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Do country risk factors attenuate the effect of taxes on corporate risk-taking?[1]

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Abstract

This study investigates whether country risk factors, including political and fiscal budget risk, attenuate the effectiveness of tax policy tools that aim to encourage corporate risk-taking. Exploiting a cross-country panel, we predict and find that the effectiveness of loss offset rules and tax rate changes is fully attenuated for firms located in high-risk countries. We document the attenuating effect of country risk is more pronounced in high-tax countries or when countries increase their corporate tax rate. Additional tests around the U.S. federal budget crises from 2011 to 2013 indicate that temporarily heightened fiscal budget risk attenuates the effectiveness of loss offset rules even in countries with low political risk. We identify conditions (low political and low fiscal budget risk) under which targeted tax policy tools effectively stimulate risk-taking. This suggests that ensuring taxpayers receive tax refunds is important in times of economic crises with budgetary or political challenges.

Keywords: corporate risk-taking; country risk; fiscal budget risk; investment incentives; loss offset; political risk

JEL classification: H25, H32, G32

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1. Introduction

This study investigates whether country-specific risk factors mitigate the effectiveness of tax policy designed to encourage corporate risk-taking. Political actions often target corporate risk-taking because it is associated with economic growth. Recent policy reports indicate that tax policy is an effective tool to foster investments by creating an attractive tax environment (IMF 2017) and as response to the COVID-19 pandemic (IMF 2020). However, corporate risk-taking, reportedly "depend[s] on country-specific circumstances [and] policy and institutional risk factors" (IMF 2017). We define country risk as taxpayers' risk that they will not receive tax refunds on losses because of institutional environment, including governance and administration of tax policy or fiscal reasons.[1] Specifically, this study investigates whether and to what extent country risk affects the ability of direct tax policy tools (tax rate and loss offset changes) to encourage corporate risk-taking.

Corporate tax rate changes and comprehensive loss offset rules are direct policy tools because they provide cash flows for initial losses and decrease the cost of investing in risky projects. Policymakers can use these tools easily and therefore are prone to use them as direct investment measures (Graham and Kim 2009; IMF 2017). By contrast, alternative instruments that indirectly encourage corporate risk-taking by creating a favorable investment climate, such as governance institutions, are difficult to adjust in the short-term and relatively stable over time (John, Litov, and Yeung 2008; Dharmapala and Hines 2009). Prior literature documents the effectiveness of tax rate changes and loss offset rules and emphasizes the stimulating potential of loss carrybacks but does not account for country-specific risk factors (Ljungqvist, Zhang, and

[1] Our definition of fiscal budget risk captures financial constraints of governments arising from interest payments and repayments of principal. Hence, it is a broader construct that differs from more specific risks such as sovereign risk that limits fiscal policy (e.g. Bianchi, Ottonello, and Presno 2019) or inflation that relates to monetary policy.

Zou 2017; Langenmayr and Lester 2018).[2] While these policy tools are prominent examples of cash-effective policy tools, their effectiveness to trigger economic growth depends on the country's institutional environment and fiscal constraints.

We distinguish between *political* and *fiscal budget risk* as elements of country risk and investigate whether they counteract the tax incentive from tax rate changes and loss offset provisions. Scaled by the tax rate, they determine the amount of tax refunds and whether tax refunds are viable. Tax policy will affect firms' behavior only if firms can reasonably expect to receive timely tax refunds. We define *political risk* to capture overall country governance as it manifests in government effectiveness affecting tax collections and refunds on losses. Countries with *low* political risk implement and administer tax policy efficiently and pay tax refunds reliably (Kaufmann, Kraay, and Mastruzzi 2011; Vegh and Vuletin 2015). These countries credibly commit not to expropriate companies through unfavorable regulations and to provide timely refunds. Countries with *high* political risk do not. For example, Donnelley (2017) describes how political risk by the tax authority in South Africa systematically delayed tax refunds to taxpayers, causing companies to hoard funds otherwise available for investments and question the timing and amount of any future refunds (Khumalo 2017; PwC and WBG 2018).

We also consider *fiscal budget risk*. Fiscal budget risk arises when governments face liquidity constraints, arising from a variety of sources regardless of political risk. Anecdotal evidence corroborates our argument that fiscal budget risk occurs in countries with both relatively low and high levels of political risk (IMF 2016; Daily Times 2018; Parlapiano and Yourish 2018). For example, low credit ratings in Pakistan or Ukraine (high political risk), or government shutdowns in the United States (low political risk) affect government liquidity.

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[2] Specifically, we examine the association between country-specific risk factors and risk-taking for firms domiciled in the respective country. See Section 3 for details.

Two streams of research motivate our paper. First, Domar and Musgrave (1944) demonstrate that risk-averse investors increase risk-taking when governments share corporate risks through comprehensive loss offset provisions and the underlying tax rate (Domar-Musgrave effect). Recent empirical studies provide evidence that firms share risk with the government through the corporate tax system and that corporate loss offset provisions, especially loss carrybacks, matter (Ljungqvist et al. 2017; Langenmayr and Lester 2018). However, these studies only find a negative association between tax rate *increases* and risk-taking with no corresponding effects for tax rate cuts. This asymmetry in risk-taking responses to tax rate changes is inconsistent with Domar and Musgrave's theory. One potential explanation for this inconsistency is that country-level risk factors affect the critical tax rate. Therefore, we consider the underlying Domar-Musgrave mechanism in its full complexity including the interaction of tax rate level, tax rate changes and loss offset provisions.[3]

The second stream of literature motivating our paper documents that country risk factors affect the overall level of corporate investment, financing and capital structure decisions, as well as risk-taking (Desai, Foley, and Hines 2008; John et al. 2008; Dharmapala and Hines 2009). Relatedly, Hassan, Hollander, van Lent, and Tahoun (2019) document a negative association between political risk and firms' investment using a firm-level measure of political risk. This stream of literature suggests that countries with reliable institutions and governance show strong

[3] Prior literature investigates the interaction of broader country risk and taxes not in a Domar-Musgrave setting. For example, Hail, Sikes, and Wang (2017) investigate the effect of capital gains taxes and government institutions *on individuals' expected market returns* absent of loss offset restrictions. By contrast, we examine *corporate risk-taking* under profit taxes with loss offset restrictions.

correlations between taxes and investment indicating that tax policy is likely to be used as a promising investment policy measure.[4]

We extend the Domar-Musgrave model by integrating the attenuating effect of country risk on risk-taking in response to tax policy changes. Our model yields three predictions. First, country risk factors reduce the effectiveness of loss offset provisions to induce corporate risk-taking. Second, in the presence of country risk, it is more likely that *a tax rate increase* discourages risk-taking than in the absence of country risk. Third, the observed effect of country risk increases in the underlying corporate tax rate, which amplifies the impact of country risk.

We empirically test our predictions using a cross-country panel. In our primary analysis, we exploit 52 increases and 183 decreases in corporate tax rates and 49 changes in loss offset provisions affecting 25,906 firms domiciled in 64 countries from 1992 to 2012. Consistent with prior literature (John et al. 2008; Langenmayr and Lester 2018), we use the standard deviation of a firm's country-industry demeaned return on assets (*ROA*) to measure risk-taking. This approach removes the potential effects of macroeconomic cycles and isolates firm-specific risk-taking responses to changes in tax rates and loss offsets.

We first provide evidence for the first prediction of our model that high *political risk* attenuates the association between changes in loss offset rules and corporate risk-taking. To put our findings in perspective: the adoption of a loss carryback regime in countries with *political risk* below the median (e.g., Spain) is associated with a 13.8 percent *increase* in corporate risk-taking. A carryback rule adoption in countries above the median (e.g., Mexico) does not

[4] Political and fiscal budget risk may by partially due to country-specific economic risk. Beyond the extent country-specific economic risk translates into political and fiscal budget risk, we abstract from economic risk as a separate country risk-factor. However, as country-specific economic risk is either captured by political or fiscal budget risk or the expected cash flows of the underlying firm, we account for economic risk via these two channels implicitly both in our theoretical and our empirical model. We address this concern in our robustness tests in Section 6.

significantly increase risk-taking. Similarly, we find that high *fiscal budget risk* fully attenuates the association between changes in loss offset rules and corporate risk-taking suggesting loss carrybacks are ineffective to foster corporate risk-taking in high-risk countries.

Second, our theoretical model predicts that tax rate increases discourage risk-taking in environments with high country risk. Our empirical results confirm this prediction for political and fiscal budget risk yet indicate a more pronounced negative impact of *fiscal budget risk*. Lastly, we test our third prediction that tax rates scale the effect of country risk. Consistent with our predictions, we find a more pronounced negative effect of country risk in countries with high corporate tax rates compared to countries with low tax rates. Consequently, high (low) country risk also reduces (increases) the critical tax rate described in the Domar-Musgrave model making tax policies in high-tax countries particularly vulnerable to country risk. In additional country-level analyses, we document an attenuating effect of country risk on aggregate risky investments such as research and development (R&D) expenditures and patent applications.

To mitigate concerns that our results reflect general effects of country risk rather than the attenuating effect of country risk on the effectiveness of tax policy, we exploit a narrower setting in a second set of analyses. This setting mitigates endogeneity concerns as it includes firms located in comparable countries in which one country experienced a temporary increase in fiscal budget risk. Specifically, we examine the time around the debt ceiling, fiscal cliff, and government shutdown in the United States (from 2011 to 2013). In this period, the federal government suffered a sequence of budget crises that potentially attenuated the effectiveness of tax policy measures (Hassan et al. 2019). We exploit this setting in a repeated difference-in-differences design that compares risk-taking of U.S. firms to Canadian firms with similar economic conditions and loss offset rules (first difference) around each event of the budget crises from 2011 to 2013 (second difference).[5] We provide evidence that U.S. firms with access to loss carrybacks exhibit a lower level of risk-taking compared to control firms only during the time of the U.S. budget crises. This finding indicates that fiscal budget risk, even in economically well-performing countries with only a moderate level of political risk, is an important attenuating factor for the effectiveness of tax policy tools. A battery of robustness tests that examine the sensitivity of our results supports our findings.[6]

Our study contributes to three streams of literature. First, we contribute to the literature on the effect of tax policy on corporate risk-taking and investment (e.g., Ljungqvist et al. 2017; Bethmann, Jacob, and Müller 2018; Langenmayr and Lester 2018). We provide theoretical and empirical evidence that the effectiveness of tax policy on corporate risk-taking and investment varies with the level of country risk. Our findings inform policymakers' decisions on direct (tax policy) and indirect (institutional) measures to foster risky investment. Second and more specifically, we add to the literature on the Domar-Musgrave effect by providing evidence that country risk affects the critical tax rate which ultimately determines outcomes of tax policy.

Lastly, we add to research on the design of corporate tax systems to incentivize corporate investment and risk-taking (Djankov, Ganser, McLiesh, Ramalho and Shleifer 2010; Vegh and Vuletin 2015). We respond to the call of Mills (2019) for more analyses of tax reforms building on institutional knowledge, theories and methods. Specifically, we are the first to document that the effectiveness of tax policy to foster investment and risk-taking crucially depends on fiscal budget risk. This result extends prior literature that only considers political risk (Dharmapala and

[5] The difference-in-differences design also mitigates concerns that time-series variation in country risk is limited and hence it is difficult to separate first-order effects of country-level risk from tax policy measures. Our setting focuses on a significant increase in fiscal budget risk enhancing our identification strategy and internal validity of the documented effect.
[6] See Section 6 for details.

Hines 2009; Hail, et al. 2017). Our study sheds light on conditions under which targeted tax policy tools are effective.[7] Importantly, we document the effectiveness of the underlying tax policy tools is sensitive to temporarily heightened fiscal budget risk, even in countries that are characterized by reliable institutions and governance like the U.S. This has important policy implications for current discussions about the effectiveness of government stimuli around the world (e.g., immediate loss carrybacks). Our findings indicate that ensuring taxpayers receive tax refunds is important in times of economic crises with budgetary or political challenges.

2. Background and Hypotheses Development

2.1 Theoretical Model

The seminal paper by Domar and Musgrave (1944) lays the theoretical foundation that explains the effect of taxation on investors' risk-taking. They model an investor who "weigh[s] the advantage of a greater return, or yield, against the disadvantage of a possible loss, or risk" (Domar and Musgrave 1944, 388). Generally, taxes reduce yields and discourage investments of a risk-averse investor. However, the authors demonstrate under a complete loss offset that the government's "share-in" can increase risk-taking of investors. If risk-averse investors maximize their expected utility, they attribute a higher weight to the increase in utility from an expected tax refund on losses than disutility to the expected tax burden on profits. The size of this effect is driven by three factors: the tax rate (the higher the tax rate the more pronounced is this sharing effect), the degree of risk aversion, and the extent of loss offset provisions. However, absent or

[7] Prior literature defines country risk as a broad concept. For example, Hail et al. 2017 describe political risk as trust in government institutions captured by "no corruption" and "tax morale". By contrast, we focus on country-level conditions that are crucial for companies to trust a reliable tax benefit. We decompose country-level risk into political and fiscal risk. Furthermore, we exploit the cross-country variation in *loss offset restrictions* across countries and over time to study their effectiveness to encourage risky *corporate* investments under different levels of country risk.

limited loss offset possibilities cause the investor to reduce risk-taking once taxes are imposed. The overall effect is either positive or negative due to these two opposing effects.

<Insert Figure 1 about here>

As illustrated in Figure 1, the Domar and Musgrave findings indicate that risk-taking (σ) increases in the extent of loss offset (λ) for a given tax rate (t). Here, loss offset restrictions are described by a level of loss offset λ below 1 which captures all features of codified loss offset restrictions such as loss carry backwards, loss carry forwards and limitations in the maximum amount of loss offset or time limits in carryback or carryforward periods.[8] However, under a limited loss offset rule it is more likely that this increase in risk-taking reverses for a high tax rate. If the tax rate exceeds a critical threshold then the investors will decrease risk-taking for a given level of loss offset.

To illustrate the forces at work both without and with country risk we develop the model stepwise. In the first step, we abstract from country risk. Consistent with prior literature (Domar and Musgrave 1944; Atkinson and Stiglitz 1980; Langenmayr and Lester 2018), we assume a firm that aims to invest a fixed amount I chooses the level of risk σ involved. Domar and Musgrave assume risk-averse individual investors, while the empirical studies focus on corporations. Consistent with empirical evidence showing corporations exhibit risk-averse characteristics in their investment profile (Hunter and Smith 2002; Purnanandam 2008) we assume a risk-averse corporate decision-maker.[9] With probability p the invested amount I generates a profit given by the function $f_g(\sigma)$ with $f_g(\sigma) > 0$ (good state of nature), with

[8] Empirical research provides evidence that half of the accumulated tax value of loss carryforwards erodes because of loss offset restrictions and insufficient profits in the future (Cooper and Knittel 2006; Edgerton 2010).
[9] Moreover, managers derive their utility from the firm's returns as manager compensation is typically linked to firm performance (Guay 1999; Hall and Murphy 2002; Coles, Daniel, and Naveen 2006; Lewellen 2006) and therefore are risk-averse in their corporate decisions.

probability $(1-p)$ a loss of $f_b(\sigma) < 0$ is incurred (bad state of nature). We assume a net-of-taxes utility function of the risk-averse decision-maker $U\left[(1-t)\left(f_g(\sigma) - I\right)\right] = U\left[f_g\right] - B$ and $U[(1-t)(f_b(\sigma) - I)] = U[f_b] + A$, where B denotes the decrease in utility due to the tax payment on the profit in the good state of nature and A the increase in utility due to the tax refund from loss offset in the bad state of nature. Due to risk-aversion, the utility gain from a full tax refund is larger than a corresponding expected utility loss from taxes on profits ($A > B$).

We assume for the post-tax profit in the good and the after-tax loss in the bad state of nature $\pi_g = (1-t) \cdot \left(f_g(\sigma) - I\right) > 0$ and $\pi_b = (1 - \lambda t) \cdot (f_b(\sigma) - I) < 0$, where $\lambda = 1$ indicates a full loss offset while $\lambda < 1$ describes loss offset restrictions and $\lambda = 0$ the absence of loss offset provisions. More generous loss offset rules increase the optimal level of risk-taking (Domar and Musgrave 1944; Atkinson and Stiglitz 1980) due to increased risk sharing with the government. The expected tax refund on losses adds more to the risk-averse decision-maker's expected utility than a corresponding expected tax burden on profits decreases utility (Figure 2).

<Insert Figure 2 about here>

The direction of the overall tax effect switches for tax rates higher than the critical tax rate. For more details on the underlying opposing effects see Appendix A. To show this mechanism formally we determine the partial derivative of the expected risk-utility function $E[U]$ with respect to σ and finally obtain the first order condition (FOC) $\frac{\partial E[U]}{\partial \sigma} = 0$ with respect to the level of loss offset λ finally (see Appendix B)

$$\frac{d\sigma}{d\lambda} = \frac{(1-p) \cdot t \cdot f_b'(\sigma) \cdot \left[U'[\pi_b] + U''[\pi_b] \cdot \pi_b\right]}{SOC} > 0, \quad (1)$$

with the second order condition, $SOC < 0$ (see proof in Appendix B). Greater loss offset λ unambiguously increases risk-taking σ. The tax rate t scales both the size of the tax refund and the risk-taking effect (numerator).[10]

By contrast, the overall effect of the tax rate on corporate risk-taking is ambiguous. While higher tax rates often induce increased risk-taking, tax rates that exceed a critical threshold lead to a reversed effect.[11] This ambiguity is obvious in Figure 1 and can be formally described by

$$\frac{d\sigma}{dt} = \frac{\begin{array}{c} p \cdot U''[\pi_g] \cdot \pi_g \cdot f_g'(\sigma) + p \cdot U'[\pi_g] \cdot f_g'(\sigma) \\ +(1-p) \cdot U''[\pi_b] \cdot \lambda \cdot \pi_b \cdot f_b'(\sigma) + (1-p) \cdot U'[\pi_b] \cdot \lambda \cdot f_b'(\sigma) \end{array}}{SOC} \gtreqless 0. \quad (2)$$

First, increasing the tax rate reduces the return from additional risk-taking in the good state of nature but simultaneously increases the marginal utility of the additional profit. Second, under full loss offset a higher tax rate increases risk-taking while under no loss offset the tax rate decreases risk-taking. Both effects are visible in the numerator. As after-tax losses (π_b) also determine the marginal utility, the effect from risk aversion is a function of the tax rate. Therefore, this effect decreases in the tax rate (see Figure 2, Appendix A, and Appendix C).[12]

In the spirit of Domar-Musgrave, recent empirical studies on corporate risk-taking assume a permanent and unobstructed risk-sharing between government and firm.[13] They do not capture all types of risk involved in a risky investment. These studies either account for operational risk or political risk, but not both. In addition, they do not account for the interactive

[10] In empirical tests of H1, we account for the scaling effect of tax rates by including an interaction term of loss offset and tax rates. We investigate the scaling effect of tax rates in H2 and H3 (see Section 4 for details).
[11] A higher tax rate mitigates the intensity of this effect as a higher tax rate and the resulting larger tax refund leads to higher utility levels and lower marginal utility in the bad state. Moreover, the tax rate directly affects corporate risk-taking. However, the direction of this effect is ambiguous (Figure 1).
[12] See Propositions 1 and 2 in Langenmayr and Lester (2018).
[13] Langenmayr and Lester (2018) and Ljungqvist et al. (2017) their empirical analyses provide evidence that both loss offset rules and tax rates affect corporate risk-taking and that the benefits from loss offsets increase in the tax rate. The studies use a cross-country sample of Western European countries and the U.S. and staggered changes in corporate income tax rates across U.S. states, respectively.

effects of country risk factors and changes in tax rates and loss offset rules. However, the finance literature (Desai et al. 2008; John et al. 2008) provides strong evidence that several firm decisions, such as capital structure decisions, are directly or indirectly influenced by political risk (De Jong, Kabir, and Nguyen 2008; Kesternich and Schnitzer 2010).[14] Also Hail et al. (2017) support this view for individual investors. They find that the negative association of capital gains taxes (absent of loss offset restrictions) and individuals' expected market returns is particularly strong in countries with more trust in government institutions.

We examine and define country risk as country-specific uncertainty triggered by two sources. *Political risk* and *fiscal budget risk* associated with the country-specific ability to collect and refund taxes (Erb, Harvey, and Viskanta 1996; Kesternich and Schnitzer 2010; Kaufmann et al. 2011; Damodaran 2017).[15] Theoretical arguments and prior literature suggest these two sources of country risk affect the ability of tax rate changes and loss offset changes to encourage corporate risk-taking. Prior literature identifies three main factors of *political risk*: differences in institutional development (La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1998), legal protection of investors (Henisz 2000; John et al. 2008), and threat of opportunistic expropriation through changes in taxation, regulation, or other financial constraints (Kaufmann et al. 2011; Baker, Bloom, and Davis 2016). All three factors impact the propensity of a government to refund taxes on losses. *Political risk* is associated with reduced risk-taking, investment, and employment for firms within a country (Desai et al. 2008; John et al. 2008; Dharmapala and Hines 2009; Hassan et al. 2019). While *political risk* can result in the non-payment of taxes

[14] We document that country risk factors provide one explanation for the inconsistent findings of prior literature within the Domar-Musgrave framework. However, further or alternative potential explanations build on the findings in prospect (Kahneman and Tversky 1979) and salience theoretical analyses (Bordalo, Gennaioli, and Shleifer 2012), which should be scrutinized empirically in future research.

[15] Please refer to Section 3 for details on the proxies used for country risk.

through lax enforcement by the tax administration and arbitrary enforcement of tax payments, it can also be an obstacle to tax refunds.

Fiscal budget risk stems from financial constraints of a country's government. One source of financial constraints arises from interest payments and repayment of principle in the future (Hamilton and Flavin 1986). The resulting fiscal budget constraints further limit the ability of a government to provide refunds for firms' loss offsets. This is particularly pronounced if many firms in an economic downturn make use of loss carrybacks because the government faces lower current revenues and is obligated to provide cash tax refunds (Alfonso, Gomes, and Rother 2011; Vegh and Vuletin 2015). While firms prefer carrybacks over carryforwards because of the immediate cash inflow effect, governments suffer from this immediate negative cash flow effect. Tax refunds amplify the negative budgetary effects for governments that arise from macroeconomic crises (Dwenger 2008; Dobridge 2016).

In the first step of our theoretical model, we implicitly assume that the overall risk exposure in the model is driven by all kinds and sources of risk, including country risk. However, to improve the empirical specification it is worthwhile to integrate country risk explicitly into the model in the second step. If the investment's risk exposure is affected by country risk, this translates in theoretical terms into a decrease in the effective loss offset potential. In the following $\hat{\lambda} = \theta\lambda$ captures the loss offset potential under country risk, where θ is the country risk coefficient. $\theta = 1$ describes the absence of country risk while $0 \leq \theta < 1$ indicates that the country of investment is characterized by political or fiscal budget risk that jeopardize tax refunds. Thus, we implicitly assume that the country risk multiplier θ is an attenuator of the effectiveness of the loss offset provision.[16] From $\hat{\lambda} = \theta\lambda$ and $\frac{d\sigma}{d\lambda} > 0$ (eq. (1)) we obtain for the effect of loss offset restrictions (λ) and country risk $(\theta < 1)$ on optimal risk-taking $(\hat{\sigma})$

$$\frac{d\hat{\sigma}}{d\hat{\lambda}} = \frac{(1-p)\cdot t\cdot f_b'(\hat{\sigma})\cdot\left[U'[\pi_b]+U''[\pi_b]\cdot\pi_b\right]}{\widehat{SOC}} < \frac{(1-p)\cdot t\cdot f_b'(\sigma)\cdot\left[U'[\pi_b]+U''[\pi_b]\cdot\pi_b\right]}{SOC} = \frac{d\sigma}{d\lambda} \tag{3}$$

with $\frac{d\hat{\sigma}}{d\hat{\lambda}} > 0$, $\widehat{SOC} < 0$ and $\widehat{SOC} < SOC.$ As country risk only changes the level of effective loss offset $(\hat{\lambda} < \lambda)$ if $\theta < 1$ the direction of the effect, again, is uniform and positive. Lower effective loss offset, i.e., lower expected tax refunds due to country risk, reduce risk-taking as loss offset restrictions do in general. Focusing on the effect of country risk $(\theta < 1)$, we find

$$\frac{d\hat{\sigma}}{d\theta} = \frac{(1-p)\cdot\lambda\cdot t\cdot f_b'(\hat{\sigma})\cdot\left[U'[\pi_b]+U''[\pi_b]\cdot\pi_b\right]}{\widehat{SOC}} > 0. \tag{4}$$

An increase in country risk, i.e., a decrease in $\theta,$ uniformly reduces risk-taking. Furthermore, we can easily see that $\frac{d\hat{\sigma}}{d\theta}$ increases in the tax rate $t.$

In summary, in this model country risk generates three effects on risk-taking (eq. (3) and (4)). Firstly, the impact of loss offset provisions in the face of country risk is lower than in the absence of country risk-induced limits to tax refunds (eq. (3); illustrated in Figure 3 as effect 1). Secondly, country risk reduces the effectiveness of the tax incentive from loss offset provisions making it more likely that a tax rate increase discourages risk-taking (eq. (4), Figure 3, effect 2). Thirdly, this impact of country risk on risk-taking is scaled by the tax rate (eq. (4); Figure 3, effect 3).

<Insert Figure 3 about here>

[16] This approach to model country risk allows a whole array of interpretations, such as country-specific risk arising from rejected or missing tax refunds due to administrative inefficiency, budgetary illiquidity, tax base disputes that culminate into a reduced deductible tax loss etc.

Figure 3 exemplifies all three effects for a common risk-averse attitude, i.e., for a logarithmic risk utility function (constant relative risk aversion). We find a critical tax rate (circle) that exactly neutralizes the risk sharing mechanism. As a consequence of country risk (dashed lines), this critical tax rate is much lower than in the absence of country risk (solid lines).

2.2 Hypotheses Development

Motivated by the mixed empirical evidence on tax policy and corporate risk-taking and these theoretical mechanisms, we predict that increased country risk attenuates the positive association between loss offset provisions and firm risk-taking. We predict that increased country risk shifts the portion of the risk shared between the firm and the government towards the firm for those firms that are located in a country with high country risk. Hence, firms exposed to high country risk bear additional risk relative to comparable firms exposed to low country risk. Consequently, a similar change in tax rates and/or loss offset rules under high country risk leads to a smaller change in corporate risk-taking or even a reverse effect. These theoretically deducted mechanisms suggest that the findings of prior literature are not generalizable to countries with high levels of country risk. Based on this rationale, we develop three testable hypotheses.

First, governments of countries with higher country risk are more inclined to tax companies' profits but are reluctant to share in losses, leading to a negative effect on corporate risk-taking (Dharmapala and Hines 2009). This effect is more pronounced if tax rates are high. Figure 3 illustrates this as effect 1. Specifically, the figure illustrates that for each and every combination of tax rate (t) and level of loss offset provision (λ) country risk decreases the optimal level of risk-taking. This country risk effect (effect 1 in Figure 3) is reflected in a downward shift of all dashed lines (in comparison to the respective solid lines in the same color).

We expect that country risk is a complex construct capturing factors that are particularly crucial for tax refunds on losses. To identify those country risk factors that are important attenuators of tax policy measures, we decompose country risk into political and fiscal budget risk. Based on this rationale, we conjecture the following:

H1a: Political risk of a country attenuates the positive association between loss offset provisions and corporate risk-taking.

Correspondingly, we investigate the effect of fiscal budget risk on risk-taking. As anecdotal evidence and prior research indicate, governments can mitigate budget constraints by stretching the duration to provide cash tax refunds to taxpayers (Dwenger 2008; Dobridge 2016). This negatively affects corporate risk-taking because firms face losses and only delayed (cash) refunds for carrybacks or decreased expectations of future tax refunds on carryforwards. Recent research provides evidence that governments actively use tax policy tools to balance public spending in economic downturns and upturns (Goncharov and Jacob 2014, Vegh and Vuletin 2015, Costello, Petacchi, and Weber 2017). Therefore, we predict the following:

H1b: Fiscal budget risk of a country attenuates the positive association between loss offset provisions and corporate risk-taking.

Second, we demonstrate in equation (4) of the model that for a given corporate *tax rate increase*, country risk attenuates the positive association between loss offset provisions and corporate risk-taking. As illustrated in Figure 3 (effect 2), country risk shifts the critical tax rate to the left, making it more likely that a tax rate increase affects risk-taking negatively. Hence, we predict the following:

H2: A tax rate increase is more likely to discourage risk-taking if country risk is high.

Third, we demonstrate in our theoretical model (eq. (4)) that the moderating effect of country risk on the tax loss offset provision increases in the underlying corporate tax rate. This relation is also illustrated as effect 3 in Figure 3. The distance between the solid and dashed lines increases in the tax rate leading to a more pronounced effect of country risk for high tax rates compared to low tax rates. Therefore, in our third hypothesis, we conjecture:

H3: The negative impact of country risk on corporate risk-taking increases in the country's tax rate.

There are at least two possible explanations why we might not find the hypothesized relation between country risk and corporate risk-taking. First, firms might not be sensitive to targeted tax policy measures as non-tax related factors (e.g., nature of investment or underlying business model) dominate their investment decisions. In contrast to a capital market setting (Hail et al. 2017), corporate investments include a variety of very different and partially less responsive assets. Capital market investments are characterized by high trade volumes and quick responses to new developments, making them more sensitive to country risk. Second, country risk could have a broader scope than we define.[17] This might be crucial for attenuating corporate risk-taking.

3. Empirical Analyses

3.1 Cross-country Panel and Empirical Identification Strategy

We use a sample of firms domiciled in 64 countries over the period 1992 to 2012 to test our hypotheses. A cross-country study allows us to investigate the effectiveness of loss offset rules dependent on the country's characteristics as it offers a setting with greater variation in tax

[17] General country risk could imply country-specific political risk (e.g., corruption and low tax morale, Hail et al. 2017) or firm-level political risk (e.g., portion of conference calls devoted to political risks topics, Hassan et al. 2019).

rate changes, loss offset rules, political, and fiscal budget risk across countries (Djankov et al. 2010; Vegh and Vuletin 2015). We select 1992 as a starting point because Eastern European and other emerging markets started their transition to the market system and capital market liberalizations around this year (Bekaert and Harvey 2002). Importantly, our sample comprises a substantial portion of the world including developed and developing countries.[18] Figure 4 provides an overview of our sample countries.

<Insert Figure 4 about here>

While many country risk factors are relatively time-invariant or changing slowly, several shocks in our sample period allow us to exploit changes in political, and fiscal budget risk as well as tax policy changes.[19] The sample period includes several economic shocks, such as the Asian crisis in 1997/98, the dot-com bubble in 2000/2001, and the financial crisis in 2008. Our sample ends in 2012 because we require data for two subsequent years (2013 and 2014) to calculate the three-year risk measures.

We exploit changes in corporate tax rates and loss offset rules. Our sample consists of 1,058 country-year observations that include 52 increases and 183 decreases in corporate tax rates in 29 and 50 countries, respectively. The mean tax rate increase is 2.4 percentage points and the mean tax rate decrease is 3.3 percentage points. Our sample includes 36 changes in loss carryforward rules and 13 changes in carryback rules. This comprises 32 (four) increases (decreases) in the length of LCF rules. Our sample includes 8 (5) enactments (abolishments) of loss carryback rules.

[18] We cover 33 OECD countries and countries developing rapidly during our sample period. However, we face limited data availability for some regions and are not able to include many African and Middle Eastern countries.
[19] Consistent with prior literature (Langenmayr and Lester 2018), we use consolidated financial data of firms. This includes firms that operate mainly domestically but also multinational firms that are exposed to tax and country risk environments of several jurisdictions. We document a stronger association for domestic firms (see Table A.1).

3.2 Effect of Country Risk on Corporate Risk-Taking

We follow Langenmayr and Lester (2018) and investigate the effect of tax rate changes and loss offset rules on corporate risk-taking of firms domiciled in their headquarter country. We modify this specification and explicitly account for the interactive effect of country risk factors and changes in corporate tax rates and loss offset rules on corporate risk-taking:

$$\begin{aligned} \textit{Firm Risk-Taking}_{I,t} = \; & \alpha_0 + \beta_1 LC_{j,t} + \beta_2 CTRStd_{j,t} + \beta_3 \; LC{*}CTRStd_{j,t} + \beta_4 \; CountryRiskFactor_{j,t} \\ & + \beta_5 LC{*}CountryRiskFactor_{j,t} + \beta_6 \; CTRStd_{j,t}{*}CountryRiskFactor_{j,t} \\ & + \beta_7 LC{*}CTRStd_{j,t}{*}CountryRiskFactor + \beta_n \; C_{i,j,t} + \alpha_{k,t} + \varepsilon_{i,j,t} \qquad (5) \end{aligned}$$

The dependent variable *Firm Risk-Taking*$_{i,t}$ is a measure of the riskiness of firm investment. We define *Firm Risk-Taking*$_{i,t}$ for firm i as the standard deviation over three years $(t\ , t+1, t+2)$ of a firm's *ROA*'s (*EBIT/Total Assets*) deviation from the country-industry-specific average *ROA* for the respective year (John et al. 2008, Langenmayr and Lester 2018). Importantly, this measure proxies for firms' operating risk and removes the influence of home country and industry-specific economic cycles. Firm management cannot alter this cycle, and thus our measure directly reflects the riskiness of corporate investment.[20]

Our main independent variables capture tax system determinants of a firm's home country.[21] Our main variable of interest, $LC_{j,t}$, captures the length of the statutory loss carryback period and the codified option of a loss carryforward in firm i's home country j in year t.[22] We use the length of the loss carryforward period in years. For unlimited loss carryforward periods, we use 20 years (maximum for limited loss carryforward).[23] For loss carrybacks, we use an

[20] To accommodate for potentially differing planning horizons, we also re-estimate all regressions with a 5-year industry-adjusted measure of *Firm Risk-Taking*. Results remain substantially unchanged.
[21] We collect the country-level tax data from Coopers & Lybrand International Tax Summaries, Ernst & Young (EY) and PwC tax yearbooks.
[22] We define home country as the jurisdiction in which the country is headquartered.
[23] We also use 100 years to account for unlimited loss carryforwards and find comparable effects.

indicator variable that equals one if the country offers a loss carryback and zero if the country does not (Bethmann et al. 2018).

The coefficient β_1 captures the effect of the loss rules on risk-taking, given the average corporate tax rate in the sample. We expect a positive effect of loss carryforwards and carrybacks on corporate risk-taking ($\beta_1 > 0$) (Langenmayr and Lester 2018). Although of similar sign, we predict a stronger effect if a loss carryback is in place (Bethmann et al. 2018; Langenmayr and Lester 2018). Second, $CTRStd_{j,t}$ captures the standardized corporate tax rate of country *j* in year *t*.[24] We use the top corporate tax rate bracket of the country standardize tax rate $CTRStd_{j,t}$ across the sample and expect a negative coefficient ($\beta_2 < 0$). Third, $LC{*}CTRStd_{j,t.}$ captures the interaction of the loss offset rules and the standardized statutory tax rate. We predict a significant positive coefficient β_3 because higher tax rates increase the benefit of loss offsets. Consistent with prior literature, we expect more pronounced effects for loss carrybacks than for carryforwards because carrybacks deliver an immediate cash refund, are not conditional on future profitability, and are not obstructed by potential changes in carryforward rules (Langenmayr and Lester 2018).

For our analysis of H1a and H1b, we use two specifications of *CountryRiskFactor*: an indicator variable equal to one if country *j*'s value for the *Political Risk* or *Fiscal Budget Risk* is a) above the median in year *t* , and b) in the highest quartile of the country-year *t*. Otherwise, we set *CountryRiskFactor* equal to zero. We predict a negative effect of *CountryRiskFactor* ($\beta_4 < 0$), its interaction with the loss offset rules ($\beta_5 < 0$), and a negative coefficient on β_7 that offsets the positive effect of β_3. We estimate equation (5) separately for both country risk factors.

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[24] We standardize tax rate $CTRStd_{j,t}$ across the sample so that the tax rate has a mean of 0 and a standard deviation of 1 across the sample (Langenmayr and Lester 2018). This allows us to interpret the coefficient on β_1 as the effect of loss offset rules on risk-taking given the average corporate tax rate in the sample.

We construct two proxies for the respective country risk factors to account for differences. First, we use the Worldwide Governance Indicators (WGI) developed by Kaufmann at al. (2011) to proxy for political risk. These measures provide cross-country indicators of governance and are proxies for political stability (De Jong et al. 2008; Dharmapala and Hines 2009).[25] Following Dharmapala and Hines (2009), we use the *yearly mean* of the combined indicators to proxy for political risk of a country (*Political Risk*). We standardize the variable to have a mean of zero and a standard deviation of one across the sample.

Second, we use percentage of government debt to GDP as a proxy for *Fiscal Budget Risk* of a country. Prior research suggests that countries use tax policy strategically to manage public spending and that the relative debt, as well as credit ratings, constrain governments' cash outflows (Goncharov and Jacob 2014).[26]

We include several firm- and country-level control variables in our regression analysis to ensure that our results are not driven by other factors. $C_{i,j,t}$ is the vector of time-varying country- and firm-level control variables. We use *Size* (the natural logarithm of total assets) because prior literature suggests that firm size is associated with lower operating risk since large firms can diversify their risk (John et al. 2008). We control for *Leverage* (ratio of total liabilities to total assets) to mitigate concerns that additional risk-taking is associated with increased financial distress (De Jong et al. 2008; John et al.2008). *ROA* captures the firm's ability to recover losses and invest in risky projects (John et al. 2008; Langenmayr and Lester 2018). We control for

[25] The WGI consists of three different categories: selection and monitoring of governments, the capacity of governments to implement policies, and the quality of institutions that govern these policies (e.g., enforcement of tax payment). Details of the WGI components are described in Appendix D. The WGI Index data start in 1996 and are only bi-annually available until 2002. For the years before 1996, we use the 1996 values and for the period from 1996 to 2002, we use the mean of the respective biannual values.

[26] We do not tabulate results for regressions using credit ratings as *Country Risk Factor* because of space constraints. However, inferences remain the same across all specifications. We obtain government debt data from the OECD and IMF Public Debt Database and credit ratings from the Worldscope Database (Oxford Economic Outlook). We again standardize both variables across the sample.

Sales Growth (defined as the year-to-year percentage change in revenues) and *MB* (market-to-book-ratio) to account for investment opportunities (Rajgopal and Shevlin 2002).

We use *GDP Growth* and *Inflation* as country-level control variables to ensure that our results are not driven by economic conditions that directly or indirectly influence tax policy (John et al. 2008; Djankov et al. 2010; Vegh and Vuletin 2015). We obtain data on *GDP Growth* (annual percentage growth rate of GDP in constant 2010 U.S. dollars) from the World Bank Database. We define *Inflation* as the rate of price change in a country measured by the annual growth rate of the GDP implicit deflator (World Bank Database). We add *Fiscal Budget Risk* as a control variable when we use *Political Risk* as *Country Risk Factor* and vice versa.

This approach paired with our extensive country sample over 21 years allows us to exploit variation from the economic development of a country. We include industry-by-year fixed effects $\alpha_{k,t}$ to account for overall macroeconomic effects in year t. [27] We cluster standard errors by country-year and by firm to account for within-firm and within country-year correlation in our sample (Petersen 2009).[28] For details, see Appendix D.

3.3 Sample Selection and Descriptive Statistics

Our sample comprises both mainly domestically and internationally operating companies.[29] From the initial sample of 552,462 firm-years, we drop 5,643 firm-year observations of cross-listed firms. We eliminate observations from firms in the financial or utilities sector (99,396 firm-years) because they are subject to different regulations that likely

[27] We use the Fama-French 48 classification to account for industry fixed effects. Our results hold when we use Fama-French 12 classification or SIC classification.
[28] In Section 6 we use different specifications of clustering and fixed effects. Inferences do not change.
[29] To mitigate concerns that firms do not only operate in one jurisdiction and hence the exposure to country risk and its tax system varies, we construct a dummy variable (Creal, Robinson, Rogers, and Zechman 2014; Langenmayr and Lester 2018). We find a stronger effect of corporate tax system changes on corporate risk-taking for domestic firms (see Table A.1). Although prior literature indicates that loss affiliates can use transfer pricing instead of loss offset rules to exploit the tax value of incurred losses (De Simone, Klassen, and Seidman 2017), we find a negative impact of country risk for multinational corporations, which emphasizes the relative importance of country risk.

affect risk-taking behavior. We drop observations due to missing risk-taking measures (106,941 firm-years) and control and country-level variables for final sample (100,710 firm-years). This procedure results in an ultimate sample of 239,772 firm-year observations located in 64 countries. Table 1 presents the sample selection. Table 2 presents the number of firm-year observations in the respective countries. About 17.2 percent of the total observations are from the United States, followed by Japan (15.9 percent), China (8.1 percent), and India (5.7 percent), and Korea (5.6 percent).

<Insert Table 1 about here>

<Insert Table 2 about here>

Table 3 presents the descriptive statistics for our sample. Panel A summarizes the firm- and country-level variables of our cross-country sample. We winsorize all firm-level and country-level variables (except for corporate tax rate) at the 1 percent and 99 percent levels.[30] The mean (median) for *Risk* is 0.087 (0.031) which is lower than in the study of Langenmayr and Lester (2018) but consistent with John et al. (2008) that uses a sample that is comparable to our study. The mean (median) of *LCF* is 12.8 (10) years and approximately 45 percent of the firm-year observations are from countries that offer a *LCB*. The average (median) corporate tax rate is 32.9 (33.0) percent. The average (median) for *Inflation* are 2.7 (2.1) percent, *Political Risk* (mean of WGI index) 5.13 (7.18), and *Fiscal Budget Risk* (government debt to GDP ratio of 73.9 (63.6)) percent.

<Insert Table 3 about here>

Table 4 presents a summary of the distribution of each of the three country risk factors for the 64 countries in the sample. Consistent with prior literature (Kaufmann et al. 2011), we

[30] We adjust for inflation using each country's Consumer Price Index in 2010 and convert them into U.S. dollars.

document a relatively low *Political Risk* for OECD countries and a relatively high *Political Risk* for emerging markets. *Fiscal Budget Risk*, however, is less concentrated in either of the two groups.

<Insert Table 4 about here>

Table 5 presents the correlations for our sample. *Firm Risk-Taking* is negatively correlated with *Size* and *ROA*. Further, *Firm Risk-Taking* is positively correlated with both loss offset variables providing first evidence of a positive effect of these provisions on corporate risk-taking. Turning to our macroeconomic and country risk variables, the correlation between *Inflation* and *Firm Risk-Taking* is negative.[31] Further, *Government Debt* is negatively correlated with *Firm Risk-Taking* providing first evidence for our hypotheses. Importantly, *Political Risk* and *Government Debt* are *negatively* correlated supporting our hypotheses to consider these two country risk factors separately.

<Insert Table 5 about here>

4. Empirical Results

4.1 Association between Country Risk and Corporate Risk-Taking

To test H1a and H1b, we estimate equation (5) separately using *Political Risk* and *Fiscal Budget Risk* as the *Country Risk Factor*. We proxy for *Country Risk Factor* in two ways. First, we define *Country Risk Factor* as an indicator variable equal to one if firm *I* is domiciled in a country whose country risk proxy is *above the yearly median* of the proxy and zero otherwise (Table 6, Panel A). Second, we use an indicator variable equal to one if firm *I* is domiciled in a country whose country risk proxy is in the *fourth quartile* in year *t* and zero otherwise (Table 6,

[31] We acknowledge high correlations among Inflation, GDP Growth, and our country risk factors. We address this concern in our robustness tests in Section 6.

Panel B). This design allows us to compare the economic magnitude of the effect of the tax system in low (β_3, *LCF/LCB*CTRStd*) vs. high country risk countries (β_7, *LCF/LCB*CTRStd*Country Risk Factor*). We expect a more negative impact of country risk in the latter specification.

Table 6, Column (1) presents the results for our specification using *Political Risk* as *Country Risk Factor* in the interaction term.[32] In Panel A the negative and significant ($p < 0.05$) coefficient on *Political Risk* (-0.005) and *LCB*Political Risk* provide initial evidence for the hypothesized negative impact of country risk on risk-taking. However, we do not find a negative effect of country risk factors on the interaction of *LCF* and *CTRStd*. The coefficient β_3 (I) that estimates the effect of *LCF* and *CTRStd* is positive (0.001), whereas the coefficient β_7 (II) is 0.000. Results from an F-Test indicate that the sum of the coefficients (I + II) is not significantly different from zero ($P > F = 0.143$). This finding is inconsistent with our prediction.

Turning to carrybacks, we estimate a significant coefficient β_3 for the interaction of *LCB* and *CTRStd* in countries whose *Political Risk* is below the yearly median of the proxy. This indicates the baseline effect for countries with low *Political Risk*. The corresponding coefficient of *LCB*CTRStd* is 0.012, translating into an increase of 13.8 percent in risk-taking after the enactment of a loss carryback.[33] Consistent with our theoretical predictions, we estimate a negative coefficient (-0.011) on β_7 (both $p < 0.05$) providing initial evidence of a negative impact of *Political Risk* on corporate risk-taking. Importantly, the magnitude of the coefficient suggests that this negative effect attenuates the positive effect estimated for countries with low *Political*

[32] We omit coefficients on other independent variables for brevity. Our coefficients of tax system variables are comparable to the findings of Langenmayr and Lester (2018), but of somewhat smaller magnitude. See Table A.1 for a replication of Langenmayr and Lester (2018) using our sample.
[33] We calculate the effect of 13.8 percent (=0.012/0.087) by dividing the coefficient by the sample mean of *Firm Risk-Taking*.

Risk. A F-test indicates that the sum of the coefficients (III + IV) is not different from zero indicating an offsetting effect of *Political Risk*.[34] The estimated effects are economically significant: The adoption of a loss carryback regime in countries with *Political Risk* below the median (e.g., Spain) is associated with a 13.8 percent increase in corporate risk-taking while a carryback rule adoption in countries above the median (e.g., Mexico) is associated with no increase in corporate risk-taking.[35]

Taken together, our results provide support for H1a for loss carrybacks but not for loss carryforwards. This result is consistent with the immediate cash flow effect of a loss carryback exerting an especially strong impact on risk-taking. By contrast, loss carryforwards only generate tax refunds if future profits are generated and country risk is low. If the tax refund is threatened by high country risk, it considerably reduces the tax incentive.[36]

To test H1b, we investigate the effect of *Fiscal Budget Risk* on corporate risk-taking. Results are presented in Column (2) of Table 6. Inconsistent with our predictions, we do not find a negative impact of country risk for loss carryforwards (sum of the coefficients *(I + II)* of 0.000 and 0.002, respectively). However, we find a negative effect of *Fiscal Budget Risk* on risk-taking for loss carrybacks. Specifically, we estimate a positive effect of *LCB* for countries with *Fiscal Budget Risk* below the median (coefficient 0.011). Consistent with our predictions, we estimate a negative coefficient (-0.012) for β_7 indicating that *Fiscal Budget Risk* fully attenuates the positive effect of loss carrybacks for loss carrybacks but not for loss carryforwards. The economic magnitude of *Fiscal Budget Risk* is similar to our estimates for *Political Risk* and is substantial.

[34] We test whether the coefficients' sum (III + IV = 0.001) equals zero and do not reject the null (p-value = 0.922).
[35] In untabulated tests, we also include an index aggregating creditor rights (La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1998; Acharya, Amihud, and Litov 2011). Our results are consistent in both sign and significance.
[36] This finding is consistent with Langenmayr and Lester (2018), who document a negative coefficient of the interaction of LCF and tax rate (p. 251). We attribute this inconclusive finding to two factors. First, it is not clear for firms whether they will have future profits to use the loss carryforwards. Second, loss offset rules change over time.

In Panel B, we re-estimate equation (5) using an indicator variable equal to one if the *Country Risk Factor* is in the fourth quartile and zero otherwise. We find a *positive* effect of country risk for loss carryforwards but find more pronounced effects especially for *Political Risk* (sum of coefficients (III + IV) equal to -0.035) compared to *Fiscal Budget Risk* (sum of coefficients (III + IV) equal to -0.008).[37] Overall, we find strong and consistent support for H1a and H1b with respect to loss carrybacks but not carryforwards.

<Insert Table 6 about here>

We also assess the appropriateness of our tests comparing countries with high vs. low country risky when adopting loss carrybacks by conducting two tests to assess the common trends assumption between countries with low and high *Country Risk Factor* around the adoption of LCBs (Roberts and Whited 2013). First, we calculate the percentage growth rate of our *Firm Risk-Taking* (aggregated at the country level) in the period preceding a loss carryback adoption. We find statistically indistinguishable growth rates for *Firm Risk-Taking* (p = 0.58 and p = 0.19 for *Political Risk* and *Fiscal Budget Risk*, respectively). This suggests that our tests meet the parallel trends assumptions necessary the comparison of the two country groups. We confirm the common trends assumption visually in untabulated figures.

4.2 Effectiveness of Loss Offset Provisions under Tax Rate Increases and Scaling Effect of Tax Rate

In H2, we predict that a tax rate increase is more likely to discourage risk-taking if country risk is high. We restrict our sample to observations three years before and after a tax rate

[37] This is consistent with prior literature that documents a significant effect of *Political Risk* (John et al. 2008), especially for countries with a low level of governance and low quality of political institutions. However, the negative sums of the coefficients (III + IV) indicate that high country risk environments can lead to negative impacts on corporate risk-taking if carrybacks are in place. In untabulated tests, we re-estimate equation (5) using continuous values of *Country Risk Factor*. The coefficients on *LCF/LCB*CTRStd*Country Risk Factor* provide similar inferences.

increase (*t-3* to *t+2*) resulting in a sub-sample of 23,255 firm-year observations. This approach allows us to investigate the impact of a tax rate increase on corporate risk-taking depending on its level of country risk. We present our results in Table 7, Panel A (Panel B) for median splits (fourth quartile) of the respective *Country Risk Factor*. Our results are inconclusive for carryforwards. For carrybacks, our results indicate a more pronounced effect of *Fiscal Budget Risk* in both panels (sums of III+IV: 0.006/-0.061 vs. 0.016/-0.029). Again, the negative impact of country risk is more pronounced for the fourth quartile of country risk. These results are consistent with our findings in H1 and provide additional support for our theoretical model.

<Insert Table 7 about here>

H3 predicts that the negative impact of country risk increases in the underlying corporate tax rate. To test this end, we split our sample at the median of corporate tax rates resulting in firm-year observations of countries with low (< 33 percent, Columns 1 and 3) and high (> 33 percent, Columns 2 and 4) corporate tax rates. We present our results in Table 8, Panel A, bifurcated between low and high corporate tax rates consisting of 108,886 and 130,862 firm-year observations, respectively.

For carryforwards, we find inconclusive results indicating positive sums of coefficients (I+II) in three out of four cases, suggesting a *positive* effect of country risk. For carrybacks, the results in columns (1) and (2) indicate a negative but insignificant effect of *Political Risk* for firms located in countries with high tax rates. The sum of coefficients (III + IV equal to 0.015) in Column (1) indicates a less pronounced negative effect of *Political Risk* for low corporate tax rates than for high corporate tax rates (Column 2, III + IV equal to -0.005). Inferences in Columns (3) and (4) remain the same for *Fiscal Budget Risk*, providing initial support for H3.

To further corroborate our results, we re-estimate equation (5) limiting our sample only to observations three years before and after a tax rate increase (as in our tests of H2). Table 8, Panel B presents the results for the two sub-samples consisting of 14,138 and 9,057 firm-year observations for low and high corporate tax rates, respectively. Consistent with our predictions of H2 and H3, we find the most pronounced effects of country risk for high corporate tax rates. Taken together, the findings in Panel A and B provide support for H3.

<Insert Table 8 about here>

4.3 Country-level Analysis

Next, we use country-level analyses to investigate the impact of tax policy and country risk factors on risky investments that foster economic growth (John et al. 2008). First, we use aggregated patent applications at the country level (*Patent Applications).* We lag this variable by three years to account for timing differences between R&D investment and patenting (Broekel 2015). Second, we use the ratio of a country's R&D expenditure and GDP (*R&D Expenditures / GDP*). Table 9 presents the results for our estimations and indicates similar inferences as for our tests that use our firm risk-taking measure. Combined, these results indicate that country risk factors attenuate the positive effect of tax policy to induce risky investments.

<Insert Table 9 about here>

5. Periods of Heightened Fiscal Budget Risk in the United States

To mitigate concerns that our results capture the first-order effect of country risk rather than its effect on the effectiveness of tax policy, we exploit a narrower setting around the budget crises of the federal U.S. government from 2011 to 2013. In this period, the federal government suffered a sequence of budget crises that are likely to affect expectations of receiving timely tax refunds and the effectiveness of tax policy measures. Hence, U.S. firms faced higher fiscal budget risk during the period of the debt ceiling, fiscal cliff, and government shutdown (Hassan et al. 2019).[38] Figure 6 depicts the timeline around the three events. In April 2011, Standard & Poor's set the outlook for U.S. credit rating to negative.[39] In December 2012, a scheduled reduction in government spending created "a massive fiscal cliff of large spending cuts and tax increases" (CNN 2012). On October 1, 2013, U.S. Congress failed to pass a budget, resulting in a partial government shutdown (The New York Times 2013).

<Insert Figure 6 about here>

We exploit a difference-in-differences design and compare risk-taking of U.S. (treatment) to Canadian (control) firms around each of the three events. We use firms located in Canada as a control group because it is also a member of the G-7 countries with similar economic conditions, very similar LCB and LCF provisions in place, and relatively stable fiscal budget risk in our sample period. [40] In addition, we are able to obtain quarterly financial data for these two countries that allows to assess risk-taking responses closer to the exact date of three event. To this end, we construct a sample of 31,654 firm-quarter observations of non-financial firms derived from the Compustat Quarterly database (sample period: 2010 Q4 to 2013 Q4). To test our prediction of a difference in differences, we estimate the following OLS regression:

$$Firm\ Risk\text{-}Taking_{i,t} = \alpha_0 + \beta_1\, US_i + \beta_2\, Post_t + \beta_3\, US_i * Post_t + \beta_n\, C_{i,j,t} + \alpha_{k,t} + \varepsilon_{i,j,t} \quad (6)$$

We include indicator variables for the treatment group (US_i) and for quarters of the heightened fiscal budget risk ($Post_t$). US_i is equal to one if a firm is domiciled in the U.S. and

[38] In Hassan et al. [2019] this risk is denoted as one form of what the study calls "political risk".
[39] This crisis resulted in an increase of debt to GDP ratio and a downgrade of the U.S. credit rating by Standard & Poor's (S&P) in August 2011. S&P commented their decision citing that "effectiveness, stability, and predictability of American policymaking and political institutions have weakened at a time of ongoing fiscal and economic challenges" (BBC 2011; The Washington Post 2011).
[40] During our sample period, the loss offset rules only differ in the length of the loss carrybacks (two years in the U.S. vs. three years in Canada). However, Canada decreased its statutory corporate tax rate from 28 to 26 percent in 2012 while the U.S. tax rate was constant. However, the tax rate decrease in Canada might bias against finding a negative response of U.S. firms because the benefit of potential tax refunds is reduced for Canadian firms in the post period.

zero otherwise. $Post_t$ (i.e., *Post_DC*, *Post_FC*, and *Post_GS*) is equal to one for firm-quarter observations in the quarter in which debt ceiling (2011 Q2), fiscal cliff (2012 Q4), and government shutdown occurred (2013 Q4). $Post_t$ is equal to zero in quarters before the respective budget crisis. In all tests, we use one quarter as post-period. However, we run the test with a one and a two quarters pre-period to mitigate concerns that our sub-tests capture (anticipation) effects of subsequent events (Roberts and Whited 2013). This approach also ensures that our event periods do not overlap.

Our main coefficient of interest is β_3. A negative coefficient on the interaction term US_i*Post_t captures the change in the level of risk-taking from the pre-period to the post-period of U.S. firms relative to Canadian firms. We expect a negative coefficient on US_i*Post_t (β_3), which would suggest that U.S. firms reduced risk-taking during the post-period. We include firm-level control variables.[41] We also include industry-by-quarter fixed effects to mitigate concerns that unobserved time-invariant industry characteristics might affect the observed changes in corporate risk-taking. We use entropy balancing as a matching approach (Hainmueller 2012) to eliminate differences, for example, in firm size of U.S. and Canadian firms. Table 3, Panels B and C present the descriptive statistics and details on the matched sample.

We present the results in Table 10 (Panel A) with two quarters (Columns 1-3) and one quarter (Columns 4-6) as pre-period. Consistent with our prediction, we find negative and significant coefficients on *US*Post* for two of the three fiscal budget crises. Specifically, we find negative but insignificant coefficients on *US*Post* ($p = 0.20$ and $p = 0.25$, respectively) for the period around the debt ceiling (Columns 1 and 4). The coefficients on *US*Post* are negative and significant ($p < 0.05$) for the periods around the fiscal cliff and debt ceiling (Columns 2, 3, 5 and

[41] We include the same control variables as in equation (5) and modify these according to Ljungqvist et al. 2017 that also uses quarterly Compustat data to construct variables. See Appendix D, Panel E for details.

6). These results indicate that U.S. firms decreased risk-taking relative to Canadian firms in the quarters of U.S. federal budget crises. Economic magnitudes are similar to our estimates derived in the cross-country sample.[42] Untabulated tests indicate that the effect is more pronounced for firms that experienced a loss in the respective period and firms that do not expect to use their tax losses. Overall, these results suggest that firms respond to temporarily heightened fiscal budget risk by decreasing risk-taking. This is consistent with a negative impact of country risk on the risk-sharing mechanism between firms and the government.

A crucial requirement for our empirical identification is that covariates evolve uniformly in the pre-period (Roberts and Whited 2013). The insignificant coefficients on *US* in all columns in Table 10, Panel A provide initial support for parallel pre-event trends. We conduct several additional tests to validate this assumption. First, we re-run equation (6) starting treatment two quarters before the actual events in falsification tests. The results of these placebo tests in Table 10, Panel B indicate no change or an increase in risk-taking of U.S. firms compared to Canadian firms, corroborating our baseline findings. Second, we find statistically indistinguishable growth rates of *Firm Risk-Taking* in each pre-event period for U.S. and Canadian firms ($p > 0.55$, untabulated). Lastly, we plot coefficients for the pre-event period for Canadian firms in Figure 7. The vertical confidence intervals indicate no significant relative change between groups in the pre-event period. Overall, we provide evidence that the parallel trends assumption holds in our setting.

<Insert Figure 7 about here>

<Insert Table 10 about here>

[42] In a pooled regression of all three events, we estimate a coefficient on *US*Post* of about 0.008, which translates into a 20 percent reduction in *Firm Risk-Taking* (evaluated at the sample mean).

6. Supplemental Analyses and Robustness Tests

To mitigate concerns that results in our primary tests are driven by the underlying formal restrictiveness of loss offset rules rather than country risk factors, we conduct a “horse race” test in which we include measures for both potentially limiting factors. To proxy for statutory limitations of the future utilization of loss offset provisions, we follow Jacob, Pasedag, and Wagner (2011) and calculate the percentages of country-specific present value of tax losses that can be offset *(Loss_Offset_Restriction*) (see Appendix D for further details). We add this measure and its respective interaction terms to specification (5). Consistent with our primary results, we find an attenuating effect of country risk factors (Table 11, Panel A).[43]

One concern with our primary tests is that tax policy reacts to the underlying economic changes and is not exogenously determined. This implies that firms in countries with changes in loss offset rules/tax rates are not comparable with firms in countries without these changes (Vegh and Vuletin 2015). To mitigate this concern, we use group-fixed effects to narrow the counterfactuals to firms in countries with similar macroeconomic conditions. Using this approach, we can further isolate the effect of tax policy changes. We use the same research designs as in equation (5) and apply GDP-Growth-Quartile-Industry-Year fixed effect (Jacob, Michaely, and Müller 2019). This approach limits our counterfactuals to firms located in countries with comparable economic conditions and development levels. Table 11, Panel B presents the results of these tests. Inferences from both, loss carryforwards and carrybacks, and country risk factors remain the same but are somewhat less pronounced.

<Insert Table 11 about here>

[43] Due to data limitations, our sample consists of 165,843 firm-year observations from 2004 to 2012 for this test.

Next, we conduct several robustness tests that are untabulated to ensure that our results are not driven by our risk measure or certain countries. First, we use a modified measure of *Firm Risk-Taking* that is based on a five-year forward-looking horizon. Second, we re-estimate equation (5) using the firm-level standard deviation of returns and document similar results in all specifications. Third, we remove all observations from countries with a) less than 50 and b) less than 200 observations and inferences are unchanged. Finally, we exclude the countries with the largest number of observations from our sample (USA, Japan, China, Korea, and India) to mitigate concerns about our sample selection procedure and potential effects driven by one country. Again, inferences are unchanged.

7. Conclusion

This study examines whether country risk factors attenuate the effectiveness of tax policy tools aimed at encouraging corporate risk-taking. We show country risk fully attenuates the effectiveness of loss offset rules and tax rate changes when firms are located in countries with high country risk. Our results indicate the negative impact of country risk is more pronounced when countries increase their corporate tax rates and when tax rates are high. Additional tests around the U.S. budget crises from 2011 to 2013 suggest the effectiveness of tax policy tools is sensitive even in economically well-performing countries when fiscal budget risk is increased temporarily. This indicates that high country risk often attenuates the effectiveness even for loss carrybacks that are considered effective risk-encouraging policy tools in prior literature.

Our study contributes to the literature on the risk-sharing mechanism between government and companies by showing these mechanisms are not effective in countries with high political risk and fiscal budget risk. We also add to research on the design of corporate tax systems to incentivize corporate investment and risk-taking (Vegh and Vuletin 2015; IMF 2017).

These findings have important policy implications especially in times of economic crises (IMF 2020). Our findings suggest that effective investment stimuli as measures in recovery strategies crucially depend on a reliable budgetary and political environment. Already temporary distractions may mitigate the stimulating effect of such tax policy measures. Future research could investigate the effective design of policy measures that aim to foster risk-taking and investment such as immediate liquidity support for firms during the COVID-19 pandemic.

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APPENDIX A:
Effect of Risk Aversion on Risk-Taking

For tax rates above the critical tax rate, the higher utility loss due to the loss offset restrictions cannot be compensated for by the high weight a risk-averse decision-maker allocates to the tax refund. As a consequence, the disutility from taxes on profits dominates the effects with respect to losses, leading to an overall disincentive of taxation on risk-taking.

The direction of the overall tax effect switches for tax rates higher than the critical tax rate because A (utility from tax refund) decreases in the tax rate such that at the critical tax rate $A = B$. For tax rates higher than the critical tax rate the tax effect on profits overcompensates the risk-sharing effect from the tax refund to a risk-averse decision-maker in case of loss offset restrictions. For high tax rates, the utility loss due to loss offset restrictions in comparison to a full loss offset is higher than for low tax rates because of risk aversion (curvature of the utility function). The effect of a higher tax rate on the disutility is illustrated in Figure 5.

<Insert Figure 5 about here>

Red color indicates a low tax rate ($t = 0.25$), while black indicates a high tax rate ($t = 0.5$). Solid lines depict pre-tax values, dotted lines and dashed lines post-tax values (loss offset restriction with $\lambda = 0.5$ is dotted, full loss offset, i.e., $\lambda = 1$, is dashed). The direction of the overall tax effect $\left(A \gtreqqless B\right)$ depends on the tax rate, risk aversion, and loss offset provisions.

An increase in the tax rate reduces after-tax profits decreasing the utility of expected after-tax profits (B). Simultaneously, this tax-induced cut in after-tax profits increases the marginal utility of the additional profit due to the changed level of risk aversion (curvature of the utility function).

The tax refund on incurred losses arises only if loss offset provisions are granted ($\lambda > 0$). Then, an increase in the tax rate increases the government's share und thus the firm's utility (A).

However, there are more forces at work in the domain of losses. First, loss offset restrictions reduce the utility gain from loss offset ($\Delta U_1, \Delta U_2$). This increase in disutility is scaled by the tax rate and thus increases in t. This effect is illustrated in Figure 5 by $\Delta U_1 > \Delta U_2$.

Second, also, the level of risk-aversion determines the size of A. The more pronounced risk aversion the more utility the decision-maker assigns to the tax refund. As depicted in Figure 5, higher taxes induce higher tax refunds and thus lower post-tax losses. The resulting lower level of risk aversion mitigates the aforementioned first effect. This second effect is illustrated by the difference $\Delta U_3 > \Delta U_1$. As for lower post-tax losses risk aversion is less pronounced (curvature of the utility function), higher tax rates reduce risk aversion in the domain of losses. Weaker risk aversion due to higher taxes reduces the utility gain from the tax refund. This mechanism is illustrated above. We see that the effect of a tax rate of 25 percent on the change in utility is stronger than the effect of an increase in the tax rate by further 25 percent (summing up to a tax rate of 50 percent).

APPENDIX B:
Effect of Loss Offset Provisions on Risk-Taking

Building on Domar and Musgrave (1944), we assume a firm that aims to invest a fixed amount I has to choose the level of risk (σ) involved. If the firm decides to increase the riskiness of investment (σ), the variance of the risky return increases, too. With probability p the invested amount I generates a profit given by the function $f_g(\sigma)$ with $f_g(\sigma) > 0$ (good state of nature), with probability $(1-p)$ a loss of $f_b(\sigma) < 0$ is incurred (bad state of nature).

Consistent with Sandmo (1971), Appelbaum and Katz (1986), Asplund (2002), Janssen and Karamychev (2007) and Langenmayr and Lester (2018) we assume the firm maximizes its continuously differentiable and concave risk-utility function with $f_g'(\sigma) > 0, f_b'(\sigma) < 0$, $f_g''(\sigma) < 0, f_b''(\sigma) < 0$. Consistent with this literature, we assume firm level risk-aversion which can be interpreted as the manager's utility from firm returns. We introduce a corporate tax at rate t and a loss offset coefficient λ with $\lambda = 1$ describing a full loss offset and $\lambda = 0$ the absence of loss offset provisions. If $\lambda < 1$ then loss offset is restricted. The expected risk-utility from the risky investment is

$$E[U] = p \cdot U\big[(1-t) \cdot \big(f_g(\sigma) - I\big)\big] + (1-p) \cdot U[(1-\lambda t) \cdot (f_b(\sigma) - I)], \tag{7}$$

with the net of taxes utilities $U\big[(1-t)\big(f_g(\sigma) - I\big)\big] = U\big[\big(f_g(\sigma) - I\big)\big] - B$, where B denotes the tax payment on the profit in the good state of nature, and $U[(1-t)(f_b(\sigma) - I)] = U[(f_b(\sigma) - I)] + A$, where A denotes the tax refund from loss offset in the bad state of nature (Langenmayr and Lester 2018). Due to risk-aversion, the utility gain from a full tax refund is larger than a corresponding expected utility loss from taxes on profits $(A > B)$ (Domar and Musgrave 1944; Atkinson and Stiglitz 1980; Langenmayr and Lester 2018).

Consistent with the Domar-Musgrave framework, the firm decides on the optimal riskiness of the investment according to the first order condition (FOC):

$$\frac{\partial E[U[(\pi)]]}{\partial \sigma} = p \cdot U'[\pi_g] \cdot (1-t) \cdot f_g'(\sigma) + (1-p) \cdot U'[\pi_b] \cdot (1-\lambda t) \cdot f_b'(\sigma) = 0, \qquad (8)$$

where $\pi_g = (1-t) \cdot (f_g(\sigma) - I) > 0$ and $\pi_b = (1-\lambda t) \cdot (f_b(\sigma) - I) < 0$ denote the after-tax profit and loss in either state of the world. Finally, we obtain

$$\frac{d\sigma}{d\lambda} = \frac{\left.\overbrace{(1-p)}^{+} \cdot \overbrace{t}^{+} \cdot \overbrace{f_b'(\sigma)}^{-} \cdot \left[\overbrace{U'[\pi_b]}^{+} + \overbrace{U''[\pi_b]}^{-} \cdot \overbrace{\pi_b}^{-}\right]\right\} <0}{\left.\begin{matrix} \underbrace{p}_{+} \cdot \underbrace{U''[\pi_g]}_{-} \cdot \underbrace{(1-t)^2 \cdot \left(f_g'(\sigma)\right)^2}_{+} + \underbrace{p}_{+} \cdot \underbrace{U'[\pi_g]}_{+} \cdot \underbrace{(1-t)}_{+} \cdot \underbrace{f_g''(\sigma)}_{-} \\ + \underbrace{(1-p)}_{+} \cdot \underbrace{U''[\pi_b]}_{-} \cdot \underbrace{(1-\lambda t)^2 \cdot \left(f_b'(\sigma)\right)^2}_{+} + \underbrace{(1-p)}_{+} \cdot \underbrace{U'[\pi_b]}_{+} \cdot \underbrace{(1-\lambda t)}_{+} \cdot \underbrace{f_b''(\sigma)}_{-} \end{matrix}\right\} SOC<0} > 0 \qquad (9)$$

with the second order condition, $SOC = p \cdot U''[\pi_g] \cdot (1-t)^2 \cdot \left(f_g'(\sigma)\right)^2 + p \cdot U'[\pi_g] \cdot (1-t) \cdot f_g''(\sigma) + (1-p) \cdot U''[\pi_b] \cdot (1-\lambda t)^2 \cdot \left(f_b'(\sigma)\right)^2 + (1-p) \cdot U'[\pi_b] \cdot (1-\lambda t) \cdot f_b''(\sigma) < 0$, in the denominator (Langenmayr and Lester 2018). The SOC is fulfilled as $f_g'(\sigma) > 0$, $f_b'(\sigma) < 0$, $f_g''(\sigma) < 0$, $f_b''(\sigma) < 0$, $U'[\pi_g] > 0$, $U'[\pi_b] > 0$, $U''[\pi_g] < 0$ and $U''[\pi_b] < 0$. Hence, we find a uniform positive effect of a marginal increase in loss offset provisions on risk-taking.

APPENDIX C:
Effect of Tax Rate on Risk-Taking

By contrast, the effect of a tax rate increase is ambiguous.

$$\frac{d\sigma}{dt}=\frac{\overbrace{\overbrace{p}^{+}\cdot\overbrace{U''[\pi_g]}^{-}\cdot\overbrace{\pi_g}^{+}\cdot\overbrace{f_g'(\sigma)}^{+}+\overbrace{p}^{+}\cdot\overbrace{U'[\pi_g]}^{+}\cdot\overbrace{f_g'(\sigma)}^{+}+\overbrace{(1-p)}^{+}\cdot\overbrace{U''[\pi_b]}^{-}\cdot\overbrace{\lambda}^{+}\cdot\overbrace{\pi_b}^{-}\cdot\overbrace{f_b'(\sigma)}^{-}+\overbrace{(1-p)}^{+}\cdot\overbrace{U'[\pi_b]}^{+}\cdot\overbrace{\lambda}^{+}\cdot\overbrace{f_b'(\sigma)}^{-}}^{\gtreqless 0}}{\underbrace{\underbrace{p}_{+}\cdot\underbrace{U''[\pi_g]}_{-}\cdot\underbrace{(1-t)^2\cdot\left(f_g'(\sigma)\right)^2}_{+}+\underbrace{p}_{+}\cdot\underbrace{U'[\pi_g]}_{+}\cdot\underbrace{(1-t)}_{+}\cdot\underbrace{f_g''(\sigma)}_{-}+\underbrace{(1-p)}_{+}\cdot\underbrace{U''[\pi_b]}_{-}\cdot\underbrace{(1-\lambda t)^2\cdot\left(f_b'(\sigma)\right)^2}_{+}+\underbrace{(1-p)}_{+}\cdot\underbrace{U'[\pi_b]}_{+}\cdot\underbrace{(1-\lambda t)}_{+}\cdot\underbrace{f_b''(\sigma)}_{-}}_{SOC<0}}\gtreqless 0. \quad (10)$$

As the second order condition (SOC) in the denominator has a uniform sign, which of the opposing effects prevails depends on the relation of the probability of a good state, the level of risk-aversion and the tax rate displayed in the numerator.

Substituting for the Arrow-Pratt coefficient of relative risk aversion, $R_R(\pi)=-\frac{U''[\pi]}{U'[\pi]}|\pi|$, we obtain, $\frac{d\sigma}{dt}=-\frac{p\cdot U'[\pi_g]\cdot f_g'(\sigma)\cdot[R_R(\pi)-1]-\lambda\cdot(1-p)\cdot U'[\pi_b]\cdot f_b'(\sigma)\cdot[R_R(\pi)+1]}{SOC}\gtreqless 0$. The SOC is negative (see Appendix B). Examining the numerator clarifies that risk-taking increases in the tax rate for

$$R_R > 0 \text{ if } p\,U'[\pi_g]\cdot f_g'(\sigma)\leq -(1-p)U'[\pi_b]\cdot(1-p)\cdot f_b'(\sigma)1-p \text{ as } \left.\frac{d\sigma}{dt}\right|_{\lambda\to 1}>0 \quad (11)$$

(Langenmayr and Lester 2018, 14). This equation illustrates that the level of risk aversion determines which one of the opposing effects in the numerator ultimately dominates.

APPENDIX D:

Variable Definitions

Panel A: Firm-Level Variables – Cross-Country Sample Source: Thomson Reuters' Worldscope Database	
Variable	*Description and Source*
Domestic	Indicator variable for foreign operations. The variable is equal to one if a firm reports less than 10 percent of income, sales, and assets as foreign (Creal et al. 2014; Langenmayr and Lester 2018). Source: Worldscope.
Firm Risk-Taking	Three-year firm risk-taking proxy: Three-year earnings volatility measure (John et al. 2008; Langenmayr and Lester 2018). It is defined as the standard deviation over three years of a firm's ROA's deviation from the industry-country specific average ROA. $RISK3y = \sqrt{\frac{1}{2}\sum_{t=1}^{3} (E_{\text{icjt}} - \frac{1}{3}\sum_{t=1}^{3} E_{\text{icjt}})^2}$, where $E_{icjt} = ROA_{ijct} - \frac{1}{Njct}\sum_{k=1}^{Njct} ROA_{kjct}$. *RISK3y* and *ROA* are winsorized at 1% and 99%. Source: Worldscope.
Leverage	Ratio of total liabilities (XWC 03351) to total assets (WC02999), winsorized at 1% and 99%. Source: Worldscope.
MB	Market-to-Book Ratio: Ratio of market capitalization (WC08001) to common equity (WC03501), winsorized at 1% and 99%. Source: Worldscope.
ROA	Return on assets: ratio of *EBIT* (WC18191) over assets (WC 02999), where *EBIT* is earnings before interest and taxes, winsorized at 1% and 99%. Source: Worldscope.
Sales Growth	Sales Growth: Year-to-year percentage change in revenues (WC01001), winsorized at 1% and 99%. Source: Worldscope.
Size	Firm Size: Natural logarithm of total assets in 1000 U.S. dollars (constant 2010 U.S. dollars) (WC02999), winsorized at 1% and 99%. Source: Worldscope.

Panel B: Country-Level Tax Variables Source: Coopers & Lybrand International Tax Summaries; Tax Handbooks published by Ernst & Young, PwC	
Variable	*Description*
CTR	Country's statutory corporate tax rate. We compute this by including central and sub-central/local rates. In case that the tax system is progressive, we use the top marginal tax rate.
CTRStd	Standardized corporate tax rate (CTR) (over sample period). Mean is 0 and standard deviation is 1.
LCB	Loss carryback equals one if the country has a loss carryback in place and zero if the country does not.
LCF	Loss carryforward is the period for which losses can be carried forward, in years. If losses can be carried forward indefinitely, we set the value to 20 years.
Loss_Offset_Restriction	Percentages of country-specific present value of tax losses that can be offset for a time horizon of 20 years. We assume a constant profit stream for periods $t = 1$ to $t = 20$ such that a specific loss that occurs in period $t = 0$ can be completely offset over 20 years under an unrestricted loss carryforward. Then, we introduce country-specific institutional loss offset regulations, i.e., loss carrybacks and loss carryforward with country-specific restrictions in time and amount) and determine the share of used losses of overall losses in present value terms. For ease of interpretation, we standardize the variable over the sample period and multiply it by -1 so that a less negative value reflects more restrictive loss offset and can be interpreted in a similar way as country risk factors. Source: Own calculations, consistent with the determination of present values for used corporate losses by Jacob et al. (2011), 82.

Panel C: Country-Level Variables Source: The World Bank (WGI) and IMF	
Variable	*Description*
Country Investment Variables	
Patent Applications	Logarithm of patent applications by residents in a country. We lag this variable by three years to account for timing differences between R&D investment and patenting (Broekel 2015). Source: The World Bank (WGI).

R&D Expenditures / GDP	Ratio of a country's total research and development expenditure to the country's *GDP*. Source: The World Bank (WGI).
Country Control Variables	
GDP Growth	Annual percentage growth rate of GDP in constant 2010 U.S. dollars.
Inflation	Quartile rank of country's inflation rate in a sample year. Inflation is the rate of price change in a country measured by the annual growth rate of the GDP implicit deflator.
Country Risk Variables	
Country Risk Factor	Indicator variable equal to one if a firm is located in a country whose country risk indicator in year *t* is above the median (in the fourth quartile) of the sample year and zero otherwise.
Fiscal Budget Risk	
Government Debt	Country's percentage of gross debt of central government to country's GDP in a sample year, standardized over the sample period. Source: IMF Economic Outlook.
Country Credit Rating	Country's annual credit rating index in a respective year. A value of 1 captures a "D" rating of a country. A value of 20 an "AAA" rating. We standardize the variable over the sample period. Source: Worldscope, Oxford Economic Outlook.
Political Risk	
Political Risk	Composite governance index of a country's (unweighted) mean of combined WGI measures *(Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption)* in a sample year (Dharmapala and Hines 2009). For ease of interpretation, we standardize the variable over the sample period and multiply it by -1 so that a higher value reflects higher political risk. Source: The World Bank (WGI).
Voice and Accountability	Yearly estimate of a country's perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media (WB).
Political Stability and Absence of Violence/Terrorism	Yearly estimate of perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism (WB).

Government Effectiveness	Yearly estimate of perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (WB).
Regulatory Quality	Yearly estimate of perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (WB).
Rule of Law	Yearly estimate of perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (WB).
Control of Corruption	Yearly estimate of perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (WB).

Panel E: Variables for Difference-in-Differences Analysis – U.S.-Canadian Sample

Source: Compustat

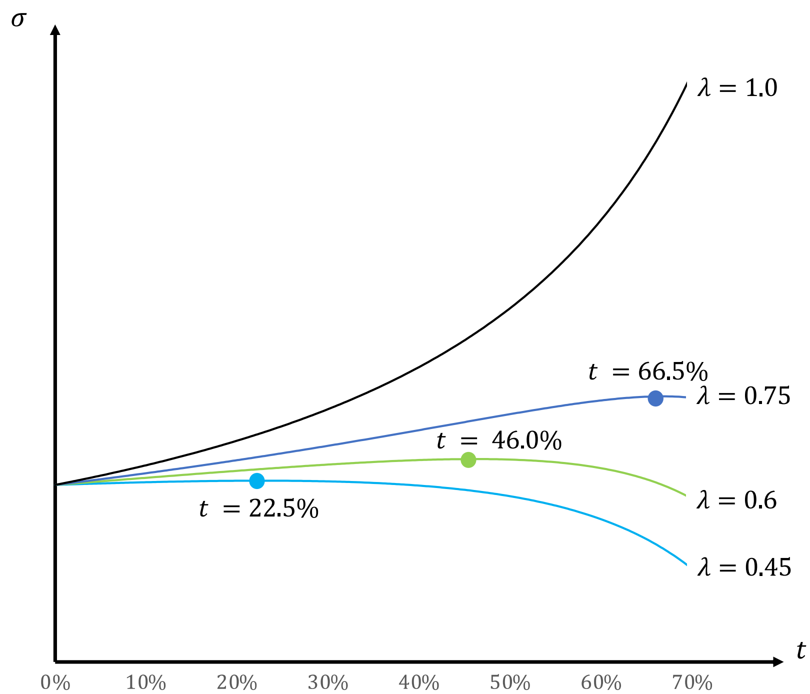
Variable	*Description*
Firm Risk-Taking	Three-year firm risk-taking proxy: Three-year earnings volatility measure (John et al. 2008; Langenmayr and Lester 2018). It is defined as the standard deviation over three years of a firm's *ROA*'s deviation from the industry-country specific average *ROA*. *RISK3y* = $\sqrt{\frac{1}{2}\sum_{t=1}^{3}\left(E_{\text{icjt}} - \frac{1}{3}\sum_{t=1}^{3}E_{\text{icjt}}\right)^{2}}$, where $E_{icjt} = ROA_{ijct} - \frac{1}{Njct}\sum_{k=1}^{Njct} ROA_{kjct}$. *RISK3y* and *ROA* are winsorized at 1% and 99%. Source: Worldscope.
Leverage	Long-term debt (Compustat item *dltt*) over the book value of assets (Compustat item *at*).
MB	Ratio of the market value of equity (Compustat items *prcc_f* × *csho*) to the book value of equity (Compustat item *ceq*).
Post	Indicator variable equal to one if a firm-quarter observation *t* is in the post-event period, and equal to zero if it is in the quarter/one of the two quarters prior to the respective budget crisis event. *Post_DC* is equal to one for firm-quarters in Q2 2011 and equal to zero for firm-quarters in Q4 2010 or Q1 2011. *Post_FC* is equal to one for firm-quarters in Q4 2012 and equal

	to zero for firm-quarters in Q2 2012 or Q3 2012. *Post_GS* is equal to one for firm-quarters in Q4 2013 and equal to zero for firm-quarters in Q2 2013 or Q3 2013.
Post_Placebo	Indicator variable equal to one for placebo event two quarters prior to the respective budget crisis and onwards, zero otherwise.
ROA	Operating income after depreciation (Compustat item *oiadpq*) over the book value of assets (Compustat item *atq*).
Sales Growth	Log of current year sales over last year sales (Compustat item *sale*).
Size	Book value of total assets (Compustat item *at*).
US	Indicator variable with the value of one if the firm is domiciled in the United States, and zero if it is domiciled in Canada.

FIGURE 1:

Optimal Risk-Taking σ as a Function of the Tax Rate t for Various Loss Offset Provisions λ

This figure illustrates optimal risk-taking under relative risk-aversion for different levels of loss-offset. E.g., for a logarithmic risk utility function risk-taking (σ) increases under a full loss offset ($\lambda = 1$) in the tax rate (t) . Under more restrictive loss offset rules (e.g., $\lambda = 0.6$) the risk sharing mechanism induces increased risk-taking for tax rates that do not exceed a specific critical tax rate (e.g., for $\lambda = 0.6$ and $t = 46\%$), while risk-taking decreases in the tax rate for higher tax rates (e.g., for $\lambda = 0.6$ and $t \geq 46\%$). Obviously, depending on the level of loss offset provision, the tax incentive from loss offset provisions on risk-taking is neutralized by the income effect of higher tax rates at a critical tax rate and reverses for higher tax rates.

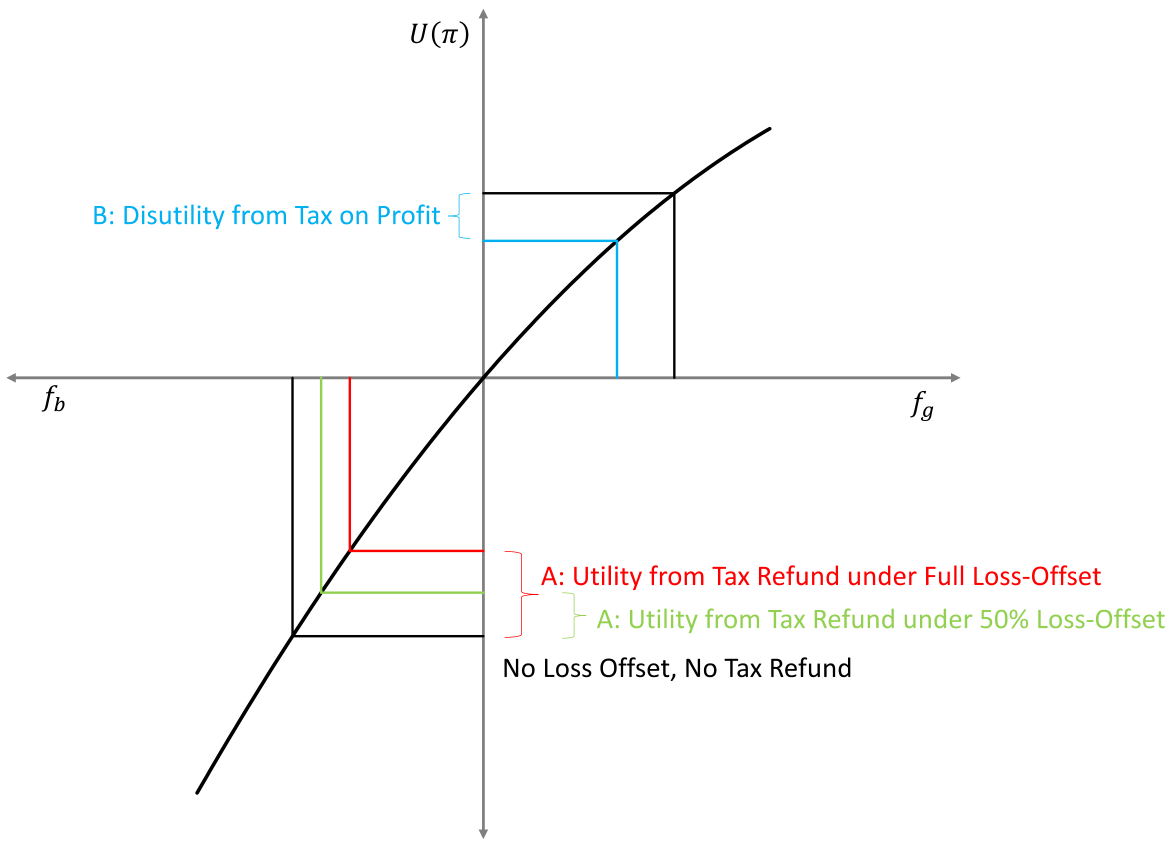


Source: own calculation.

FIGURE 2:

Benefit from Tax Refund on a Tax Loss (A) in Comparison to the Disutility from Taxes on Profits (B)

This figure illustrates the utility effects exemplified for a tax rate t of 30% under full loss offset ($\lambda = 1$), a loss offset of 50% ($\lambda = 0.5$) or no loss offset ($\lambda = 0$) for a risk-averse decision-maker. $f_g(\sigma)$ with $f_g(\sigma) > 0$ describes the profit generated by the invested amount I in the good state of nature. $f_b(\sigma)$ with $f_b(\sigma) < 0$ describes the loss incurred in the bad state of nature.

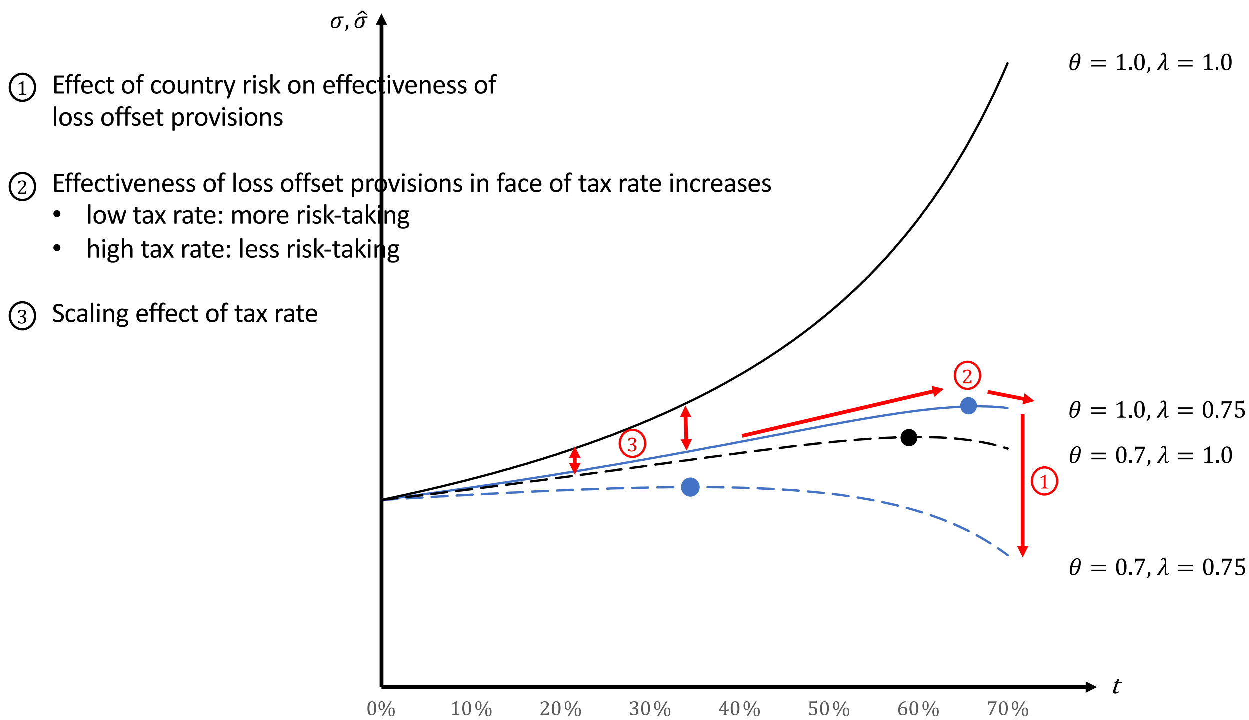


Source: modified from Langenmayr and Lester (2018), own calculations.

FIGURE 3:

Optimal Risk-Taking as a Function of the Tax Rate for Various Loss Offset Provisions Considering Country Risk

This figure illustrates the effect of country risk (θ) on the reversal of the tax incentive from loss offset provisions on risk-taking in absence of country risk (σ) and with explicit country risk ($\hat{\sigma}$) as a function of the tax rate (t) for different levels of loss offset provisions (λ). $\theta = 1$ describes the absence of country risk while $\theta < 0.7$ describes a country of investment that is characterized by political or fiscal budget risk. Thus, optimal risk-taking in absence of country risk is illustrated by solid lines while optimal risk-taking adjusted for country risk is plotted as dashed lines. The lower λ the more restrictive is the underlying loss offset provision. Obviously, the optimal risk-taking decreases in face of country risk. Moreover, the critical tax rate (illustrated by circles, i.e., neutralization of tax incentive) also decreases in face of country risk (risk-taking maxima/circles of dashed lines in comparison to the risk-taking maxima/circles of solid lines).

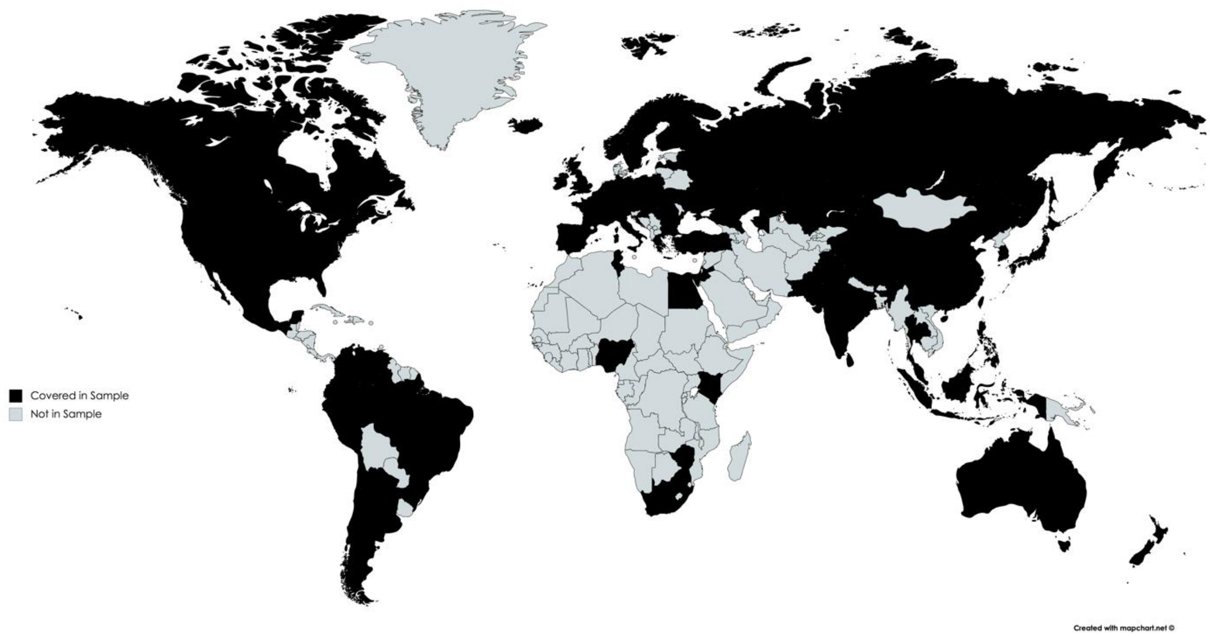


Source: own calculation.

FIGURE 4:

Countries Covered in Cross-Country Sample

This figure indicates those countries that are in our sample. Countries highlighted in black are in our sample and countries shaded in grey are not in our sample.

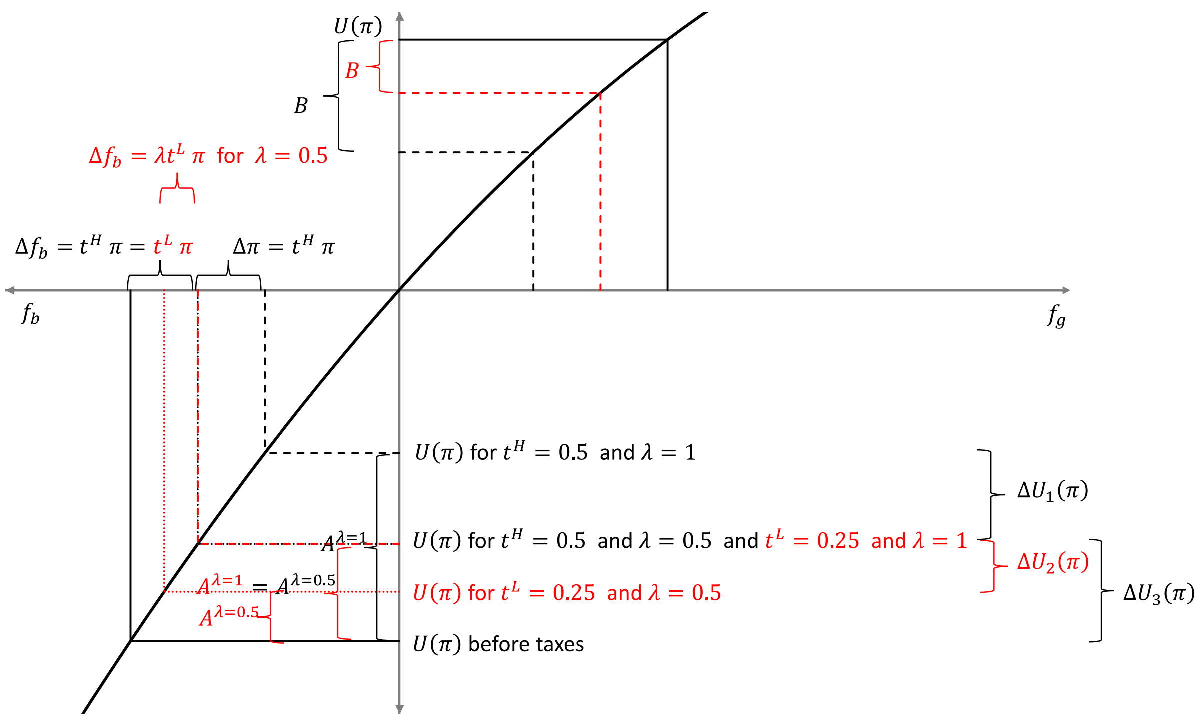


Source: own calculations.

FIGURE 5:

Decrease in Utility Due to Loss Offset Restrictions for Different Tax Rate Levels

This figure illustrates the effect of risk aversion on the decrease in utility for different tax rate levels exemplified for a tax rate t of $t^L = 25\%$ and of $t^H = 50\%$ under full loss offset ($\lambda = 1$) and a loss offset of 50 percent ($\lambda = 0.5$). $f_g(\sigma)$ with $f_g(\sigma) > 0$ describes the profit generated by the invested amount I in the good state of nature. $f_b(\sigma)$ with $f_b(\sigma) < 0$ describes the loss incurred in the bad state of nature.



Source: own calculations.

FIGURE 6:

Timeline of Events around U.S. Budget Crises

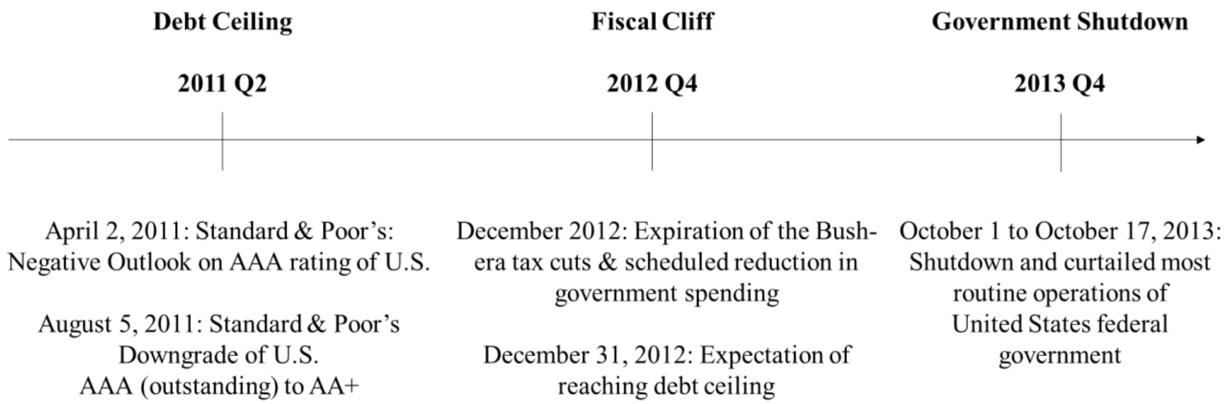
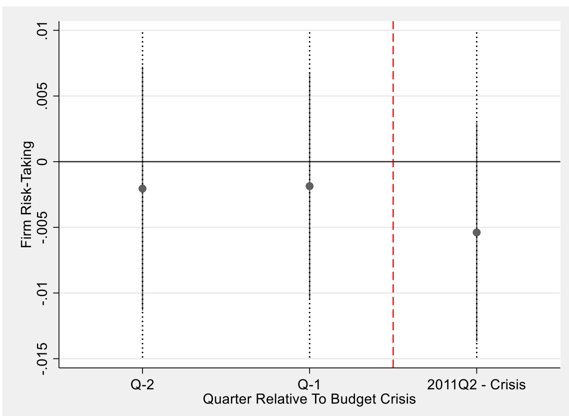


FIGURE 7:

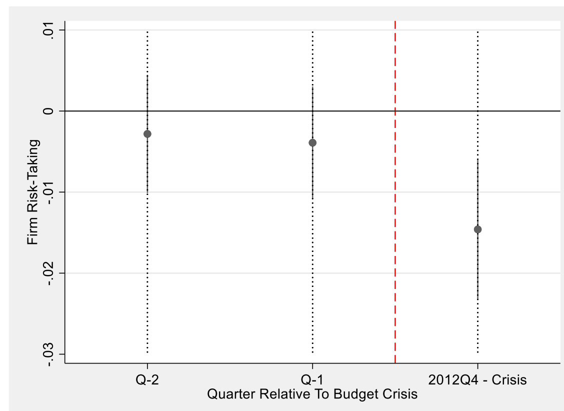
Visual Common Trends – U.S.-Canadian Sample

This figure presents graphical evidence on the effect of heightened fiscal budget risk on corporate risk-taking during the three federal U.S. budget crises from 2011 to 2013. Panel A presents the two quarters prior and the quarter in which the debt ceiling occurred (2011 Q2). Panel B presents the two quarters prior and the quarter in which the fiscal cliff occurred (2012 Q4). Panel C presents the two quarters prior and the quarter in which the government shutdown occurred (2013 Q4). The x-axis depicts quarters around the respective budget crisis event. The y-axis depicts the yearly coefficient of the interaction $US \times Post$ of regression equation (6) representing the increase/decrease in *Firm Risk-Taking* of U.S. firms relative to Canadian firms. Quarterly solid vertical lines indicate the confidence interval at the 95%-level. Variables are defined in Appendix D.

Panel A: Debt Ceiling (2011 Q2)



Panel B: Fiscal Cliff (2012 Q4)



Panel C: Government Shutdown (2013 Q4)

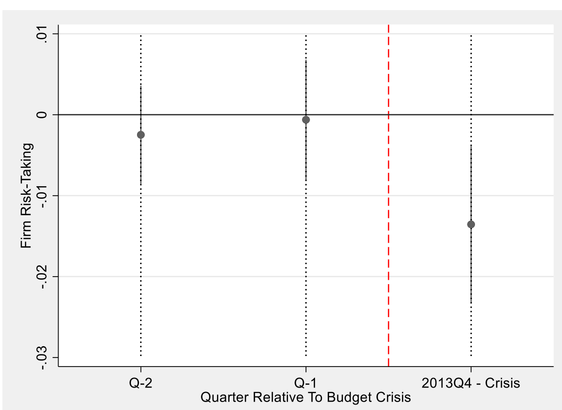


TABLE 1:

Sample Selection

This table describes the sample selection. Panel A presents the sample selection for the cross-country sample over the period from 1992 to 2012. Panel A presents the sample selection for the U.S.-Canadian sample of our difference-in-differences setting over the period from 2010 Q4 to 2013 Q4.

Panel A: Cross-Country Sample

Step	Description	No. of observations dropped	No. of observations remaining
1	All firms listed in Thomson Reuters' Worldscope Database with non-missing data for total assets (1992-2014)		552,462
2	Less: observations of cross-listed firms	(5,643)	546,819
3	Less: observations of firms in the financial or utilities sector	(99,396)	447,423
4	Less: observations with missing risk-taking measures	(106,941)	340,482
5	Less: observations with missing control and country-level variables	(100,710)	**239,772**

Panel B: U.S.-Canadian Sample

Step	Description	No. of observations dropped	No. of observations remaining
1	All U.S. and Canadian firms listed in Compustat Database with non-missing quarterly data for total assets (2010 Q4-2013 Q4)		174,908
2	Less: observations of firms in the financial or utilities sector	(72,009)	102,899
3	Less: observations with missing risk-taking measures	(24,049)	78,850
4	Less: observations with missing control variables	(47,196)	**31,654**

TABLE 2:

Cross-Country Sample Composition

This table summarizes the number of 239,772 observations per country in our cross-country sample over the period from 1992 to 2012.

Country	Obs.	Country	Obs.	Country	Obs.
Argentina	586	India	13,715	Philippines	1,372
Australia	9,898	Indonesia	3,586	Poland	2,232
Austria	736	Ireland	659	Portugal	580
Belgium	1,031	Israel	2,184	Romania	487
Brazil	2,013	Italy	1,964	Russia	1,023
Bulgaria	827	Japan	38,050	Singapore	4,961
Canada	7,503	Jordan	377	Slovak Rep.	58
Chile	1,555	Kazakhstan	7	South Africa	2,437
China	19,365	Kenya	166	Spain	1,329
Colombia	202	Korea	13,494	Sweden	3,000
Croatia	405	Latvia	56	Switzerland	2,315
Czech Rep.	44	Lithuania	138	Thailand	5,170
Denmark	1,453	Luxembourg	188	Tunisia	154
Egypt	516	Malaysia	8,628	Turkey	2,249
Finland	1,419	Mexico	1,179	Uganda	2
France	6,025	Morocco	214	Ukraine	102
Germany	6,400	Netherlands	1,398	United Kingdom	10,229
Ghana	59	New Zealand	775	United States	41,167
Greece	1,735	Nigeria	147	Venezuela	55
Hong Kong	8,683	Norway	1,195	Zimbabwe	2
Hungary	180	Pakistan	1,308		
Iceland	50	Peru	735		

TABLE 3:

Descriptive Statistics

This table presents descriptive statistics of our analyses. Panel A presents summary statistics for the cross-country sample of our main variables for 25,906 firms and 239,772 firm-year observations over the period from 1992 to 2012. Panel B presents summary statistics for 4,428 firms and 31,654 firm-quarter observations over the period from 2010 to 2013 for the U.S.-Canadian sample in the difference-in-differences analysis. Panel B presents the results of the entropy matching procedure. Matching was performed based on covariates of *Size*, *Leverage*, *Sales Growth, ROA,* and *MB* prior to the budget crises. The table reports the means for *Size*, *Leverage*, *Sales Growth, ROA, and MB* for U.S. firms and Canadian firms before and after entropy balancing. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. All continuous variables are winsorized at the 1 and 99 percent levels. Variables are defined in Appendix D.

Panel A: Descriptive Statistics of Cross-Country Sample

Variable	N	Mean	SD	P5	P25	Median	P75	P95
Firm Risk-Taking	239,772	0.087	0.183	0.000	0.012	0.031	0.081	1.352
Size	239,772	12.043	2.133	6.317	10.707	12.030	13.393	17.296
Leverage	239,772	0.527	0.354	0.024	0.321	0.501	0.661	2.744
Sales Growth	239,772	0.209	0.795	-0.884	-0.040	0.073	0.228	6.072
ROA	239,772	0.002	0.300	-2.049	0.010	0.057	0.108	0.378
MB	239,772	2.159	3.426	-8.429	0.712	1.361	2.564	22.362
LCF	239,772	12.846	6.921	0.000	5.000	10.000	20.000	20.000
LCB	239,772	0.457	0.498	0.000	0.000	0.000	1.000	1.000
CTR	239,772	0.329	0.078	0.100	0.280	0.330	0.390	0.582
GDP Growth	239,772	0.073	0.098	-0.171	0.017	0.066	0.129	0.305
Inflation	239,772	0.027	0.036	-0.034	0.008	0.021	0.039	0.181
Political Risk	239,772	5.134	4.526	-4.865	1.962	7.184	8.606	11.004
Control of Corruption	239,772	0.973	0.962	-0.986	0.125	1.265	1.766	2.390
Government Effectiveness	239,772	1.148	0.721	-0.451	0.524	1.459	1.697	2.229
Political Stability	239,772	0.370	0.781	-1.678	-0.090	0.595	0.980	1.441
Regulatory Quality	239,772	0.982	0.737	-0.541	0.490	1.146	1.593	2.015
Rule of Law	239,772	0.993	0.783	-0.826	0.417	1.319	1.589	1.948
Voice and Accountability	239,772	0.667	0.880	-1.666	0.422	0.998	1.312	1.656
Government Debt	239,772	0.739	0.545	0.097	0.349	0.636	0.860	2.373
Country Debt Rating	239,772	16.700	3.849	0.001	14.250	18.333	19.889	20.000
Patent Applications	238,021	9.796	2.658	5.142	7.654	10.001	12.341	12.816
R&D Expenditures / GDP	209,307	2.087	0.994	0.532	1.130	2.212	2.819	3.461

TABLE 3:

Descriptive Statistics (continued)

Panel B: Descriptive Statistics of U.S.-Canadian Sample

	Full Sample				U.S.				CA			
	N	**Mean**	**SD**	**Median**	**N**	**Mean**	**SD**	**Median**	**N**	**Mean**	**SD**	**Median**
Firm Risk Taking	31,654	0.040	0.103	0.015	25,733	0.038	0.102	0.014	5,921	0.048	0.109	0.021
Size	31,654	10.273	2.566	10.487	25,733	10.384	2.571	10.602	5,921	9.791	2.486	9.956
Leverage	31,654	0.181	0.227	0.109	25,733	0.187	0.234	0.114	5,921	0.155	0.195	0.092
Sales Growth	31,654	0.095	0.588	0.069	25,733	0.090	0.565	0.068	5,921	0.117	0.681	0.076
ROA	31,654	-0.026	0.167	0.014	25,733	-0.025	0.169	0.016	5,921	-0.031	0.160	0.008
MB	31,654	2.627	7.862	1.878	25,733	2.820	8.169	2.011	5,921	1.789	6.287	1.411

Panel C: Results of Entropy Balancing – U.S.-Canadian Sample

	Mean after Entropy Balancing			Mean before Entropy Balancing		
	U.S.	**CA**	**Diff.**	**U.S.**	**CA**	**Diff.**
Size	10.360	10.360		10.360	9.908	***
Leverage	0.183	0.183		0.183	0.151	***
Sales Growth	0.096	0.096		0.096	0.139	***
ROA	-0.022	-0.022		-0.022	-0.020	
MB	2.635	2.630		2.635	1.774	***

TABLE 4:

Distribution of Country Risk Factors in Cross-Country Sample

This table presents the distribution of the quartiles of the respective country risk factors for the countries in the sample for our full sample. The quartiles are based on the yearly rank of the country within the respective risk measure.

Country	Obs	Political Risk					Fiscal Budget Risk				
		Mean	SD	P25	P50	P75	Mean	SD	P25	P50	P75
Argentina	586	4.000	0.000	4.000	4.000	4.000	2.594	0.900	2.000	2.000	3.000
Australia	9,898	1.000	0.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000
Austria	736	1.000	0.000	1.000	1.000	1.000	2.829	0.376	3.000	3.000	3.000
Belgium	1,031	1.929	0.257	2.000	2.000	2.000	3.933	0.250	4.000	4.000	4.000
Brazil	2,013	4.000	0.000	4.000	4.000	4.000	2.756	0.548	3.000	3.000	3.000
Bulgaria	827	4.000	0.000	4.000	4.000	4.000	1.000	0.000	1.000	1.000	1.000
Canada	7,503	1.000	0.000	1.000	1.000	1.000	3.200	0.400	3.000	3.000	3.000
Chile	1,555	2.729	0.477	2.000	3.000	3.000	1.000	0.000	1.000	1.000	1.000
China	19,365	4.000	0.000	4.000	4.000	4.000	1.000	0.000	1.000	1.000	1.000
Colombia	202	4.000	0.000	4.000	4.000	4.000	1.623	0.486	1.000	2.000	2.000
Croatia	405	3.000	0.000	3.000	3.000	3.000	1.696	0.461	1.000	2.000	2.000
Czech Rep.	44	3.000	0.000	3.000	3.000	3.000	1.186	0.394	1.000	1.000	1.000
Denmark	1,453	1.000	0.000	1.000	1.000	1.000	2.019	0.606	2.000	2.000	2.000
Egypt	516	4.000	0.000	4.000	4.000	4.000	3.222	0.416	3.000	3.000	3.000
Finland	1,419	1.000	0.000	1.000	1.000	1.000	1.933	0.250	2.000	2.000	2.000
France	6,025	2.351	0.477	2.000	2.000	3.000	2.664	0.601	2.000	3.000	3.000
Germany	6,400	1.122	0.328	1.000	1.000	1.000	2.628	0.483	2.000	3.000	3.000
Ghana	59	4.000	0.000	4.000	4.000	4.000	1.500	0.505	1.000	1.500	2.000
Greece	1,735	3.108	0.311	3.000	3.000	3.000	4.000	0.000	4.000	4.000	4.000
Hong Kong	8,683	1.527	0.589	1.000	1.000	2.000	1.096	0.295	1.000	1.000	1.000
Hungary	180	3.000	0.000	3.000	3.000	3.000	2.609	0.489	2.000	3.000	3.000
Iceland	50	1.000	0.000	1.000	1.000	1.000	2.900	1.344	1.000	4.000	4.000
India	13,715	4.000	0.000	4.000	4.000	4.000	3.000	0.000	3.000	3.000	3.000
Indonesia	3,586	4.000	0.000	4.000	4.000	4.000	1.815	0.923	1.000	2.000	2.000
Ireland	659	1.163	0.370	1.000	1.000	1.000	2.329	1.252	1.000	2.000	4.000
Israel	2,184	3.000	0.000	3.000	3.000	3.000	3.191	0.393	3.000	3.000	3.000
Italy	1,964	3.000	0.000	3.000	3.000	3.000	4.000	0.000	4.000	4.000	4.000
Japan	38,050	2.628	0.483	2.000	3.000	3.000	3.984	0.127	4.000	4.000	4.000
Jordan	377	4.000	0.000	4.000	4.000	4.000	2.784	0.412	3.000	3.000	3.000
Kazakhstan	7	4.000	0.000	4.000	4.000	4.000	1.000	0.000	1.000	1.000	1.000
Kenya	166	4.000	0.000	4.000	4.000	4.000	2.012	0.109	2.000	2.000	2.000
Korea	13,494	3.000	0.000	3.000	3.000	3.000	1.000	0.000	1.000	1.000	1.000
Latvia	56	3.000	0.000	3.000	3.000	3.000	1.382	0.490	1.000	1.000	2.000
Lithuania	138	3.000	0.000	3.000	3.000	3.000	1.452	0.500	1.000	1.000	2.000
Luxembourg	188	1.000	0.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000
Malaysia	8,628	3.317	0.465	3.000	3.000	4.000	1.988	0.170	2.000	2.000	2.000
Mexico	1,179	4.000	0.000	4.000	4.000	4.000	1.954	0.209	2.000	2.000	2.000
Morocco	214	4.000	0.000	4.000	4.000	4.000	2.146	0.354	2.000	2.000	2.000
Netherlands	1,398	1.000	0.000	1.000	1.000	1.000	2.353	0.478	2.000	2.000	3.000
New Zealand	775	1.000	0.000	1.000	1.000	1.000	1.279	0.449	1.000	1.000	2.000

Country	Obs	Political Risk					Fiscal Budget Risk				
		Mean	**SD**	**P25**	**P50**	**P75**	**Mean**	**SD**	**P25**	**P50**	**P75**
Nigeria	147	4.000	0.000	4.000	4.000	4.000	1.020	0.142	1.000	1.000	1.000
Norway	1,195	1.000	0.000	1.000	1.000	1.000	1.585	0.493	1.000	2.000	2.000
Pakistan	1,308	4.000	0.000	4.000	4.000	4.000	2.417	0.493	2.000	2.000	3.000
Peru	735	4.000	0.000	4.000	4.000	4.000	1.414	0.493	1.000	1.000	2.000
Philippines	1,372	4.000	0.000	4.000	4.000	4.000	2.151	0.358	2.000	2.000	2.000
Poland	2,232	3.000	0.000	3.000	3.000	3.000	2.000	0.000	2.000	2.000	2.000
Portugal	580	2.633	0.497	2.000	3.000	3.000	2.686	0.796	2.000	2.000	3.000
Romania	487	4.000	0.000	4.000	4.000	4.000	1.112	0.316	1.000	1.000	1.000
Russia	1,023	4.000	0.000	4.000	4.000	4.000	1.031	0.219	1.000	1.000	1.000
Singapore	4,961	1.056	0.229	1.000	1.000	1.000	3.784	0.412	4.000	4.000	4.000
Slovak Rep.	58	3.000	0.000	3.000	3.000	3.000	1.750	0.437	1.500	2.000	2.000
South Africa	2,437	3.399	0.490	3.000	3.000	4.000	1.650	0.477	1.000	2.000	2.000
Spain	1,329	2.816	0.388	3.000	3.000	3.000	2.242	0.428	2.000	2.000	2.000
Sweden	3,000	1.000	0.000	1.000	1.000	1.000	2.132	0.339	2.000	2.000	2.000
Switzerland	2,315	1.000	0.000	1.000	1.000	1.000	2.211	0.408	2.000	2.000	2.000
Thailand	5,170	3.970	0.172	4.000	4.000	4.000	1.902	0.298	2.000	2.000	2.000
Tunisia	154	4.000	0.000	4.000	4.000	4.000	2.000	0.000	2.000	2.000	2.000
Turkey	2,249	4.000	0.000	4.000	4.000	4.000	2.144	0.390	2.000	2.000	2.000
Uganda	2	4.000	0.000	4.000	4.000	4.000	1.000	0.000	1.000	1.000	1.000
Ukraine	102	4.000	0.000	4.000	4.000	4.000	1.990	0.099	2.000	2.000	2.000
UK	10,229	1.422	0.494	1.000	1.000	2.000	2.347	0.650	2.000	2.000	3.000
United States	41,167	1.787	0.409	2.000	2.000	2.000	2.895	0.713	2.000	3.000	3.000
Venezuela	55	4.000	0.000	4.000	4.000	4.000	1.556	0.572	1.000	2.000	2.000
Zimbabwe	2	2.490	1.116	1.000	2.000	3.000	2.481	1.116	1.000	2.000	3.000

TABLE 5:

Correlation Table

These tables provide Pearson correlations for the cross-country (Panel A) and U.S.-Canadian (Panel B) samples. Bold letters denote statistical significance at the 1 percent level.

Panel A: Cross-Country Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) *Firm Risk-Taking*	1														
(2) *Size*	**-0.341**	1													
(3) *Leverage*	**0.293**	**-0.057**	1												
(4) *Sales Growth*	**0.076**	**-0.076**	**-0.023**	1											
(5) *ROA*	**-0.634**	**0.395**	**-0.400**	**-0.045**	1										
(6) *MB*	**0.024**	-0.003	**-0.131**	**0.086**	**0.039**	1									
(7) *LCF*	**0.243**	**-0.105**	**0.011**	**0.064**	**-0.167**	**0.06**	1								
(8) *LCB*	**0.131**	**0.057**	**0.071**	**-0.020**	**-0.11**	**0.018**	**0.357**	1							
(9) *CTR*	-0.001	**0.114**	**0.118**	**-0.039**	**-0.027**	**0.015**	**-0.102**	**0.288**	1						
(10) *GDP Growth*	**-0.022**	**-0.043**	**-0.053**	**0.063**	**0.047**	**0.050**	**-0.101**	**-0.211**	**-0.212**	1					
(11) *Inflation*	**-0.016**	**-0.097**	**-0.011**	**0.082**	**0.062**	**0.038**	**-0.070**	**-0.283**	**-0.259**	**0.419**	1				
(12) *Political Risk*	**-0.170**	-0.001	**-0.013**	**-0.006**	**0.152**	-0.005	**-0.554**	**-0.497**	**-0.193**	**0.338**	**0.564**	1			
(13) *Government Debt*	**-0.104**	**0.147**	**0.052**	**-0.098**	**0.030**	**-0.097**	**-0.241**	**0.134**	**0.536**	**-0.275**	**-0.482**	**-0.259**	1		
(14) *Country Debt Rating*	**0.156**	**0.072**	**0.036**	0.004	**-0.153**	**0.065**	**0.366**	**0.447**	**0.365**	**-0.241**	**-0.536**	**-0.736**	**0.180**	1	
(15) *Loss_Offset_Restriction*	**-0.243**	**0.076**	**-0.049**	**-0.058**	**0.183**	**-0.04**	**-0.991**	**-0.418**	**-0.026**	**0.195**	**0.135**	**0.611**	**-0.628**	**-0.623**	1

Panel B: U.S.-Canadian Sample

	(1)	(2)	(3)	(4)	(5)	(6)
(1) *Firm Risk-Taking*	1					
(2) *Size*	**-0.107**	1				
(3) *Leverage*	0.012	**0.199**	1			
(4) *Sales Growth*	**-0.048**	**0.029**	-0.003	1		
(5) *ROA*	**-0.204**	**0.509**	**-0.047**	**0.056**	1	
(6) *MB*	**-0.035**	**0.070**	**-0.075**	**0.061**	**0.139**	1

TABLE 6:
Interactive Effect of Tax System Changes and Country Risk Factors

This table presents regression results on firm risk-taking over the 1992 to 2012 period. The variable *Firm Risk-Taking* is defined as the standard deviation over three years of a firm's *ROA*'s deviation from the industry-country-specific average *ROA*. In Panel A (B), we define *Country Risk Factor* as an indicator variable equal to one if the firm is located in a country whose country risk proxy in year *t* is above the yearly median of the proxy (in the fourth quartile) and zero otherwise. In column (1), we present results from estimates of equation (5) using *Political Risk* as *Country Risk Factor*, in column (2) from estimates of equation (5) using *Fiscal Budget Risk* as *Country Risk Factor*. The main effects specified in equation (5) are included in the model but are not reported in this table. We include industry-by-year fixed effects. We report robust standard errors clustered by firm and by country-year in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Independent variables are described in Appendix D.

Panel A: Median Split of *Country Risk Factor*

	Dependent Variable: Firm Risk-Taking	
	Political Risk	Fiscal Budget Risk
	(1)	(2)
(I) LCF*CTRStd	0.001***	0.002***
	(0.000)	(0.000)
(II) LCF*CTRStd*Country Risk Factor	0.000	0.000
	(0.001)	(0.000)
Sum of Coefficients *(I + II)*	0.001	0.002***
P > F (I + II = 0)	[0.143]	[0.002]
(III) LCB*CTRStd	0.012***	0.011**
	(0.004)	(0.005)
(IV) LCB*CTRStd*Country Risk Factor	-0.011**	-0.012**
	(0.005)	(0.006)
Sum of Coefficients *(III + IV)*	0.001	-0.001
P > F (III + IV = 0)	[0.922]	[0.729]
Political Risk	-0.005**	-0.007***
	(0.002)	(0.002)
Fiscal Budget Risk	-0.015***	-0.012***
	(0.002)	(0.002)
LCF	0.001***	0.002***
	(0.000)	(0.000)
LCB	0.021***	0.004
	(0.005)	(0.005)
CTRStd	-0.007	-0.017***
	(0.010)	(0.006)
*CTRStd*Country Risk Factor*	0.007	0.000
	(0.010)	(0.000)
*LCF*Country Risk Factor*	-0.000	0.000
	(0.000)	(0.000)
*LCB*Country Risk Factor*	-0.029***	0.018***
	(0.006)	(0.006)
Country Risk Factor interactions & Firm- and Country-level controls & Industry-by-Year fixed effects included		
Observations	239,772	239,772
Adjusted R-squared	0.458	0.458

TABLE 6:

Interactive Effect of Tax System Changes and Country Risk Factors (continued)

Panel B: Indicator Variable Equal to One if *Country Risk Factor* is in the Fourth Quartile

	Dependent Variable: Firm Risk-Taking	
	Political Risk	Fiscal Budget Risk
	(1)	(2)
(I) LCF*CTRStd	0.000**	-0.000
	(0.000)	(0.000)
(II) LCF*CTRStd*Country Risk Factor	0.001***	0.002***
	(0.000)	(0.000)
Sum of Coefficients *(I + II)*	0.001***	0.002***
P > F (I + II = 0)	[0.000]	[0.000]
(III) LCB*CTRStd	0.008***	0.016***
	(0.003)	(0.004)
(IV) LCB*CTRStd*Country Risk Factor	-0.043***	-0.024***
	(0.013)	(0.005)
Sum of Coefficients *(III + IV)*	-0.035***	-0.008**
P > F (III + IV = 0)	[0.008]	[0.024]
Political Risk	-0.012***	-0.008***
	(0.004)	(0.002)
Fiscal Budget Risk	-0.021***	-0.013***
	(0.003)	(0.002)
LCF	0.003***	0.001***
	(0.000)	(0.000)
LCB	0.008*	0.011***
	(0.005)	(0.004)
CTRStd	-0.002	0.004
	(0.005)	(0.003)
*CTRStd*Country Risk Factor*	-0.002	-0.016***
	(0.005)	(0.004)
*LCF*Country Risk Factor*	-0.001**	0.000
	(0.001)	(0.000)
*LCB*Country Risk Factor*	-0.047**	0.010
	(0.022)	(0.007)
Country Risk Factor interactions & Firm- and Country-level controls & Industry-by-Year fixed effects included		
Observations	239,772	239,772
Adjusted R-squared	0.456	0.457

TABLE 7:

Effectiveness of Loss Offset Provisions in Face of Tax Rate Increases

This table presents regression results on firm risk-taking over the 1992 to 2012 period. We restrict our sub-sample to observations three years prior and post to tax rate increases. The variable *Firm Risk-Taking* is defined as the standard deviation over three years of a firm's *ROA*'s deviation from the industry-country-specific average *ROA*. In Panel A (B), we define *Country Risk Factor* as an indicator variable equal to one if the firm is located in a country whose country risk proxy in year *t* is above the yearly median of the proxy (in the fourth quartile) and zero otherwise. In column (1), we present results from estimates of equation (5) using *Political Risk* as *Country Risk Factor*, in column (2) from estimates of equation (5) using *Fiscal Budget Risk* as *Country Risk Factor*. The main effects specified in equation (5) are included in the model but are not reported in this table. We include industry-by-year fixed effects. We report robust standard errors clustered by firm and by country-year in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Independent variables are described in Appendix D.

Panel A: Median Split of Country Risk Factor		
	Dependent Variable: Firm Risk-Taking	
	Political Risk	Fiscal Budget Risk
	(1)	(2)
(I) LCF*CTRStd	-0.002***	-0.000
	(0.001)	(0.000)
(II) LCF*CTRStd*Country Risk Factor	0.003***	0.000
	(0.001)	(0.001)
Sum of Coefficients *(I + II)*	0.001***	0.000
P > F (I + II = 0)	[0.001]	[0.9102]
(III) LCB*CTRStd	0.020***	0.016***
	(0.005)	(0.004)
(IV) LCB*CTRStd*Country Risk Factor	-0.004	-0.010
	(0.007)	(0.006)
Sum of Coefficients *(III + IV)*	0.016***	0.006
P > F (III + IV = 0)	[0.001]	[0.266]
Country Risk Factor interactions & Firm- and Country-level controls & Industry-by-Year fixed effects included		
Observations	23,255	23,255
Adjusted R-squared	0.412	0.408
Panel B: Indicator Variable Equal to One if Country Risk Factor is in the Fourth Quartile		
(I) LCF*CTRStd	0.000	0.000
	(0.000)	(0.000)
(II) LCF*CTRStd*Country Risk Factor	-0.001	0.002
	(0.001)	(0.001)
Sum of Coefficients *(I + II)*	-0.001	0.002*
P > F (I + II = 0)	[0.342]	[0.054]
(III) LCB*CTRStd	0.015***	0.012***
	(0.003)	(0.004)
(IV) LCB*CTRStd*Country Risk Factor	-0.044***	-0.073***
	(0.013)	(0.013)
Sum of Coefficients *(III + IV)*	-0.029**	-0.061***
P > F (III + IV = 0)	[0.023]	[0.006]
Country Risk Factor interactions & Firm- and Country-level controls & Industry-by-Year fixed effects included		
Observations	23,255	23,255
Adjusted R-squared	0.407	0.412

TABLE 8:

Effect of Country Risk in Countries with Low vs. High Corporate Tax Rates

This table presents regression results on firm risk-taking over the 1992 to 2012 period. The variable *Firm Risk-Taking* is defined as the standard deviation over three years of a firm's ROA's deviation from the industry-country-specific average ROA. In Panel A, we estimate equation (5) including all observations. In Panel B, we restrict our sub-sample to observations three years prior and post to tax rate increases. We define *Country Risk Factor* as an indicator variable equal to one if the firm is located in a country whose country risk proxy is above the yearly median of the proxy. In columns (1) and (2), we estimate equation (5) using *Political Risk*, in column (3) and (4) using *Fiscal Budget Risk* as *Country Risk Factor*. Columns (1) and (3) present results for firms in countries with statutory corporate tax rates below the median (33%). Columns (2) and (4) present results for firms in countries with statutory corporate tax rates above the median (33%). The main effects specified in equation (5) are included in the model but are not reported in this table. We include industry-by-year fixed effects. We report robust standard errors clustered by firm and by country-year in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Independent variables are described in Appendix D.

Panel A: All Observations

	Dependent Variable: Firm Risk-Taking			
	Political Risk		Fiscal Budget Risk	
	Low Tax Rate	High Tax Rate	Low Tax Rate	High Tax Rate
	(1)	(2)	(3)	(4)
(I) LCF*CTRStd	-0.000	0.000	-0.000	0.001
	(0.001)	(0.001)	(0.000)	(0.001)
(II) LCF*CTRStd*Country Risk Factor	0.000	0.002	0.001**	0.004***
	(0.001)	(0.001)	(0.000)	(0.001)
Sum of Coefficients *(I + II)*	0.000	0.002*	0.001*	0.004***
P > F (I + II = 0)	[0.401]	[0.0757]	[0.0946]	[0.000]
(III) LCB*CTRStd	0.017**	0.008	0.026***	-0.009
	(0.007)	(0.015)	(0.006)	(0.015)
(IV) LCB*CTRStd*Country Risk Factor	-0.002	-0.013	-0.022*	-0.000
	(0.009)	(0.016)	(0.012)	(0.015)
Sum of Coefficients *(III + IV)*	0.015**	-0.005	0.004	-0.009
P > F (III + IV = 0)	[0.021]	[0.456]	[0.699]	[0.198]
Observations	108,886	130,862	108,886	130,862
Adjusted R-squared	0.403	0.507	0.404	0.509

Country Risk Factor interactions & Firm- and Country-level controls & Industry-by-Year fixed effects included

Panel B: Tax Rate Increases

	Low Tax Rate	High Tax Rate	Low Tax Rate	High Tax Rate
	(1)	(2)	(3)	(4)
(I) LCF*CTRStd	0.001	0.003	0.004**	-0.003***
	(0.001)	(0.003)	(0.001)	(0.001)
(II) LCF*CTRStd*Country Risk Factor	0.000	0.000	0.002	0.004
	(0.001)	(0.001)	(0.002)	(0.003)
Sum of Coefficients *(I + II)*	0.001	0.003*	0.006	0.001
P > F (I + II = 0)	[0.139]	[0.067]	[0.116]	[0.801]
(III) LCB*CTRStd	0.022***	0.046***	0.031	-0.000
	(0.006)	(0.014)	(0.019)	(0.023)
(IV) LCB*CTRStd*Country Risk Factor	-0.013	-0.095***	-0.018	-0.069
	(0.009)	(0.030)	(0.029)	(0.051)
Sum of Coefficients *(III + IV)*	0.009	-0.049	0.013	-0.069*
P > F (III + IV = 0)	[0.399]	[0.146]	[0.778]	[0.073]
Observations	14,138	9,057	14,138	9,057
Adjusted R-squared	0.409	0.475	0.410	0.469

Country Risk Factor interactions & Firm- and Country-level controls & Industry-by-Year fixed effects included

TABLE 9:

Country-Level Analysis

This table presents regression results on firm risk-taking over the 1992 to 2012 period. The variable *Patent Applications* is defined as the logarithm of patent applications by residents in a country. We lag this variable by three years to account for timing differences between R&D expenditures and patenting. The variable *R&D Expenditures / GDP* is defined as the ratio of a country's total research and development expenditure to its GDP. In column (1) and (3), we present results from estimates of equation (5) using *Political Risk* as *Country Risk Factor*, in column (2) and (4) from estimates of equation (5) using *Fiscal Budget Risk* as *Country Risk Factor*. The main effects specified in equation (5) are included in the model but are not reported in this table. We calculate quartiles of GDP growth and quartiles of GDP in the current and then include GDP–Growth-Level–Industry–Year fixed effects. We report robust standard errors clustered by firm and by country-year in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Independent variables are described in Appendix D.

Median Split of *Country Risk Factor*				
Dependent Variable:	*Patent Applications*		*R&D Expenditures / GDP*	
	Political Risk	Fiscal Budget Risk	Political Risk	Fiscal Budget Risk
	(1)	(2)		
(I) LCF*CTRStd	0.032***	0.006	-0.006	-0.002
	(0.007)	(0.004)	(0.005)	(0.002)
(II) LCF*CTRStd*Country Risk Factor	-0.030***	-0.016***	0.006	0.001
	(0.009)	(0.006)	(0.005)	(0.004)
Sum of Coefficients *(I + II)*	0.002	-0.010	0.000	-0.001
P > F (I + II = 0)	0.774	0.051	[0.861]	[0.883]
(III) LCB*CTRStd	0.152*	0.155***	0.196***	0.092*
	(0.079)	(0.057)	(0.063)	(0.054)
(IV) LCB*CTRStd*Country Risk Factor	-0.096	-0.293***	-0.338***	-0.168***
	(0.085)	(0.068)	(0.081)	(0.061)
Sum of Coefficients *(III + IV)*	0.056	-0.138	-0.142**	-0.076
P > F (III + IV = 0)	0.332	0.015	[0.028]	[0.094]*
Country Risk Factor interactions & Country-level controls & GDP-Growth-Quartile-Ln(GDP)-Ind-Year fixed effects included				
Observations	784	784	677	677
Adjusted R-squared	0.978	0.978	0.971	0.970

TABLE 10:

Periods of Heightened Fiscal Budget Risk in the United States

This table presents regression results for difference-in-differences tests around the federal budget crises in the U.S. using a sample of U.S. and Canadian firms from 2010 to 2013. In Panel A, we estimate equation (6) for the quarter of the budget crisis and two (one) quarter prior to the crisis. *US* is equal to one if a firm is domiciled in the U.S. and 0 otherwise. *Post* (i.e., *Post_DC*, *Post_FC*, and *Post_GS*) is equal to one for firm-quarter observations in the quarter in which debt ceiling, fiscal cliff, and government shutdown occurred (i.e., 2011 Q2, 2012 Q4, and 2013 Q4, respectively). *Post* is equal to zero in quarters before the respective budget crisis. In Panel B, we estimate equation (6) *Post_Placebo* equals one for quarters two quarters before the actual events and onwards. The variable *Firm Risk-Taking* is defined as the standard deviation over three years of a firm's ROA's deviation from the industry-country-specific average *ROA*. We include industry-by-year fixed effects and report robust standard errors clustered by firm in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Independent variables are described in Appendix E.

Panel A: Events around U.S. Fiscal Budget Crises

	Dependent Variable: Firm Risk-Taking					
	Two Pre-Quarters			*One Pre-Quarter*		
	(1)	(2)	(3)	(4)	(5)	(6)
US*Post_DC	**-0.003**			**-0.004**		
	(0.003)			**(0.003)**		
US*Post_FC		**-0.012*** **			**-0.011** **	
		(0.004)			**(0.005)**	
US*Post_GS			**-0.012*** **			**-0.013*** **
			(0.004)			**(0.004)**
US	-0.003	0.003	0.004	-0.003	0.002	0.005
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Size	-0.004***	-0.003***	-0.005***	-0.003***	-0.003***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.007	-0.005	0.007	0.001	-0.009	0.008
	(0.007)	(0.006)	(0.008)	(0.007)	(0.007)	(0.010)
Sales Growth	0.004	0.004	-0.001	0.006**	0.001	0.001
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
ROA	-0.404***	-0.442***	-0.429***	-0.390***	-0.444***	-0.414***
	(0.029)	(0.017)	(0.026)	(0.028)	(0.022)	(0.029)
MB	-0.000	-0.000	-0.001	-0.001*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry-by-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,541	10,424	10,689	7,045	6,907	7,059
Adjusted R-squared	0.480	0.570	0.520	0.470	0.580	0.487

TABLE 10:

Periods of Heightened Fiscal Budget Risk in the United States (continued)

Panel B: Placebo Events around U.S. Fiscal Budget Crises						
	Dependent Variable: Firm Risk-Taking					
	Two Pre-Quarters			*One Pre-Quarter*		
	(1)	(2)	(3)	(4)	(5)	(6)
US*Post_Placebo_DC	-0.002			-0.002		
	(0.005)			(0.005)		
US*Post_Placebo_FC		-0.001			0.008**	
		(0.004)			(0.004)	
US*Post_Placebo_GS			-0.002			0.004
			(0.003)			(0.003)
US	-0.000	0.004	0.004	-0.000	-0.004	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Size	-0.004***	-0.003***	-0.003***	-0.004***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.022**	0.006	-0.000	0.022**	0.003	-0.003
	(0.009)	(0.007)	(0.009)	(0.009)	(0.006)	(0.008)
Sales Growth	0.005	0.002	-0.005	0.005	0.003	-0.003
	(0.003)	(0.005)	(0.004)	(0.003)	(0.004)	(0.004)
ROA	-0.446***	-0.414***	-0.453***	-0.446***	-0.421***	-0.455***
	(0.031)	(0.027)	(0.029)	(0.031)	(0.020)	(0.024)
MB	-0.000	0.000	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry-by-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,013	6,987	7,199	7,013	10,425	10,643
Adjusted R-squared	0.503	0.531	0.596	0.503	0.530	0.582

TABLE 11:

Robustness Tests: – Cross-Country Sample

This table presents robustness tests for the cross-country sample. Panel A presents regression results on firm risk-taking over the 2004 to 2012 period including interactions of country risk and loss offset restrictions with loss offset variables and tax rates, respectively. Column (1) presents results from estimates of equation (5) using *Political Risk* as *Country Risk Factor*. Column (2) presents results from estimates of equation (5) using *Fiscal Budget Risk* as *Country Risk Factor*. *Loss_Offset_Restriction* is defined as the adjusted percentages of country-specific present value of tax losses that can be offset for a time horizon of 20 years (Jacob et al. 2011). The main effects specified in equation (5) are included in the model but are not reported in this table. We include industry-by-year fixed effects. We report robust standard errors clustered by firm and by country-year in parentheses. Panel B presents regression results on firm risk-taking over the 1992 to 2012 period. In Columns (1), (3), and (5), we estimate equation (5) using *Political Risk*. In Columns (2), (4), and (6) we estimate equation (5) using *Fiscal Budget Risk* as *Country Risk Factor*. The main effects specified in equation (5) are included in the model but are not reported in this table. We calculate quartiles of GDP growth and quartiles of GDP in the current and then include GDP–Growth-Level–Industry–Year fixed effects. In Columns (5) and (6), we additionally include firm fixed effects. We report robust standard errors clustered by country-year if not otherwise indicated in parentheses. The variable *Firm Risk-Taking* is defined as the standard deviation over three years of a firm's *ROA*'s deviation from the industry-country-specific average *ROA*. We define *Country Risk Factor* as an indicator variable equal to one if the firm is located in a country whose country risk proxy in year *t* is in the fourth quartile and zero otherwise. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Independent variables are described in Appendix D.

Panel A: Horse Race of Statutory Loss Offset Limitations and Country Risk Factors		
(I) LCB*CTRStd	0.012***	0.033***
	(0.004)	(0.005)
(II) LCB*CTRStd*Country Risk Factor	-0.111*	-0.045***
	(0.062)	(0.007)
(III) LCB*CTRStd*Loss_Offset_Restriction	0.006	-0.064***
	(0.036)	(0.014)
Sum of Coefficients *(I + II)*	-0.099***	-0.012***
P > F (I + II = 0)	[0.001]	[0.000]
Sum of Coefficients *(I + III)*	0.018***	-0.031***
P > F (I + III = 0)	[0.001]	[0.001]
Country Risk Factor interactions & Firm- and Country-level controls & Industry-by-Year fixed effects included		
Observations	165,806	165,806
Adjusted R-squared	0.460	0.461

TABLE 11:

Robustness Tests: – Cross-Country Sample (continued)

Panel B: *Country-Group and Firm-Level Analyses*						
	Dependent Variable: Firm Risk-Taking					
	Political	Fiscal	Political	Fiscal	Political	Fiscal
	(1)	(2)	(3)	(4)	(5)	(6)
(I) LCF*CTRStd	-0.001***	-0.001***	-0.001	-0.001	0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
***(II)* LCF*CTRStd*Country Risk Factor**	0.002***	0.001*	0.002***	0.001*	-0.002***	0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Sum of Coefficients *(I + II)*	0.001***	0.000	0.001***	0.000	-0.001**	0.000
P > F (I + II = 0)	[0.000]	[0.315]	[0.000]	[0.291]	[0.022]	[0.364]
(III) LCB*CTRStd	0.014***	0.013***	0.014**	0.013*	0.004	0.001
	(0.003)	(0.004)	(0.006)	(0.007)	(0.003)	(0.003)
***(IV)* LCB*CTRStd*Country Risk Factor**	-0.031**	-0.006	-0.031**	-0.006	-0.005	0.001
	(0.014)	(0.007)	(0.014)	(0.009)	(0.011)	(0.005)
Sum of Coefficients *(III + IV)*	-0.017	0.007	-0.017	0.007	-0.001	0.002
P > F (III + IV = 0)	[0.176]	[0.234]	[0.137]	[0.221]	[0.903]	[0.525]
Observations	238,905	238,905	238,905	238,905	237,252	237,252
Adjusted R-squared	0.494	0.494	0.494	0.494	0.614	0.614
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	Yes	Yes
GDP-Growth-Quartile-Ln(GDP)-Ind-Year FE	Yes	Yes	Yes	Yes	No	No
Cluster	Country-Year	Country-Year	Country	Country	Country-Year	Country-Year

TABLE A.1:

Effect of Tax Rates and Loss Offset Rules on Corporate Risk-Taking

This table validates the results documented by Langenmayr and Lester (2018) using a larger sample that includes more heterogeneous countries over the 1992 to 2012 period. We use the following regression specification:

$$Firm\ Risk\text{-}Taking_{i,t} = \alpha_0 + \beta_1 LC_{j,t} + \beta_2 CTRStd_{j,t} + \beta_3\ LC{*}CTRStd_{j,t} + \beta_n C_{i,j,t} + \alpha_{k,t} + \varepsilon_{i,j,t} \quad (12)$$

The variable *Firm Risk-Taking* is defined as the standard deviation over three years of a firm's *ROA*'s deviation from the industry-country-specific average *ROA*. In columns (1) and (2), we estimate equation (12) without the interactions of loss offset rules and standardized corporate tax rates using the full sample. In columns 3 (4), we estimate equation (12) using the full sample without (with) *Inflation* and country risk controls. In column (5), we estimate equation (12) for domestic firms (*Domestic* = 1), i.e. firms that have more than 10% of their business operations not in the country in which they are headquartered. All specifications include industry-by-year fixed effects. We report robust standard errors clustered by firm and by country-year in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Independent variables are described in Appendix D.

	Dependent Variable: Firm Risk-Taking				
	(1)	(2)	(3)	(4)	(5)
LCF	0.005***	0.003***	0.003***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LCB	0.019***	0.013***	0.011***	0.008***	0.010***
	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
CTRStd	0.003	-0.001	-0.016***	-0.004	-0.003
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
*LCF*CTRStd*			0.001***	0.001**	0.001*
			(0.000)	(0.000)	(0.000)
*LCB*CTRStd*			0.008***	0.007***	0.008***
			(0.003)	(0.003)	(0.003)
Size		-0.009***	-0.009***	-0.009***	-0.011***
		(0.001)	(0.001)	(0.001)	(0.001)
Leverage		0.047***	0.046***	0.047***	0.051***
		(0.004)	(0.004)	(0.004)	(0.004)
Sales Growth		0.005***	0.005***	0.004***	0.004***
		(0.001)	(0.001)	(0.001)	(0.001)
ROA		-0.312***	-0.311***	-0.310***	-0.305***
		(0.006)	(0.006)	(0.006)	(0.007)
MB		0.002***	0.002***	0.002***	0.001***
		(0.000)	(0.000)	(0.000)	(0.000)
GDP Growth		0.035**	0.022	0.015	0.009
		(0.015)	(0.013)	(0.014)	(0.014)
Inflation				-0.009***	-0.006***
				(0.002)	(0.002)
Political Risk				-0.011***	-0.011***
				(0.002)	(0.002)
Fiscal Budget Risk				0.002	0.001
				(0.002)	(0.002)
Industry-by-Year FE	Yes	Yes	Yes	Yes	Yes
Observations	239,772	239,772	239,772	239,772	184,570
Adjusted R-squared	0.114	0.453	0.455	0.456	0.475

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