA97. Consistent with the results in columns (3) and (4), the relation between *CGRATE* and *RET* surrounding JGTRRA03 is negative and significant when we do not control for *MKTBETA* and *RFR* and negative but not quite significant when we control for *MKTBETA* and *RFR*. We also find the relation between *CGRATE* and *RET* is

[26] The results in Dhaliwal et al. (2007) and Auerbach and Hassett (2007) suggest a positive relation between the capital gains tax rate and expected returns around JGTRRA03. There are several differences between our research designs that could explain the difference in conclusions. Auerbach and Hassett (2007) is an event study that examines investors' reactions to key dates related to the legislation. Key differences between our research design and that in Dhaliwal et al. (2007) are that Dhaliwal et al. (2007) use a measure of implied cost of capital as opposed to realized returns as their dependent variable, examine three as opposed to four years surrounding JGTRRA03, and use a regime dummy variable as opposed to the continuous capital gains tax rate. Another difference is that we require for firms to have at least one monthly observation in each of the 24 month periods surrounding RA78, TRA97, and JGTRRA03. When we drop this requirement and replace *CGRATE* with a regime dummy variable, we do not find a significant difference in *RET* from before to after JGTRRA03.

significantly more negative surrounding JGTRRA03 than surrounding TRA97, which is consistent with the low *RFR* surrounding JGTRRA03 attenuating the general positive relation.[27]

To assess the economic magnitude of the results, we analyze the effect of a one percentage point decrease in *CGRATE* on *RET* across each of the three periods. In column (2), the sum of the coefficients on *CGRATE* and the interaction *CGRATE*Earlier Event* provides the effect of a change in *CGRATE* on *RET* in the 48 months surrounding RA78. A one percentage point decrease in *CGRATE* in the period surrounding RA78 would have resulted in a 0.80 percentage point *increase* in *RET*, which is a 53 percent change for the average firm. The coefficient on *CGRATE* in column (2) provides the effect of *CGRATE* on *RET* in the 48 month period surrounding TRA97. A one percentage point decrease in *CGRATE* surrounding TRA97 would have resulted in a 0.10 percentage point decrease in *RET*, which is a 6.8 percent change for the average firm. Finally, the coefficient on *CGRATE* in column (4) provides the effect of *CGRATE* on *RET* in the period surrounding JGTRRA03. The results suggest that a one percentage point decrease in *CGRATE* would have resulted in a 0.23 percentage point *increase* in *RET*, which is a 15.6 percent change for the average firm. We note, however, that these economic magnitudes are lower bound estimates of the effects because rather than decreasing the capital gains tax rate by one percentage point, the three tax acts decreased the capital gains tax rate on average by six percentage points.[28]

[27] Our predictions relate to tax capitalization, which is a demand-side effect, and not to the "lock-in effect," which is a supply-side effect. To ensure that our results are not confounded by shareholders "unlocking" their gains, we exclude the three months immediately following each of the enactment months from the tests discussed above (not tabulated). To the extent that taxable investors "unlocked" their gains following the three tax rate reductions, we expect that they did so shortly after the rate changes became effective. Our results continue to hold and even get slightly stronger, suggesting that the lock-in effect does not unduly affect our results.

[28] In untabulated tests, we compare the 48 month periods surrounding RA78, TRA97, and JGTRRA03 to the 48 month periods surrounding the enactment month of ERTA81 (August 1981) and the enactment month of TRA86 (October 1986). In the period surrounding ERTA81 and TRA86, the mean *MKTBETA* was 1.17 and 1.03, respectively, and the mean annualized one-month Treasury bill rate was 11.4 percent and 6.6 percent, respectively. Consistent with our expectations, we find that the relation between expected returns and capital

5. Conclusion

In this study, we examine how firm and market risk affects the relation between investor-level capital gains tax rates and asset prices using panel data from 25 countries with positive capital gains tax rates over the 1990 to 2004 period. Specifically, we test and find evidence supportive of the predictions in Sikes and Verrecchia (2012) that the general positive relation between capital gains tax rates and expected returns is attenuated when (i) a firm's systematic risk is high, (ii) the market risk premium is high, or (iii) the risk-free interest rate is low. We provide large sample evidence of cross-sectional and time-series variation in tax capitalization, which is relevant to policy makers, firms, and investors.

We first document the on average positive relation between capital gains tax rates and expected returns in our overall sample. Next, we find that the general positive relation is attenuated and in some instances even reversed for firms with high systematic risk and in countries and periods with high risk premiums or low risk-free rates. These effects are particularly pronounced in countries that experience changes to their capital gains tax rate, in countries with low tax evasion, in countries with higher ownership by local investors who are subject to a country's capital gains tax rate (i.e., countries with low foreign direct investment, low total institutional ownership, or low foreign institutional ownership), and surrounding substantive changes in a firm's systematic risk or in a country's market risk premium or risk-free rate. Finally, we corroborate the results from the cross-country analyses in a single country setting, namely around three regulatory changes to the capital gains tax rate in the United States (RA78, TRA97, and JGTRRA03). We find that when the market risk premium is high (RA78) or when the risk-free rate is low (JGTRRA03), the relation between the capital gains tax rate and

gains tax rates is more negative surrounding RA78 (when the market risk premium was higher) and more negative surrounding JGTRRA03 (when the risk-free rate was lower) than surrounding ERTA81 or TRA86.

expected returns is negative. Overall, these results confirm that the relation between capital gains tax rates and expected returns is more nuanced than generally thought, and that the risk characteristics of the firm and/or the economy should be considered when evaluating the anticipated effects of tax rate changes.

The results are important for policy-making, especially in the current period when many countries face budget shortfalls and sluggish economies. When setting tax policy, there are often tradeoffs in which rates to cut. Because the relation between capital gains tax rates and expected returns is generally thought to be positive (Scholes et al. 2009), many believe that cutting the capital gains tax rate will stimulate investment among firms that seek external equity to fund their investments. Our results suggest that, at a minimum, this anticipated effect will be weaker when a firm's systematic risk is high or when a country's market risk premium is high or risk-free rate is low. Furthermore, our results indicate situations when cutting the capital gains tax rate could have the opposite effect. Rather than reducing firms' cost of equity capital and thus stimulating investment among firms seeking external equity, cutting the capital gains tax rate could actually increase the cost of equity capital and stunt investment.

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Appendix 1: Panel of International Capital Gains and Dividend Tax Rates

We collect the maximum statutory individual-level capital gains tax rates (*CGRATE*) and dividend tax rates (*DIVRATE*) for the 44 countries in our initial sample from the OECD online tax database, Worldwide Tax Summaries published by Pricewaterhouse Coopers LLP, and previously by Coopers & Lybrand LLP, Ernst & Young Worldwide Personal Tax Guides, and KPMG's Individual Tax Rate Surveys. We also compare our data to the rates in Becker, Jacob, and Jacob (2013) and make adjustments when appropriate. In the case of inconsistencies among the different sources or when data are missing, we rely on the sources with the most detail and, if necessary, try to resolve the issues by contacting tax experts in the local offices of the Big 4 accounting firms. For the maximum statutory tax rate on capital gains, we use the rate applicable to non-substantial shareholders with long-term capital gains. Table A1 outlines these tax rates.

Appendix 2: Additional Sensitivity Analyses

In this appendix, we discuss several robustness tests that we conduct of Models 1-3 in Table 4. We only present the results for each of the three interactions. The results using *RET* (*COC*) as the dependent variable appear in the first (second) set of three columns.

In the first set of robustness tests, we include additional control variables. First we include the continuous variables *MKTBETA* and *RFR* as additional controls and find that the coefficients on the interaction terms are quantitatively similar to those in Table 4. Next we redefine RFR_{LOW} using real as opposed to nominal interest rates, and include the continuous variables *MKTBETA* and RFR_{REAL} as additional controls, and find that the results are quantitatively similar to those in Table 4.

In the second set of robustness tests, we use alternative proxies for the market risk premium and the risk-free rate. Rather than basing the high market risk premium indicator variable on *MKTBETA*, we base it on either return variability (*RETVAR*), which equals the standard deviation of daily returns on the local market index over the year, or an implied risk premium (*MKTCOC*), which equals the country-year median of firm-level implied cost of capital. When *RET* is the dependent variable, we continue to find that the relation between capital gains tax rates and expected returns is significantly more negative when the market risk premium is high; however, when *COC* is the dependent variable, we no longer find support for our prediction related to market risk premiums. Next we redefine RFR_{LOW} to be based on the real RFR (RFR_{REAL}) as opposed to the nominal risk-free rate.[29] When either *RET* or *COC* is the

[29] The only difference between this test and the one discussed above that also uses RFR_{REAL} is that this specification does not include the continuous variables *MKTBETA* and RFR_{REAL} as additional controls.

dependent variable, the coefficient on the interaction $CGRATE*RFR_{LOW}$ remains negative and significant, consistent with our predictions and the results in column (3) of Table 4.

Our third set of robustness tests relates to how we cluster standard errors and which fixed effects we include. In Table 4, we include country, year, and industry fixed effects in the regressions and cluster the standard errors by firm. In Table A2, we present the coefficient estimates for the interaction terms when instead of including country, year, and industry fixed effects, we do one of the following: (1) cluster the standard errors by firm and year, (2) cluster the standard errors by country-industry, or (3) include firm fixed effects.[30] When *RET* is the dependent variable, consistent with the results in Table 4, the coefficients on $CGRATE*BETA_{HIGH}$ and $CGRATE*MKTBETA_{HIGH}$ are negative and significant for all three of these tests. However, we no longer find support for our prediction related to low risk-free rates. The coefficient on $CGRATE*RFR_{LOW}$ is insignificant in all three tests. When *COC* is the dependent variable, the results for all three tests are consistent with those in Table 4.

In our fourth set of robustness tests, we use alternative samples. First, we re-estimate Models (1)-(3) in Table 4 using all 44 countries for which we have data (i.e., those with and without positive capital gains tax rates). The results are robust. Second, we limit the influence of the two countries with the most observations in our sample (Japan and the United States). In this estimation, we only include randomly selected 14,000 (5,000) firm-years from each of these two countries along with all of the observations from the other 23 countries with positive capital gains tax rates in the *RET* (*COC*) analyses. When *RET* is the dependent variable, the results for the predictions related to high systematic risk and high market risk premium hold; however, we no longer find support for the prediction related to low risk-free rates. When *COC* is the dependent variable, the results are consistent with those in Table 4.

[30] We continue to cluster the standard errors by firm as well in these three robustness tests.

Our predictions relate to tax capitalization, which is a demand-side effect.[31] The "lock-in effect," on the other hand, is a supply-side effect. The lock-in effect stipulates that taxable investors incorporate the tax that will be due upon disposing their shares into their reservation price, or the price at which they are willing to sell their shares. This effect can result in temporary downward price pressure following a reduction in the capital gains tax rate when a group of taxable investors suddenly reaches their reservation price and thus the supply of a stock temporarily exceeds the demand for it (see, e.g., Dai et al. 2008). As a result, at least in the short-term, the correlation between capital gains tax rates and expected returns can be negative. We are interested, however, in the impact of capital gains taxes on (long-term) equilibrium prices, as opposed to short-term price pressure. Even though we have no reason to believe that *BETA*, *MKTBETA*, and *RFR* are correlated with short-term lock-in behavior, we conduct sensitivity analyses to assess the potential confounding effects of lock-in on our results. In our third test that uses an alternative sample, we repeat the analyses in columns (1)-(3) of Table 4 but exclude years when the capital gains tax rate changed by at least five percentage points. To the extent that taxable investors "unlocked" their gains following capital gains tax rate reductions or preceding capital gains tax rate increases, we expect that they did so in the narrow window surrounding the tax rate changes. Thus, any temporary price pressure caused by the lock-in effect would be captured in the year of change. Our results continue to hold, suggesting that the lock-in effect does not unduly affect our results.

Jacob and Jacob (2013) and Becker, Jacob and Jacob (2013) also construct a dataset of dividend and capital gains tax rates for a sample of 25 countries over the period 1990-2008. Their process for collecting the rates is very similar to ours. However, in some cases, our rates

[31] The model in Sikes and Verrecchia (2012) is based on the CAPM, which is a model of how investors price shares at inception. In the CAPM, there is no notion of any shareholder already owning shares. Thus, the CAPM models the impact of demand, but not supply, on price.

differ from theirs. In many of these cases, the difference is explained by the fact that these authors use the capital gains tax rate that is applicable to share repurchases, which in some countries does not equal the statutory capital gains tax rate. Nevertheless, we conduct a robustness test where we replace our rates with their rates when the two rates are not the same. The last row of Table A2 shows that our results are robust to this replacement, with the exception that the coefficient on the interaction $CGRATE*RFR_{LOW}$ is no longer significant when *COC* is the dependent variable.

Table 1: Sample Composition, Risk Variables, and Cross-Sectional Partitioning Variables by Country

	Sample Composition				*Risk Variables*		*Partitioning Variables*				
	(1) Realized Buy-and-hold Returns (RET)		*(2) Implied Cost of Capital (COC)*		*(3) Market Beta*	*(4) Risk-Free Interest Rate*	*(5) Substantive Changes in Tax Rate*	*(6) Tax Evasion Index*	*(7) Foreign Direct Investments*	*(8) Total Institutional Ownership*	*(9) Foreign Institutional Ownership*
Country	*N*	*Mean*	*N*	*Mean*	*MKTBETA*	*RFR*	*ΔCGRATE*	*TAXEVA*	*FDI*	*INSTOWN*	*FINSTOWN*
Australia	4,281	16.7%	1,839	10.8%	0.732	6.6%	***1***	***4.7***	0.709	***1.3%***	***0.5%***
Brazil	1,093	28.3%	177	16.3%	0.602	24.0%	0	2.4	0.939	***1.4%***	1.3%
Canada	6,306	16.5%	1,901	11.1%	0.785	5.4%	***1***	***5.2***	***-1.606***	13.4%	1.7%
Chile	1,109	18.2%	120	13.0%	0.641	5.4%	***1***	***5.3***	1.816	***1.0%***	***0.9%***
China	3,213	3.0%	124	10.4%	0.249	1.9%	0	3.0	1.161	***0.7%***	***0.6%***
Denmark	1,940	17.0%	637	11.5%	0.392	5.8%	***1***	3.6	***-1.468***	7.2%	***0.3%***
Finland	962	23.1%	455	13.1%	0.468	5.4%	0	***5.1***	***-1.650***	10.1%	2.9%
France	6,907	14.5%	2,505	11.0%	0.571	5.3%	***1***	***4.0***	0.631	***4.7%***	***1.0%***
Hungary	124	17.6%	44	15.6%	0.552	11.1%	0	3.4	1.639	6.9%	6.8%
India	2,518	25.2%	610	14.1%	0.815	8.5%	***1***	2.7	***-0.644***	***3.6%***	1.6%
Indonesia	1,261	9.4%	227	15.8%	0.652	15.1%	0	2.3	***-11.482***	***1.2%***	***1.2%***
Ireland	641	18.6%	218	12.6%	0.709	5.9%	***1***	***4.1***	***-0.583***	12.4%	10.0%
Israel	551	19.5%	46	10.1%	0.932	9.2%	***1***	***3.7***	0.829	***1.2%***	***1.2%***
Italy	2,740	12.0%	694	10.9%	0.798	7.0%	***1***	2.8	***-0.724***	***3.1%***	1.3%
Japan	35,531	6.7%	4,293	8.4%	0.988	1.9%	***1***	***4.7***	***-3.104***	***1.8%***	***0.7%***
Norway	1,320	18.0%	418	13.1%	0.709	6.5%	0	3.4	***-3.898***	10.3%	1.7%
Philippines	902	4.6%	194	12.7%	0.828	10.7%	0	1.9	0.278	***0.9%***	***0.9%***
Poland	390	27.0%	96	12.1%	0.575	12.9%	***1***	3.0	1.238	6.0%	2.4%
Russian Federation	81	54.6%	–	–	0.590	12.3%	0	2.1	0.169	***3.8%***	3.7%
South Africa	2,354	23.7%	894	16.3%	0.659	13.0%	***1***	3.0	***-3.100***	5.8%	***0.3%***
Spain	1,674	20.1%	773	11.5%	0.834	7.0%	***1***	***4.7***	0.937	5.3%	1.4%
Sweden	2,191	19.1%	783	12.1%	0.699	6.4%	***1***	***3.7***	***-0.911***	12.7%	2.5%
Taiwan	4,474	9.7%	564	11.8%	0.815	5.0%	0	***4.0***	–	***0.6%***	***0.6%***
United Kingdom	14,411	13.3%	5,267	11.3%	0.640	6.7%	0	***5.4***	0.912	16.1%	***0.7%***
United States	54,395	15.3%	26,570	10.6%	0.589	4.1%	***1***	***5.4***	***0.010***	30.0%	***0.1%***
Total/Median	151,369	6.5%	49,449	10.3%	0.722	6.1%	15	3.7	0.090	4.7%	1.2%

(continued)

Table 1 (continued)

The expected returns (cost of capital) sample comprises a maximum of 151,369 (49,449) firm-year observations from 25 countries with non-zero capital gains tax rates over the 1990 to 2004 period. The sample excludes countries with less than 20 individual firm observations, country-years with inflation rates above 25%, and firms with market value below US$ 10 million. In the first two columns, the table reports the number of firm-years and mean values by country for the two dependent variables used in the analyses. (1) We use realized buy-and-hold returns (*RET*) computed over one year and based on US$ price information adjusted for dividends and stock splits. (2) The implied cost of capital (*COC*) is the average cost of capital estimate implied by the mean analyst consensus forecasts and stock prices using the Claus and Thomas (2001) model, the Gebhardt, Lee, and Swaminathan (2001) model, the Ohlson and Juettner-Nauroth (2005) model, and the Easton (2004) model. See Hail and Leuz (2006) for details on the estimation procedure. We measure *RET* (*COC*) beginning in (as of) month +10 after the fiscal-year end, and truncate both variables at the 1st and 99th percentile. We collect the financial data from Worldscope, analyst forecast data from I/B/E/S, and stock price data from Datastream. In the next two columns, the table reports mean values for two variables used to distinguish between high and low aggregate risk/risk-free investment return countries in the analyses. (3) The market risk premium (*MKTBETA*) is equal to the country-year median of firms' systematic risk. We measure a firm's systematic risk as the coefficient on the local market index from a two-factor market model that regresses the firm's monthly excess returns on the local market index and a world market index over the 60 months leading up to month +10 after the firm's fiscal-year end. We require at least 24 months of data for the estimation of *BETA*. (4) The risk-free interest rate (*RFR*) is the country-year median of monthly nominal short-term Treasury bill rates (or, if unavailable, yields on central bank papers and interbank loans) collected from Datastream and the World Bank. The risk-free rates correspond to the calendar year of month +10 after a firm's fiscal-year end. In the last five columns, the table reports country values for the partitioning variables used in the cross-sectional analyses. (5) We identify countries with year-to-year changes in capital gains tax rates exceeding 5 percentage points (Δ*CGRATE*=1). (6) We measure a country's tax morale by the tax evasion index (source: World Economic Forum, Global Competitiveness Report 2001/2002). Higher scores indicate good compliance with local tax laws (*TAXEVA*=1). (7) We measure a country's openness and market integration as the foreign direct investment inflows in percent of GDP (source: World Bank). We take the natural logarithm of the yearly values and compute the time-series mean for each country. Lower values stand for less integrated markets (*FDI*=1). (8) Aggregate institutional ownership is the country median firm-level ratio of total institutional ownership in percent of market capitalization (source: Ferreira and Matos 2008). The data are only available for the years 2000 to 2004 of our sample period. Lower values indicate countries with fewer stock holdings by institutional investors (*INSTOWN*=1). We measure (9) in the same way as (8) but only for the subset of foreign institutional ownership. Lower values indicate countries with fewer stock holdings by foreign institutional investors (*FINSTOWN*=1). For the cross-sectional analyses, we transform the continuous partitioning variables in columns (6) to (9) into binary indicators by splitting the sample by the median (as indicated in the last row of the table). Values in ***bold italics*** mark countries with a partitioning indicator value of '1'.

Table 2: Descriptive Statistics for Variables Used in the Regression Analyses

Panel A: Distributional Characteristics

	N	*Mean*	*Std. Dev.*	*P1*	*P25*	*Median*	*P75*	*P99*
Dependent Variables:								
Buy-and-hold Returns (RET)	151,369	13.3%	49.5%	-74.3%	-17.0%	6.5%	33.7%	198.6%
Implied Cost of Capital (COC)	49,449	10.9%	3.5%	5.2%	8.5%	10.3%	12.5%	22.7%
Tax Variables:								
Capital Gains Tax Rate (CGRATE)	151,369	23.5%	10.1%	0.0%	20.0%	26.0%	28.0%	47.0%
Dividend Tax Rate (DIVRATE)	151,369	29.6%	13.0%	0.0%	20.0%	35.0%	39.6%	47.9%
Dividend Penalty (DIVPEN)	151,369	0.070	0.181	-0.453	0.000	0.122	0.238	0.373
Control/Risk Variables:								
Risk-Free Interest Rate (RFR)	151,369	4.0%	3.3%	0.1%	1.2%	3.9%	5.3%	16.0%
Market Beta (MKTBETA)	151,369	0.674	0.296	0.060	0.453	0.708	0.931	1.286
Firm Beta (BETA)	151,369	0.747	0.915	-2.148	0.287	0.749	1.223	3.215
Log (Market Value) (SIZE)	151,369	12.265	1.780	9.315	10.904	12.084	13.406	16.973
Book-to-Market Ratio (BMR)	151,369	0.777	0.596	0.069	0.372	0.619	0.995	3.019
Earnings Variance (EARNVAR)	49,449	0.033	0.051	0.001	0.008	0.018	0.036	0.267
Forecast Bias (BIAS)	49,449	0.006	0.032	-0.043	-0.003	0.000	0.006	0.137

Panel B: Pearson (Below Diagonal) and Spearman (Above Diagonal) Correlations

	RET	*COC*	*CGRATE*	*DIVRATE*	*RFR*	*MKTBETA*	*BETA*	*SIZE*	*BMR*	*EARNVAR*	*BIAS*
RET	1	0.046	-0.044	-0.091	-0.007	-0.083	-0.037	-0.012	0.125	-0.046	-0.191
COC	0.060	1	0.139	0.008	0.340	0.094	0.060	-0.345	0.296	0.082	0.178
CGRATE	-0.052	0.059	1	0.226	0.262	0.214	0.088	-0.025	-0.049	0.019	*0.001*
DIVRATE	-0.086	-0.057	0.388	1	-0.018	0.070	0.063	*-0.004*	0.032	-0.074	0.050
RFR	0.007	0.356	0.122	-0.131	1	-0.145	-0.036	-0.016	-0.130	0.052	0.041
MKTBETA	-0.068	0.089	0.098	0.101	-0.047	1	0.318	0.020	0.147	-0.077	0.074
BETA	-0.005	0.037	0.044	0.055	-0.013	0.283	1	0.138	-0.025	0.061	0.019
SIZE	-0.047	-0.344	-0.020	0.025	-0.024	-0.004	0.106	1	-0.382	-0.166	-0.053
BMR	0.106	0.286	-0.085	-0.031	-0.056	0.140	*0.001*	-0.375	1	-0.241	0.031
EARNVAR	*0.003*	0.081	0.007	-0.054	0.010	-0.085	0.024	-0.160	-0.105	1	0.009
BIAS	-0.103	0.268	*-0.002*	0.020	0.046	0.046	0.016	-0.118	0.104	0.030	1

(continued)

Table 2 (continued)

The sample comprises up to 151,369 firm-year observations from 25 countries between 1990 and 2004 with sufficient Worldscope financial data, I/B/E/S analyst forecast data, and Datastream stock price data (see Table 1). Panel A presents descriptive statistics for the variables used in the regression analyses. Panel B reports Pearson correlation coefficients (below the diagonal) and Spearman correlation coefficients (above the diagonal). All correlations are significant at the 10 percent level or better, except those values indicated in *italics*. The two dependent variables are: (1) realized buy-and-hold returns (*RET*) computed over one year and based on US$ price information adjusted for dividends and stock splits; and (2) the implied cost of capital (*COC*), which equals the average cost of capital estimate implied by the mean analyst consensus forecasts and stock prices using the Claus and Thomas (2001) model, the Gebhardt, Lee, and Swaminathan (2001) model, the Ohlson and Juettner-Nauroth (2005) model, and the Easton (2004) model. See Hail and Leuz (2006) for details on the *COC* estimation procedure. We measure *RET* (*COC*) beginning in (as of) month +10 after the fiscal-year end. The tax variables are the maximum statutory capital gains tax rate (*CGRATE*) and dividend tax rate (*DIVRATE*) for individuals, as indicated in the OECD tax database and various publications of the Big 4 accounting firms (see also Table A1 in the Appendix). Instead of the dividend tax rate we include the dividend tax penalty in our models. We compute *DIVPEN* as (*DIVRATE* – *CGRATE*) / (1 – *CGRATE*). The tax rates correspond to the calendar year of month +10 after a firm's fiscal-year end. Next, we define our control variables. The risk-free interest rate (*RFR*) is the country-year median of monthly nominal short-term Treasury bill rates (or, if unavailable, yields on central bank papers and interbank loans) collected from Datastream and the World Bank. We measure *RFR* over the same interval as the tax rates. The market risk premium (*MKTBETA*) is equal to the country-year median of firms' systematic risk. We measure a firm's systematic risk (*BETA*) as the coefficient on the local market index from a two-factor market model that regresses the firm's monthly excess returns on the local market index and a world market index over the 60 months leading up to month +10 after the firm's fiscal-year end. We require at least 24 months of data for the estimation of *BETA*. We measure *SIZE* as the natural log of the market value of equity in US$ thousand (i.e., stock price times the number of shares outstanding). Book-to-market (*BMR*) is the ratio of the accounting book value to the market value of equity. We measure earnings variance (*EARNVAR*) as the firm's standard deviation of annual earnings per share over the last five years scaled by total assets per share. We require at least three yearly observations to calculate *EARNVAR*. Forecast bias (*BIAS*) is the one-year-ahead analyst forecast error (mean forecast minus actual) scaled by forecast-period stock price. We measure *SIZE*, *BMR*, and *EARNVAR* as of the fiscal-year end, and *BIAS* as of month +10 after the fiscal-year end. Except for the tax variables, *RFR*, and *MKTBETA*, we truncate all variables at the 1^{st} and 99^{th} percentile.

Table 3: Unconditional Relation Between Capital Gains Tax Rates and Expected Returns

	RET as Dependent Variable				*COC as Dependent Variable*			
Base Sample (CGRATE>0 Countries)	*(1) All Countries*	*(2) All Countries*	*(3) All Countries*	*(4) No Japan*	*(1) All Countries*	*(2) All Countries*	*(3) All Countries*	*(4) No Japan*
Tax Variables:								
CGRATE	-0.342***	–	-0.365***	0.288***	0.006*	–	0.014***	0.033***
	(-11.64)		(-11.83)	(8.24)	(1.68)		(3.51)	(7.55)
DIVRATE	–	-0.045**	–	–	–	0.012***	–	–
		(-2.46)				(5.37)		
DIVPEN	–	–	-0.028*	0.057***	–	–	0.008***	0.008***
			(-1.96)	(3.33)			(4.95)	(3.98)
Control Variables:								
BETA	0.012***	0.011***	0.012***	0.007***	0.002***	0.002***	0.002***	0.001***
	(6.59)	(6.25)	(6.64)	(3.76)	(9.51)	(9.41)	(9.35)	(6.98)
SIZE	-0.001	-0.001	-0.001	0.000	-0.005***	-0.005***	-0.005***	-0.004***
	(-0.77)	(-0.95)	(-0.86)	(0.33)	(-31.86)	(-31.77)	(-31.75)	(-27.85)
BMR	0.097***	0.097***	0.097***	0.089***	0.019***	0.019***	0.019***	0.021***
	(35.61)	(35.61)	(35.61)	(23.71)	(29.18)	(29.09)	(29.12)	(28.72)
EARNVAR	–	–	–	–	0.038***	0.037***	0.037***	0.040***
					(9.49)	(9.46)	(9.47)	(9.89)
BIAS	–	–	–	–	0.227***	0.228***	0.228***	0.237***
					(30.49)	(30.51)	(30.51)	(29.36)
Country, Industry, and Year Fixed Effects	Included	Included	Included	Included	Included	Included	Included	Included
N	151,369	151,369	151,369	115,838	49,449	49,449	49,449	45,156
R^2	0.077	0.076	0.077	0.055	0.377	0.378	0.378	0.366

The table reports the unconditional relation between individual capital gains and dividend tax rates and expected returns. We report results for our base sample comprising firm-year observations from 25 countries with non-zero capital gains tax rates over the 1990 to 2004 period (see Table 1). In Model (4) we exclude Japan from the analysis. The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors clustered by firm from regressing realized buy-and-hold returns *RET* (implied cost of capital *COC*) on the tax variables (capital gains tax rate, dividend tax rate, dividend penalty) plus controls. For variable details see Table 2. We include an intercept, country, Campbell (1996) industry, and year fixed effects in the regressions, but do not report the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

Table 4: Relation between Capital Gains Tax Rates and Expected Returns Conditional on Firm Risk, Market Risk, and Risk-Free Rates

	RET as Dependent Variable (N=151,369)				*COC as Dependent Variable (N=49,449)*			
Base Sample (CGRATE>0 Countries)	*(1) Firm Risk (BETA)*	*(2) Market Risk (MKTBETA)*	*(3) Risk-Free Rates (RFR)*	*(4) All Three Combined*	*(1) Firm Risk (BETA)*	*(2) Market Risk (MKTBETA)*	*(3) Risk-Free Rates (RFR)*	*(4) All Three Combined*
Tax Variables:								
(1) CGRATE	-0.233***	-0.106***	-0.176***	0.064	0.015***	0.035***	0.039***	0.061***
	(-7.25)	(-3.06)	(-4.73)	(1.52)	(3.29)	(8.17)	(8.05)	(11.23)
(2) CGRATE*$BETA_{High}$	-0.268***	–	–	-0.177***	-0.002	–	–	0.005
	(-10.32)			(-6.82)	(-0.53)			(1.25)
P-value: (1)+(2) = 0	[0.000]			[0.013]	[0.003]			[0.000]
(3) CGRATE*$MKTBETA_{High}$	–	-0.525***	–	-0.466***	–	-0.052***	–	-0.055***
		(-15.18)		(-13.49)		(-13.10)		(-13.93)
P-value: (1)+(3) = 0		[0.000]		[0.000]		[0.000]		[0.306]
(4) CGRATE*RFR_{Low}	–	–	-0.239***	-0.115***	–	–	-0.039***	-0.039***
			(-6.25)	(-2.91)			(-8.11)	(-8.29)
P-value: (1)+(4) = 0			[0.000]	[0.190]			[0.922]	[0.000]
DIVPEN	-0.024*	-0.046***	-0.030*	-0.061***	0.009***	0.005***	0.016***	0.011***
	(-1.67)	(-3.15)	(-1.88)	(-3.82)	(5.06)	(3.05)	(7.95)	(5.77)
Control Variables:								
$BETA_{High}$	0.015***	–	–	0.012***	0.004***	–	–	0.004***
	(4.18)			(3.25)	(9.07)			(8.20)
$MKTBETA_{High}$	–	0.021***	–	0.035***	–	0.003***	–	0.003***
		(4.50)		(6.85)		(5.13)		(4.57)
RFR_{Low}	–	–	-0.051***	-0.062***	–	–	-0.000	-0.002***
			(-12.40)	(-13.72)			(-0.93)	(-3.21)
BETA	0.005**	0.010***	0.012***	0.005**	0.000	0.002***	0.002***	0.000
	(2.14)	(5.40)	(7.01)	(2.16)	(1.37)	(8.40)	(9.51)	(1.52)
SIZE	-0.001	-0.000	-0.001	-0.000	-0.005***	-0.005***	-0.005***	-0.005***
	(-0.76)	(-0.26)	(-0.71)	(-0.15)	(-32.36)	(-31.18)	(-31.71)	(-31.71)
BMR	0.096***	0.094***	0.096***	0.092***	0.019***	0.019***	0.019***	0.019***
	(35.35)	(34.12)	(35.23)	(33.56)	(28.93)	(29.20)	(29.08)	(28.90)
EARNVAR	–	–	–	–	0.036***	0.038***	0.037***	0.037***
					(9.28)	(9.61)	(9.41)	(9.36)
BIAS	–	–	–	–	0.227***	0.228***	0.228***	0.227***
					(30.51)	(30.56)	(30.44)	(30.48)
Country, Industry, and Year Fixed Effects	Included	Included	Included	Included	Included	Included	Included	Included
R^2	0.076	0.078	0.079	0.081	0.379	0.381	0.379	0.384

(continued)

Table 4 (continued)

The table reports the relation between individual capital gains tax rates and expected returns conditional on firm-level risk, market-wide risk, and the returns on risk-free investments. We report results for our base sample comprising firm-year observations from 25 countries with non-zero capital gains tax rates over the 1990 to 2004 period (see Table 1). The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors clustered by firm from regressing realized buy-and-hold returns *RET* (implied cost of capital *COC*) on the tax variables (*CGRATE* and *DIVPEN*) plus controls. We further interact *CGRATE* (either separately or combined) with the following three binary indicator variables and include the main effects and the interaction term in the model. We set $BETA_{High}$ to '1' for observations where a firm's systematic risk (*BETA*) is above the yearly median. $MKTBETA_{High}$ is equal to '1' for observations in country-years with market risk premiums (*MKTBETA*) above the sample-period median. We set RFR_{Low} to '1' for observations in country-years with risk-free interest rates (*RFR*) falling below the 30^{th} percentile of the sample-period distribution. In line with Guenther and Sansing (2010), we demean the continuous *CGRATE* variable (using the sample mean) when computing the interaction terms. For details on the dependent and control variables see Table 2. We include an intercept, country, industry, and year fixed effects in the regressions, but do not report the coefficients. We also report *p*-values from *F*-tests comparing the sum of two coefficients to zero. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

Table 5: Analyses for Subset of Sample Countries

Subset of Base Sample (Countries with Partitioning Variables PART=1)	*(1) Substantive Changes in Tax Rate (ΔCGRATE)*	*(2) Tax Evasion Index (TAXEVA)*	*(3) Foreign Direct Investments (FDI)*	*(4) Total Institutional Ownership (INSTOWN)*	*(5) Foreign Institutional Ownership (FINSTOWN)*
Panel A: Buy-and-hold Returns as Dependent Variable					
(1) CGRATE	1.119***	-0.004	0.954***	-0.346***	0.203***
	(18.65)	(-0.07)	(14.00)	(-4.38)	(4.19)
P-value: $PART_1=PART_0$	[0.000]	[0.000]	[0.000]	[0.000][a]	[0.000]
(2) CGRATE*$BETA_{High}$	-0.251***	-0.200***	-0.251***	-0.326***	-0.151***
	(-7.02)	(-6.91)	(-6.06)	(-8.06)	(-5.46)
P-value: $PART_1=PART_0$	[0.007]	[0.001]	[0.007]	[0.000]	[0.725]
(3) CGRATE*$MKTBETA_{High}$	-1.223***	-0.652***	-1.281***	-0.008	-0.525***
	(-22.37)	(-15.86)	(-21.36)	(-0.12)	(-14.39)
P-value: $PART_1=PART_0$	[0.000]	[0.013]	[0.000]	[0.000]	[0.000]
(4) CGRATE*RFR_{Low}	-0.920***	-0.229***	-0.596***	-0.484***	-0.280***
	(-15.46)	(-5.13)	(-8.13)	(-8.11)	(-6.19)
P-value: $PART_1=PART_0$	[0.000]	[0.000]	[0.000]	[0.000]	[0.357]
Dividend Penalty and Control Variables	Included	Included	Included	Included	Included
Country, Industry, and Year Fixed Effects	Included	Included	Included	Included	Included
N	123,528	133,433	112,159	64,661	131,329
R^2	0.089	0.075	0.097	0.174	0.079
Panel B: Implied Cost of Capital as Dependent Variable					
(1) CGRATE	0.070***	0.058***	0.058***	0.045***	0.067***
	(10.81)	(8.83)	(7.36)	(3.15)	(10.66)
P-value: $PART_1=PART_0$	[0.013]	[0.311]	[0.009]	[0.336]	[0.000]
(2) CGRATE*$BETA_{High}$	0.014***	0.001	0.016***	-0.000	0.005
	(2.95)	(0.28)	(2.95)	(-0.00)	(1.22)
P-value: $PART_1=PART_0$	[0.006][a]	[0.065]	[0.432]	[0.072]	[0.885]
(3) CGRATE*$MKTBETA_{High}$	-0.068***	-0.070***	-0.057***	-0.019	-0.059***
	(-11.19)	(-15.58)	(-7.98)	(-1.57)	(-14.17)
P-value: $PART_1=PART_0$	[0.000]	[0.000]	[0.000]	[0.205]	[0.000]
(4) CGRATE*RFR_{Low}	-0.039***	-0.036***	-0.050***	-0.060***	-0.035***
	(-5.92)	(-6.48)	(-6.39)	(-6.65)	(-6.33)
P-value: $PART_1=PART_0$	[0.682]	[0.035][a]	[0.227]	[0.000]	[0.281]
Dividend Penalty and Control Variables	Included	Included	Included	Included	Included
Country, Industry, and Year Fixed Effects	Included	Included	Included	Included	Included
N	41,979	45,334	37,700	11,393	43,280
R^2	0.393	0.340	0.417	0.449	0.377

(continued)

Table 5 (continued)

The table reports cross-sectional analyses of the conditional relation between individual capital gains tax rates and expected returns. We report results for subsets of countries from our base sample comprising 25 countries with non-zero capital gains tax rates over the 1990 to 2004 period (see Table 1). We use the following five country-level partitioning variables to identify sample subsets (i.e., *PART*=1): (1) countries with at least one substantive change in capital gains tax rates exceeding 5 percentage points (Δ*CGRATE*); (2) countries with an above average record of compliance with local tax laws as measured by the tax evasion index (*TAXEVA*); (3) countries with below average market integration as measured by the inflows of foreign direct investments (*FDI*), (4) countries with below average total institutional ownership (*INSTOWN*); and (5) countries with below average foreign institutional ownership (*FINSTOWN*). For variable details see Table 1. The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors clustered by firm from regressing *RET* (Panel A) or *COC* (Panel B) on the tax variables (*CGRATE* and *DIVPEN*), interaction terms of *CGRATE* with binary indicators for high firm-level risk, high market-wide risk, and low risk-free interest rates, plus controls (see Model 4 in Table 4). We only tabulate the main variables of interest but include the full set of controls and fixed effects. We also report *p*-values from *F*-tests comparing the main effect of the tax variable (*CGRATE*) as well as the interaction terms (e.g., $CGRATE*BETA_{\text{High}}$) from the subset of tabulated countries (*PART*=1) to the same coefficients for the opposite group of countries (*PART*=0, not tabulated). The superscript [a] indicates *p*-values that are significant but opposite to our prediction. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

Table 6: Analyses Around Substantive Changes in Firm Risk, Market Risk, and Risk-Free Rates

Subset of Base Sample (Firm-Years Surrounding Substantive Changes)	*RET as Dependent Variable*		*COC as Dependent Variable*	
	(1) Substantive Increases	*(2) Substantive Decreases*	*(1) Substantive Increases*	*(2) Substantive Decreases*
Panel A: Analysis Surrounding Substantive Changes of Firm Beta (BETA)				
(1) CGRATE	1.278***	1.139***	0.081***	0.086***
	(3.29)	(3.88)	(3.52)	(2.61)
(2) CGRATE*$BETA_{High}$	-0.128**	-0.151**	-0.001	-0.016**
	(-2.47)	(-2.52)	(-0.22)	(-2.05)
P-value: (1)+(2) = 0	[0.003]	[0.001]	[0.001]	[0.034]
Dividend Penalty and Control Variables	Included	Included	Included	Included
Country-Year and Industry Fixed Effects	Included	Included	Included	Included
N	40,528	37,138	11,207	11,446
R^2	0.172	0.106	0.451	0.436
Panel B: Analysis Surrounding Substantive Changes of Market Beta (MKTBETA)				
(1) CGRATE	-0.228***	0.586***	0.012*	0.036***
	(-4.74)	(4.95)	(1.76)	(2.99)
(2) CGRATE*$MKTBETA_{High}$	-0.098**	-0.191***	-0.012**	-0.016**
	(-2.22)	(-3.49)	(-2.56)	(-2.27)
P-value: (1)+(2) = 0	[0.000]	[0.001]	[0.994]	[0.105]
Dividend Penalty and Control Variables	Included	Included	Included	Included
Country, Industry, and Year Fixed Effects	Included	Included	Included	Included
N	70,909	80,001	13,620	35,090
R^2	0.185	0.055	0.492	0.345
Panel C: Analysis Surrounding Substantive Changes of Risk-Free Interest Rates (RFR)				
(1) CGRATE	0.342***	0.019	0.009	0.009
	(3.85)	(0.30)	(0.96)	(1.12)
(2) CGRATE*RFR_{Low}	0.022	-0.771***	-0.013***	-0.021***
	(0.67)	(-14.20)	(-3.73)	(-2.88)
P-value: (1)+(2) = 0	[0.000]	[0.000]	[0.707]	[0.099]
Dividend Penalty and Control Variables	Included	Included	Included	Included
Country, Industry, and Year Fixed Effects	Included	Included	Included	Included
N	69,594	66,196	28,340	14,415
R^2	0.054	0.134	0.356	0.446

(continued)

Table 6 (continued)

The table reports the conditional relation between individual capital gains tax rates and expected returns around substantive changes in the conditioning variables. We report results for subsets of firm-years from our base sample comprising 25 countries with non-zero capital gains tax rates over the 1990 to 2004 period (see Table 1). The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors clustered by firm from regressing *RET* or *COC* on the tax variables (*CGRATE* and *DIVPEN*) plus controls around substantive changes in systematic firm risk (Panel A), country-level market risk (Panel B), and risk-free interest rates (Panel C). For each analysis we include up to eight years (i.e., *t*–4 to *t*+3) surrounding substantive increases or decreases (year *t*=0) in the conditioning variables, but only as long as there is no other substantive change within the event window. We conduct a pre-post comparison around substantive changes by including the main effects and the interaction term of *CGRATE* with one of the following three binary indicator variables in the model. We set $BETA_{High}$ to '1' for firm-years following the switch from below to above (preceding the switch from above to below) median systematic risk (*BETA*) in a given year over the sample period. $MKTBETA_{High}$ is equal to '1' for firm-years following an increase (preceding a decrease) in country-level market risk premiums (*MKTBETA*) that falls in the upper (lower) 15 percentiles of all year-to-year changes over the sample period. RFR_{Low} is equal to '1' for firm-years following a decrease (preceding an increase) in country-level risk-free interest rates (*RFR*) that falls in the lower (upper) 15 percentiles of all year-to-year changes over the sample period. We only tabulate the main variables of interest but include the full set of controls and fixed effects (see Models 1 to 3, respectively, in Table 4). In Panel A, we replace the country and year fixed effects with separate fixed effects for each country-year combination. In Panels B and C, we include the raw values of *MKTBETA* and *RFR*, respectively, as additional controls. We also report *p*-values from *F*-tests comparing the sum of two coefficients to zero. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

Table 7: Descriptive Statistics for Analysis of Capital Gains Tax Rate Changes in the United States

Panel A: Mean Market Risk and Risk-Free Interest Rates in Periods Surrounding U.S. Tax Rate Changes in 1978, 1997, and 2003

Variables	*Event #1: RA78 (November 1978)*	*Event #2: TRA97 (May 1997)*	*Event #3: JGTRRA03 (May 2003)*
Capital Gains Tax Rate:			
CGRATE	From 35% to 28%	From 28% to 20%	From 20% to 15%
Aggregate Market Risk:			
Market Beta (MKTBETA)	1.188	0.882	0.728
Implied Risk Premium	5.7%	2.7%	3.7%
Return Variability	0.046	0.043	0.043
	(Period of High Market Risk)	(Period of Medium Market Risk)	(Period of Medium Market Risk)
Risk-Free Interest Rates:			
1-Month T-Bills (RFR)	8.3%	5.1%	1.7%
	(Period of High Risk-Free Interest Rates)	(Period of Medium Risk-Free Interest Rates)	(Period of Low Risk-Free Interest Rates)

Panel B: Distributional Characteristics

	N	*Mean*	*Std. Dev.*	*P1*	*P25*	*Median*	*P75*	*P99*
Dependent Variable:								
Buy-and-hold Returns (RET)	79,239	1.5%	9.6%	-23.5%	-3.8%	1.1%	6.3%	30.7%
Tax Variable:								
Capital Gains Tax Rate (CGRATE)	79,239	24.2%	6.6%	15.0%	20.0%	20.0%	28.0%	35.0%
Control Variables:								
Risk-Free Interest Rate (RFR)	79,239	5.0%	3.2%	0.7%	1.9%	4.9%	6.0%	15.5%
Market Beta (MKTBETA)	79,239	0.928	0.195	0.665	0.738	0.879	1.143	1.298
Firm Beta (BETA)	79,239	0.856	0.543	-0.189	0.478	0.813	1.164	2.482
Log (Market Value) (SIZE)	79,239	13.279	1.965	9.369	11.760	13.407	14.820	16.935
Book-to-Market Ratio (BMR)	79,239	0.768	0.529	0.026	0.409	0.633	0.994	2.591

(continued)

Table 7 (continued)

The sample comprises up to 79,239 firm-month observations from the United States in the 48 months surrounding a change in capital gains tax rates (i.e., *t*–24 to *t*+23) with sufficient Compustat financial data and CRSP stock price data. We consider three regulatory changes of capital gains tax rates: (1) the Revenue Reconciliation Act of 1978 (RA78), (2) the Taxpayer Relief Act of 1997 (TRA97), and (3) the Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA03). We tabulate results for a 'constant' sample, i.e., firms must have at least one observation pre and post each of the three events. Panel A presents the capital gains tax rates (*CGRATE*) and various proxies of the two conditioning variables. We capture aggregate market risk with the following variables. Market beta (*MKTBETA*) is equal to the monthly median of firms' systematic risk. The panel reports the event-period mean. We measure a firm's systematic risk (*BETA*) as the coefficient from a one-factor market model that regresses the firm's monthly excess returns on the local value-weighted market index over the 60 months leading up to month *t*. We require at least 24 months of data for the computation of *BETA*. The implied equity risk premiums equal the internal rates of return from a discounted cash flow valuation model as implemented by Damodaran (2012). We measure return variability as the standard deviation of monthly index returns over the event period. We measure the risk-free interest rate (*RFR*) as the median daily 1-month Treasury bill rate in month *t*. We report annualized values of *RFR* in the table. In Panel B, we report descriptive statistics for the variables used in the regression analyses. We use the monthly buy-and-hold return (*RET*) as dependent variable. We also include *SIZE* measured as the natural log of the market value of equity in US$ million and the ratio of the accounting book value (as of the last fiscal year) to the market value of equity (*BMR*) in the model. We measure both variables at the most recent quarter-end prior to month *t*. Except for CGRATE, *RFR*, and *MKTBETA*, we truncate all variables at the 1^{st} and 99^{th} percentile.

Table 8: Relation between Capital Gains Tax Rates and Expected Returns Around Tax Rate Changes in the United States

Buy-and-Hold Returns as Dependent Variable	*Comparison Event #1 vs. Event #2 (RA78 vs. TRA97)*		*Comparison Event #1 vs. Event #3 (RA78 vs. JGTRRA03)*		*Comparison Event #2 vs. Event #3 (TRA97 vs. JGTRRA03)*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Tax Variables:						
(1) CGRATE	0.041	0.102	-0.320**	-0.234	-0.329**	-0.246
	(0.43)	(0.95)	(-2.33)	(-1.21)	(-2.41)	(-1.27)
(2) CGRATE*Earlier Event	-0.236**	-0.897***	0.121	-0.528**	0.374**	0.336*
	(-2.02)	(-4.52)	(0.78)	(-2.03)	(2.25)	(1.69)
P-value: (1)+(2) = 0	[0.005]	[0.000]	[0.004]	[0.000]	[0.638]	[0.439]
Control Variables:						
Earlier Event	0.006**	0.058***	0.034***	0.140***	0.011	0.031*
	(2.18)	(3.83)	(3.41)	(3.52)	(1.39)	(1.84)
MKTBETA	–	-0.009	–	-0.040	–	-0.012
		(-0.20)		(-0.69)		(-0.19)
RFR	–	-11.421***	–	-10.397***	–	-8.084*
		(-3.64)		(-3.36)		(-1.68)
BETA	0.010***	0.011***	0.005	0.005	0.004	0.004
	(3.47)	(3.73)	(1.12)	(1.18)	(1.05)	(1.07)
SIZE	-0.001	-0.001	-0.002***	-0.002***	0.001	0.001
	(-0.82)	(-0.85)	(-3.55)	(-3.45)	(0.87)	(0.85)
BMR	0.004	0.004	0.006*	0.006*	0.014***	0.013***
	(1.41)	(1.29)	(1.89)	(1.79)	(4.58)	(4.42)
Industry Fixed Effects	Included	Included	Included	Included	Included	Included
N	52,627	52,627	51,869	51,869	53,982	53,982
R^2	0.008	0.020	0.012	0.024	0.007	0.009

The table compares the relation between individual capital gains tax rates and expected returns across three tax rate changes in the United States: (1) the Revenue Reconciliation Act of 1978 (RA78), (2) the Taxpayer Relief Act of 1997 (TRA97), and (3) the Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA03). The sample comprises firm-month observations in the 48 months surrounding a change in capital gains tax rates (i.e., t–24 to t+23) and requires firms to have at least one observation pre and post each event. The table reports OLS coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm and year from regressing realized buy-and-hold returns (*RET*) on the tax variable (*CGRATE*) plus controls. To compare the relation across two events, we further interact *CGRATE* with a binary indicator *Earlier Event* and include the main effects and the interaction term in the model. We set *Earlier Event* to '1' for firm-years from the earlier event period (e.g., when comparing RA78 to TRA97, *Earlier Event* marks the period surrounding RA78). In line with Guenther and Sansing (2010), we demean the continuous *CGRATE* variable (using the sample mean) when computing the interaction term. For details on the dependent and control variables see Table 7. We include an intercept and one-digit SIC industry fixed effects in the regressions, but do not report the coefficients. We also report p-values from F-tests comparing the sum of two coefficients to zero. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

Table A1: Panel of Personal Tax Rates for Capital Gains and Dividends Over the Period 1990 to 2004 (by Country)

Panel A: Capital Gains Tax Rates (in Percent)

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
Argentina	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Australia	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	23.5	23.5	23.5	23.5	23.5
Austria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belgium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil	30.0	30.0	30.0	30.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Canada	37.1	37.1	37.1	39.3	39.9	39.9	39.7	38.7	37.7	36.6	31.9	23.2	23.2	23.2	23.2
Chile	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	45.0	45.0	45.0	45.0	40.0	40.0	40.0
China	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Czech Republic	–	–	–	–	–	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denmark	0.0	0.0	0.0	0.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	43.0	43.0	43.0	43.0
Finland	23.8	27.8	27.9	25.0	25.0	25.0	28.0	28.0	28.0	28.0	29.0	29.0	29.0	29.0	29.0
France	18.1	18.1	18.1	19.4	19.4	19.4	19.4	20.9	20.9	26.0	26.0	26.0	26.0	26.0	26.0
Germany	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Greece	–	–	–	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hungary	–	–	40.0	40.0	20.0	10.0	10.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	0.0
India	32.0	32.0	32.0	32.0	20.0	20.0	20.0	20.0	20.0	22.0	23.4	22.0	21.0	22.0	0.0
Indonesia	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Ireland	50.0	50.0	50.0	40.0	40.0	40.0	40.0	40.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Israel	–	–	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0
Italy	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Japan	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	10.0	10.0
Korea (South)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaysia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mexico	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Norway	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Pakistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Philippines	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Poland	–	–	40.0	40.0	45.0	45.0	44.0	44.0	44.0	0.0	0.0	0.0	0.0	0.0	19.0
Portugal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russian Federation	–	–	–	–	–	0.0	35.0	35.0	35.0	35.0	35.0	13.0	13.0	13.0	13.0
Singapore	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	10.0	10.0
Spain	11.2	11.2	10.6	37.3	37.3	37.3	20.0	20.0	20.0	20.0	18.0	18.0	18.0	15.0	15.0
Sweden	25.0	25.0	25.0	25.0	25.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Switzerland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taiwan	0.6	0.6	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Thailand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turkey	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
United Kingdom	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
United States	28.0	28.0	28.0	28.0	28.0	28.0	28.0	20.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0

(continued)

Table A1 (continued)

Panel B: Dividend Tax Rates (in Percent)

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
Argentina	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Australia	15.2	15.2	15.2	23.0	23.0	19.5	19.8	19.5	19.5	19.5	22.0	26.4	26.4	26.4	26.4
Austria	25.0	25.0	25.0	25.0	22.0	22.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Belgium	25.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Brazil	13.0	13.0	13.0	0.0	15.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada	41.3	42.1	43.1	46.8	47.9	47.9	35.1	34.3	33.4	32.7	32.3	31.3	31.3	31.3	31.3
Chile	35.0	35.0	35.0	35.0	33.0	30.0	30.0	30.0	45.0	45.0	35.3	35.3	32.9	28.6	28.1
China	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Czech Republic	–	–	–	–	–	25.0	25.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0	15.0
Denmark	46.9	45.0	45.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	43.0	43.0	43.0	43.0
Finland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
France	39.9	39.9	39.9	41.8	41.8	42.6	39.0	43.4	41.9	41.9	40.8	40.1	35.6	33.5	33.9
Germany	28.9	29.4	28.2	27.8	33.8	35.6	35.3	34.8	34.3	34.2	31.1	25.6	25.6	25.6	23.7
Greece	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hungary	–	–	10.0	10.0	10.0	10.0	10.0	27.0	35.0	46.0	46.0	46.0	46.0	46.0	35.0
India	62.0	62.0	62.0	52.0	40.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	35.0	0.0	0.0
Indonesia	35.0	35.0	35.0	35.0	35.0	30.0	30.0	30.0	30.0	30.0	30.0	35.0	35.0	35.0	35.0
Ireland	35.8	35.7	32.0	30.7	30.7	32.0	32.5	34.4	39.9	39.3	44.0	42.0	42.0	42.0	42.0
Israel	–	–	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Italy	37.1	39.6	50.4	50.4	50.3	50.3	50.3	50.3	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Japan	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	43.6	43.6	43.6	43.6	10.0
Korea (South)	55.0	55.0	55.0	55.0	48.5	48.0	48.0	48.0	48.0	44.0	44.0	44.0	39.6	39.6	39.6
Malaysia	35.0	35.0	35.0	34.0	34.0	32.0	30.0	30.0	30.0	30.0	29.0	29.0	28.0	28.0	28.0
Mexico	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	25.0	25.0	25.0	25.0
New Zealand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	8.9	8.9	8.9	8.9
Norway	28.6	25.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0
Pakistan	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Peru	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	4.1
Philippines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	10.0	10.0	10.0	10.0	10.0
Poland	–	–	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0	19.0
Portugal	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	20.0	20.0	20.0
Russian Federation	–	–	–	–	–	15.0	15.0	15.0	15.0	15.0	15.0	13.0	13.0	6.0	6.0
Singapore	33.0	33.0	33.0	30.0	30.0	30.0	28.0	28.0	28.0	28.0	28.0	26.0	22.0	0.0	0.0
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	46.0	46.0	46.0	46.0	46.0	38.4	38.4	38.4	38.4	27.2	27.2	27.2	27.2	23.0	23.0
Sweden	66.2	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Switzerland	40.9	40.9	41.5	42.4	42.4	42.4	42.4	42.4	42.4	42.4	42.1	41.5	41.0	40.4	40.4
Taiwan	40.0	40.0	40.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0
Thailand	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	10.0	10.0	10.0	10.0	10.0	10.0
Turkey	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.2	31.2	31.2	23.5	22.5
United Kingdom	20.0	20.0	20.0	25.0	25.0	25.0	25.0	25.0	25.0	33.3	25.0	25.0	25.0	25.0	25.0
United States	28.0	31.0	31.0	39.6	39.6	39.6	39.6	39.6	39.6	39.6	39.6	39.1	38.6	15.0	15.0

(continued)

Table A1 (continued)

The table presents a panel of the maximum statutory capital gains tax rates (Panel A) and dividend tax rates (Panel B) in 44 countries with data available to estimate our main regressions over the 1990 to 2004 period. The tax rates are effective rates incurred by individual investors with non-substantial stockholdings that qualify for long-term capital gains tax treatment. We start the collection of the tax rate data with the OECD tax database (http://www.oecd.org/tax/tax-policy/tax-database.htm), and complete and cross-check the panel with various annual publications from the Big 4 accounting firms. Specifically, we use the Worldwide Tax Summaries published by PricewaterhouseCoopers (previously Coopers & Lybrand), the Ernst & Young Worldwide Personal Tax Guides, and KPMG's Individual Tax Rate Surveys. We also compare our data to the rates in Becker, Jacob, and Jacob (2013) and make adjustments when appropriate. In case of inconsistencies among the different sources or when data were missing, we rely on the sources with most detail and, if necessary, try to resolve the issues by contacting tax experts in the local offices of the accounting firms.

Table A2: Additional Sensitivity Analyses of Conditional Relation between Capital Gains Tax Rates and Expected Returns

Models 1 to 3 in Table 4 Serve as Base Specification	*RET as Dependent Variable* (1) *CGRATE* $BETA_{High}$*	(2) *CGRATE* $MKTBETA_{High}$*	(3) *CGRATE* RFR_{Low}*	*COC as Dependent Variable* (1) *CGRATE* $BETA_{High}$*	(2) *CGRATE* $MKTBETA_{High}$*	(3) *CGRATE* RFR_{Low}*
(1) Alternative Control Variables:						
- Include MKTBETA and RFR	-0.231***	-0.399***	-0.186***	-0.000	-0.026***	-0.055***
	(-8.90)	(-10.85)	(-4.78)	(-0.02)	(-5.83)	(-11.67)
- Include MKTBETA and RFR_{real}	-0.216***	-0.386***	-0.590***	0.000	-0.032***	-0.044***
	(-8.29)	(-10.54)	(-17.27)	(0.11)	(-6.97)	(-9.47)
(2) Alternative Proxies for Market Risk and Risk-Free Rates:						
- Return Variability (RETVAR)	–	-0.519***	–	–	0.001	–
		(-15.09)			(0.40)	
- Implied Risk Premium (MKTCOC)	–	-0.090***	–	–	-0.007	–
		(-2.69)			(-1.60)	
- Real Risk-Free Interest Rates (RFR_{real})	–	–	-0.476***	–	–	-0.031***
			(-14.11)			(-6.70)
(3) Alternative Clustering and Fixed Effects:						
- Two-Way Clustering by Firm and Year	-0.268***	-0.525**	-0.239	-0.002	-0.052***	-0.039***
	(-3.02)	(-2.24)	(-0.72)	(-0.50)	(-4.91)	(-4.69)
- Clustering by Country-Industry	-0.268***	-0.525***	-0.239	-0.002	-0.052***	-0.039**
	(-3.50)	(-2.68)	(-1.30)	(-0.34)	(-5.40)	(-3.00)
- Firm Fixed Effects	-0.263***	-0.358***	0.035	-0.003	-0.036***	-0.027***
	(-7.23)	(-9.01)	(0.81)	(-0.61)	(-7.91)	(-4.98)
(4) Alternative Sample Composition:						
- All Countries with Data Available	-0.085***	-0.152***	-0.308***	-0.003	-0.034***	-0.009***
	(-4.61)	(-5.94)	(-13.54)	(-1.21)	(-10.84)	(-3.09)
- Limit Influence of Large Sample	-0.123***	-0.080**	0.013	-0.004	-0.029***	-0.045***
Countries (U.S.A. and Japan)	(-4.38)	(-2.13)	(0.34)	(-0.80)	(-6.12)	(-8.41)
- Eliminate ΔCGRATE Years	-0.245***	-0.466***	-0.266***	-0.004	-0.057***	-0.039***
	(-9.16)	(-13.08)	(-6.80)	(-0.94)	(-13.83)	(-7.93)
(5) Alternative Tax Rates:						
- Becker, Jacob, and Jacob (2013)	-0.232***	-0.310***	-0.094***	0.002	-0.035***	-0.004
Tax Rates	(-10.41)	(-10.84)	(-3.24)	(0.75)	(-12.39)	(-1.07)

(continued)

Table A2 (continued)

The table reports various sensitivity analyses of the conditional relation between individual capital gains tax rates and expected returns. The base sample comprises firm-year observations from 25 countries with non-zero capital gains tax rates over the 1990 to 2004 period (see Table 1). Buy-and-hold returns (*RET*) and implied cost of capital (*COC*) serve as dependent variables. We report results for the following specifications: First, we use alternative control variables and include the raw values of aggregate market risk (*MKTBETA*) and risk-free interest rates (*RFR*) into the model. We do this with nominal risk-free interest rates as well as real risk-free interest rates, using the following formula: $(1+RFR_{real})*(1+\text{Inflation}) = (1+RFR)$. Second, we employ different proxies for the computation of aggregate market risk. Specifically, we use the country-year standard deviation of daily returns on the local market index (*RETVAR*) and, in line with Damodaran (2012), the country-year median firm-level implied cost of capital (*MKTCOC*) to create the binary indicator for high versus low market risk. We also use the real risk-free rates (RFR_{real}) to create the binary indicator for low versus high risk-free investment returns. Third, we use alternative clustering criteria when computing standard errors and fixed effects structures. That is, we apply (i) two-way clustering by firm and year, (ii) clustering by country-industry combinations, and (iii) we replace the country and industry fixed effects with firm fixed effects. Fourth, we change the composition of the sample. That is, we (i) add all observations from countries without capital gains taxation for individuals (see Table A1 in the Appendix), (ii) limit the influence of large sample countries by only including randomly selected 14,000 (5,000) firm-years for each the U.S.A. and Japan in the *RET* (*COC*) analyses, and (iii) drop observations in years with substantive changes in capital gains tax rates exceeding 5 percentage points ($\Delta CGRATE$) from the sample. Fifth, we replace our capital gains and dividend tax rates with the rates from Becker, Jacob, and Jacob (2013), Table 2, where available. Unless indicated otherwise, we include the full set of control variables and fixed effects (see Models 1 to 3, respectively, in Table 4), but only report OLS coefficient estimates (*t*-statistics with firm clustering) for the interaction term of *CGRATE* with the binary indicator variables representing firm-years with high firm-level risk ($BETA_{High}$), high market-wide risk ($MKTBETA_{High}$), and low risk-free interest rates (RFR_{Low}). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).