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ABSTRACT

When corporate payout is taxed, internal equity (retained earnings) is cheaper than external equity (share issues). High taxes will favor firms who can finance internally. If there are no perfect substitutes for equity finance, payout taxes may thus change the investment behavior of firms. Using an international panel with many changes in payout taxes, we show that this prediction holds well. Payout taxes have a large impact on the dynamics of corporate investment and growth. Investment is "locked in" in profitable firms when payout is heavily taxed. Thus, apart from any aggregate effects, payout taxes change the allocation of capital.

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1. Introduction

Corporate payout, in the form of dividends or as repurchases of shares, is subject to taxation in most countries. Such taxes on corporate payout drive a wedge between the cost of internal and external equity (retained earnings and equity issues, respectively).[1] Therefore, higher payout taxes are expected to "lock in" investment in profitable firms, at the expense of firms with good investment opportunities which would require external equity financing to undertake.

The empirical relevance of this simple prediction has not been well tested. Despite the large amount of theoretical and empirical research about the effect of dividend taxes on the level of investment and on the valuation of firms (see, e.g., Auerbach 1979a, Bradford 1981, Chetty and Saez 2010, Feldstein 1970, Guenther and Sansing 2006, Harberger 1962, King 1977, Korinek and Stiglitz 2009, Poterba and Summers 1984 and 1985), little is known about the effects of such taxes on the allocation of investment across firms. Yet, the theoretical prediction is very clear: higher payout taxes will increase the wedge between the cost of internal and external equity, and firms with more costly external financing will exhibit greater investment cash flow sensitivities. Put differently, payout taxes favor investment financed by retained earnings over investment financed by equity issues.[2] This can matter for the productivity and nature of investment if a) debt finance is an imperfect substitute for equity (in other words, if the Miller Modigliani propositions do not hold), b) different firms have different investment opportunities, c) the marginal investor is subject to taxation, and d) firms make equity payouts while the tax is in effect. All these conditions have some empirical support.[3] But are such frictions important enough for this to matter

[1] To see the tax difference, consider a firm facing a dividend tax rate of t and which has the opportunity to invest one dollar now in order to receive π in the future. If the firm issues equity, it can pay a dividend of $1+\pi$. The initial investment is paid in capital and not subject to dividend taxes, so the shareholders will receive $1+\pi(1-t)$ in after-tax payoff. Alternatively, investors can invest the dollar at a tax-free return $(1+r)$. This firm should invest if $\pi(1-t)>r$. Now consider another firm, which has retained earnings, so that it faces the choice between paying out one dollar, producing $(1-t)$ in after-tax payoff to investors today, which will be worth $(1-t)(1+r)$ tomorrow, or investing, producing $(1+\pi(1-t))$ in after-tax dividend for investors. This firm should invest if $\pi>r$. The tax wedge is the difference between the two firms' investment criteria. Put differently, the after-tax cost of capital is lower for firms with inside equity. Lewellen and Lewellen (2006) develop this intuition and further results in a richer model. We sometimes refer to this prediction as the tax wedge theory.

[2] The debate about the impact of payout taxes on the level of investment between the "old view" (Harberger 1962, 1966, Feldstein 1970, Poterba and Summers 1985) and the "new view" (Auerbach 1979a, Bradford 1981, King 1977) can be understood in terms of different assumptions about the marginal source of investment financing. To simplify, the old view assumes that marginal investment is financed by equity issues, so that payout taxes raise the cost of capital and reduce investment. The new view assumes that marginal investment is financed by retained earnings, so that payout taxes do not reduce investment. In practice, firms are likely to differ in their ability to finance investment with internal resources (e.g. Lamont 1997). If they do, the tax rate will affect the allocation of investment. Auerbach (1979b) makes a related point about how firms with and without internal funds should respond differently to dividend taxes.

[3] Regarding the imperfect substitutability between debt and equity, see e.g. Myers (1977), Jensen and Meckling (1976). Regarding the variation in investment opportunities across firms, see e.g. Coase (1937) and Zingales (2000). Firms with limited access to internal equity may include entrepreneurial firms and firms with strong growth

in practice for investment levels? This paper aims to test the extent to which the "lock in" effect of payout taxes matters empirically. There are several challenges in testing how payout taxes affect the cross-firm allocation of investment. First, large changes in the US tax code are rare. The 2003 tax cut has provided a suitable natural experiment for testing how dividend levels responded to taxes (see Chetty and Saez 2005 and Brown, Liang, and Weisbenner 2007), but investment is a more challenging dependent variable than dividends, so the experiment may not provide sufficient statistical power for examining investment responses. First, unlike dividends, investment is imperfectly measured by accounting data which, for example, leaves out many types of intangible investment such as that in brands and human capital. This means that available empirical proxies (e.g. capital expenditures) are noisy estimates of the true variable of interest. Second, much investment is lumpy and takes time to build, so any response to tax changes is likely slow and more difficult to pinpoint in time. This suggests that a longer time window may be necessary (the payout studies used quarters around the tax change).Third, however, investment is affected by business cycles and other macro-economic trends, so extending the window around a single policy change introduces more noise from other sources, and may not provide better identification.

We address these challenges by using an international dividend and capital gains tax data set covering 25 countries over the 19-year period 1990-2008 (Jacob and Jacob 2011). This data set contains fifteen substantial tax reforms and 67 discrete changes in the dividend or capital gains tax rate. With so many tax changes, we have sufficient variation to study the effects of payout taxes on the investment allocation.[4] We use this tax data base to test if the allocation of investment across firms with and without access to internal equity depends on payout taxes.[5] We first run non-parametric tests that contrast the investment by the two groups of firms around tax reforms. We focus on events where payout taxes changed by at least three percentage points and compare the five years preceding the tax change with the two years following it. There are fifteen events with payout tax reductions. The mean tax drop is 9.8 percentage points (median 5.5). There are fourteen tax increase events with a tax change of 8.4 percentage

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opportunities. Regarding the taxability of the marginal investor, see e.g. our Section 4.4. and note also that in many countries outside the U.S. and the U.K. (for example, in Germany and Austria) investment funds managing private investors' money are ultimately taxed like private investors. Regarding payout, may firms pay dividends or repurchase shares every year. Others may plan to do so in the future. Korinek and Stiglitz (2010) consider firms' ability to time their payout around tax changes.

[4] Because dividends and share repurchases are treated very differently for tax purposes, we construct a measure of the overall tax burden on payout. We do this by weighting the tax rates on dividends and on capital gains by the observed quantity of each in a country (using amounts of dividends and repurchases from our sample firms over the sample period). We also report results using the dividend tax and using an average payout tax measure adjusted for effective capital gains taxation. We vary assumptions about the amount of taxable capital gains caused by repurchases. Variations of the measurement of taxes produce similar results. See section 3. Data for details.

[5] As discussed in detail in the empirical section below, we use a range of variables to classify firms into those with and without access to internal equity, including net income, operating cash flow, and even cash holdings. Neither measure is perfect, since a firm's perceived access to internal equity must depend on (unobservable) expectations about future years.

points (median 5.6).[6] We sort firms into quintiles of the ratio of cash flow to assets in each country-year cell. We then calculate average investment over lagged assets for each quintile. There is no trend in investment for any of the quintiles during the five year period preceding the tax events. After the tax cuts, we observe a significant convergence of the investment rate of high and low cash flow firms (top and bottom quintiles). In other words, firms with limited internal equity increase their investment relative to firms with plenty of internal equity. This is consistent with the tax wedge theory, and suggests that low taxes favor firms with limited access to internal equity. In contrast, following *increases* in payout taxes there is a divergence of investment of high and low cash flow firms. The estimated effects appear large in both sets of tax reforms. On average, the difference in investment between low and high cash flow firms increases from 5.33% (of assets) to 7.59% following a payout tax increase – a 42% increase. When payout taxes are cut, the difference in investment falls from 7.27% to 5.54% – a decrease by 31%. In other words, for the typical large tax change, a large quantity of investment is estimated to get displaced (when taxes go up, investment flows from firms with limited access to internal equity to those with more internal equity, and vice versa for tax reductions). These non-parametric results are consistent with the predictions of the tax wedge theory: tax increases raise the cost of capital wedge between firms with and without access to internal equity financing, and thereby increases the investment of internally funded firms relative to firms that have limited access to internal equity.

Because the panel data set contains multiple tax change events, we can estimate not just the mean treatment effect of a tax change, but also ranges. Only two (three) of the fifteen (fourteen) tax decreases (increases) have difference-in-difference effects that are in conflict with our hypothesis. The other estimates agree with the tax wedge hypothesis, and many point estimates are large: one third of tax decreases events reduce the difference in the investment rate of high and low cash flow firms by at least 2.5 percentage points. About 40% of the tax raises are associated with a point estimate for the increased wedge between high and low cash flow firms by more than 2.5 percentage points. In other words, the effect of tax changes on the relative investment of firms varies quite a bit across events, and is sometimes large.[7]

We next turn to parametric tests in the form of linear regressions. The regressions use data from all years, and can integrate both tax increases and decreases in the same specifications.[8] For our baseline

[6] We report results for the country-average payout tax rate here, but results are similar with alternative measures, described below.

[7] We can also use the individual diff-in-diff point estimates to do non-parametric tests. For example, a sign test of the frequencies with which estimates are positive and negative suggest that we can reject that an increase and a decrease of the investment rate difference are equally likely after a tax increase (decrease) at the 5% (1%) level of statistical significance.

[8] The weights placed on different observations also differ between linear regression tests and non-parametric tests. Because of the many differences, it is useful to verify that both methods deliver similar results.

tests, we regress investment on firm controls, fixed effects for firms and for country-year cells, and the interaction of the payout tax rate with cash flow. Thanks to the panel structure of the data set, we can allow the coefficient on cash flow to vary across countries and years, in essence replicating the identification strategy of the many studies exploiting the 2003 tax cut in the US, but for the whole panel of 25 country times 19 year. The estimated coefficient for the tax-cash flow interaction variable is consistently positive and significant. In other words, the higher payout taxes are, the stronger is the tendency for investment to occur where cash flows are high. As predicted by the tax wedge theory, payout taxes "lock in" investment in firms generating earnings and cash flow. The estimated magnitudes are large. For example, going from the 25th percentile of payout tax (15.0%) to the 75th percentile (32.2%) implies that the effective coefficient on cash flow increases by 0.029, an increase by 33% over the conditional estimate at the 25th percentile. Like the NP results, this implies that payout taxes have an important effect on the allocation of capital across firms.

We report extensive robustness tests for our results. For most tests, we report regression results with three alternative tax rates, with similar results. The results also hold for alternative measures of the ability to finance out of internal resources (e.g. net income instead of cash flow), as well as when controlling for the corporate income tax rate and its interaction with cash flow. We also collect economic policy controls from the World Development Indicators (World Bank 2010). This is to address endogeneity concerns, i.e. to ensure that tax changes are not just fragments of wider structural changes in an economy that change firms' investment behavior around tax reforms. This test shows that payout tax changes appear to have their own very unique and economically significant effect on the allocation of investment (assuming we have identified the relevant set of policy variables).

We next examine in greater detail the predictions of the old and new view. A key distinguishing feature of models belonging to the old and new view is whether the marginal source of investment funds is assumed to be internal cash flow or external equity. We hypothesize that both these assumptions may be valid for a subset of firms at any given time. Some firms behave as predicted by the old view, and reduce investment when payout taxes increase. Others behave more like the new view predicts, and respond less. This has two implications. First, this difference in responsiveness to taxes generates the within-country, within-year, cross-firm prediction our paper focuses on. By comparing different firms in the same country and at the same time, we get rid of concerns about omitted aggregate time-series variables. This prediction is what we examine with all our main tests (regressions and non-parametric tests). A second implication is that it becomes interesting to try to identify the relevant groups of firms in the data, and to test their responses. We go about this by differentiating between firms based on three alternative measures. First, we define firms as old view firms if predicted equity sales are above 2% of lagged assets. Second, we look at historical equity issuance by firms. We exploit the fact that such

issuance is persistent, so that classifying firms by recent equity issuance likely indicates their ability to issue in the future.[9] Firms with recent equity issuance activity, which are more likely to consider external equity their marginal source of investment funds, correspond most closely to the assumptions of the old view. Third, we classify firms as new view firms if the Kaplan and Zingales (1997) index of financial constraints is above 0.7, and as old view firms otherwise. For all three classifications, there is a sizable difference in the effect of taxation on the marginal source of funds for investment between old view firms and new view firms. For old view firms, the cash flow coefficient is always sensitive to tax rates, as predicted. For new view firms, the coefficient estimate is positive but smaller and insignificant in all specifications. This suggest that *both* the old and the new view have predictive power, and exactly for the set of firms which match the critical assumptions of the two views. This confirms the mechanism behind the differential responses of investment to tax rates that we have documented earlier: high tax rates drive a wedge between the cost of internal and external equity.

We also examine the effect of governance. Chetty and Saez (2010) predict that a dividend tax cut will not affect poorly governed firms in the same way it will well governed firms. In poorly governed firms with much cash, investment is inflated by CEOs who derive private benefits from investment (or from firm size). A tax cut reduces the incentive for cash-rich firms to (inefficiently) over-invest in pet projects because it becomes more attractive for the CEO to get dividends from his shareholdings. It is important to note that the same result does not apply to well governed firms in the model: a tax cut raises equity issues and productive (as well as unproductive) investment by such firms. If Chetty and Saez' mechanism is important, the pattern we have established in the data between taxes, cash flow and investment, will in fact be driven by the set of well governed firms.[10] To proxy for governance across multiple countries, where laws, practices, and financial development varies substantially, we use the ownership stake of insiders (i.e., corporate directors and officers). This is based on the notion that managers and directors with large stakes have both the power and the incentive to make sure the firm is maximizing value (Shleifer and Vishny 1986, Jensen and Murphy 1990). The insider ownership variable is available for many of our sample firms, and measured fairly consistently across countries. When sorting by insider ownership, we find that firms with very low insider ownership show a less significant response to taxes, whereas firms with strong ownership have larger and more significant responses to

[9] In our data, firms that issued any equity in the previous year are 3.9 times as likely to issue again next year. Firms issuing more than 5% of assets over the last year are 7.7 times as likely to do so again this year. These numbers probably reflect capital needs as well as access to the market. There are several possible reasons for this. Issuing costs are high for equity (see Asquith and Mullins, 1986, and Chen and Ritter 2000). However, some firms find it less costly to issue equity, for example because they have a favorable stock valuation (see Baker, Stein, and Wurgler, 2003).

[10] The tests of the US tax cut in 2003 have found that governance variables have strong predictive power for firms' responses to the tax cuts. See, e.g. Chetty and Saez (2005) and Brown, Liang, and Weisbenner (2007).

taxes. This is consistent with the Chetty and Saez predictions. Since individual owners (such as insiders) are more likely to be taxable than owners in general (which include tax exempt institutions), this result also highlights that where the marginal shareholder is more likely to be a taxable investor the tax effects are stronger.

Finally, we examine how quantities of equity raised respond to taxes. If our identifying assumptions are valid, and if we have identified real variation in the effective taxation as perceived by firms, we would expect to see a drop in equity issuance when taxes go up. We find exactly this: When taxes are high, equity issuance tends to be low. This supports the interpretation that the tax variation we pick up is meaningful.

Our results have three main implications. First, it appears that payout taxes influence the allocation of capital across firms. High taxes lock in capital in those firms that generate internal cash flows, ahead of those firms that need to raise outside equity. If firms have different investment opportunities, this means that tax rate changes alter the type of investments being made. For example, high payout taxes may favor established industries.[11] Second, the effect of payout taxes is related to both access to the equity market and governance. Firms which can access the equity market, "old view" firms, are the most affected by tax changes. Firms whose only source of equity finance is internal are less affected by taxes, as predicted by the "new view". A final source of heterogeneity is governance. Firms where decision makers have low financial stakes are less affected by tax changes, reflecting their propensity to make investment decisions for reasons unrelated to the cost of capital.[12] Third, the relation between cash flow and investment (see e.g. Fazzari, Hubbard, and Petersen 1988, Kaplan and Zingales 1997) appears to partially reflect the difference in the after-tax cost of capital between firms with and without access to inside equity.

2. Taxes on corporate payout across countries

2.1 Tax systems

The prerequisite for a useful study of the relationship between payout tax policies and the allocation of investment across countries is a sufficient degree of identifying variation in dividend and capital gains tax regimes and tax rates both across countries and within countries across time. Tables 1 and 2, and Figures 1, 2, and 3 illustrate that this is the case for the 25 countries scrutinized in this study.

[11] We consider the allocation across firms an important topic in itself, but there may also be some suggestive implications for aggregate investment. While we do not estimate the impact of taxes on the level of corporate investment directly, our main result is inconsistent with a standard new view model of payout taxes. Hence, our results generally point to the relevance of payout taxes for investment

[12] Although, to be precise, our findings do not necessarily support an empire building agency problem. See e.g. Malmendier and Tate (2005) for other possibilities.

We count five major tax systems in our data set: classical corporate tax systems, shareholder relief systems, dividend tax exemption systems, and full and partial imputation systems. *Classical corporate taxation systems* (for example, currently used in Ireland, and previously in the Netherlands or Spain) are characterized by double taxation of corporate profits, that is, income, before it is distributed as dividends, is taxed at the corporate level, and later taxed again as dividend income at the individual shareholder level. This contrasts with *shareholder relief systems* (for example, currently used in the US, Japan, and Spain) which aim to reduce the full economic burden of double taxation that applies under a pure classical system. For example, at the individual shareholder level, reduced tax rates on dividends received or exclusion of a proportion of dividend income from taxation are common forms of shareholder tax relief. Under an *imputation system* (for example, used currently in Australia and Mexico, and previously in France), taxes paid by a corporation are considered as paid on behalf of its shareholders. As a result, shareholders are entitled to a credit (the "imputation credit") for taxes already paid at the corporate level. That is, shareholders are liable only for the difference between their marginal income tax rate and the imputation rate. Full and partial imputation systems are distinguished by the nature of the imputation credit, which may be the full corporate tax or only a fraction thereof. In *dividend tax exemption systems* (currently only Greece in our sample) dividend income is generally not taxed. [13]

Table 1 shows that there have been many changes in payout tax systems over the last two decades. While in the first half of our sample period the classical corporate tax system dominates, from 2005 the shareholder relief system is the most widespread tax system. While there are only five shareholder relief systems in place in 1990, shareholder relief systems can be found in almost 70% of the countries (17) in our sample at the end of the sample period. The reduction in the prevalence of full and partial imputation systems from 11 in 1990 to only 6 in 2008 is largely due to the harmonization of European tax laws that necessitated an abolition of differences in the availability of imputation credits for domestic and foreign investors across EU member states.

2.2 Tax rates

The significant trend from imputation systems and classical corporate tax systems to shareholder relief systems naturally coincides with the development of the absolute taxation of dividend income and capital gains. Yet, as Tables 1 and 2 illustrate, tax reforms are not necessarily accompanied by changes in the effective taxation of dividends and capital gains. Rather, much of the dynamics in dividend and capital gains taxation relate to pure rate changes. Changes occur frequently absent any tax system reforms.

[13] See La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000) for additional information on characteristics of the various tax systems.

In this study, we are interested in the effective tax burden on dividend income and capital gains faced by individual investors. One concern with our analysis is that the tax rates we measure do not have sufficiently close correspondence with actual share ownership of our sample firms. Rydqvist, Spizman and Strebulaev (2010) point to the reduced role of the taxable investors in recent decades. They suggest that the influence of private investors' taxes has likely been falling through time. In the extreme, if the marginal investor for every firm is a (tax neutral) institution, individual shareholder taxation should not matter. If this is true for our sample firms, we would find no effect. To the extent that we identify an effect of payout taxes, we can conclude taxable investors have some impact on firm prices (at least for a subset of firms).[14]

Similarly, the increasing role of cross-country stock holdings might affect our ability to isolate true tax rates faced on payout by equity owners through the tax rules for domestic investors. Our data do not allow us to identify the fraction of foreign ownership in a company. However, since there is strong evidence of a substantial home bias in national investment portfolios (see, for example, French and Poterba 1991, Mondria and Wu 2010), we believe domestic tax rules are likely the most important source of time series variation in tax rates. The tax rates applicable to domestic investors is the most plausible approximation for the typical investor's tax burden, especially for smaller firms, where international ownership is likely lower.

The first, immediate, observation from Table 2 is that the level of taxation on dividends and share repurchases varies considerably across countries and time. As we report in Panel A of Table 2, the highest average tax rates on dividend income over the sample period can be observed in the Netherlands, Denmark, Switzerland, France, and Ireland. Peak values range from 66.2% in Sweden (1990), to 60.9% in Denmark (1990), to 60.0% in the Netherlands (1990-2000), to 47.3% in Korea (1990-1993), to 46% in Spain (1990/1991, 1993/1994). Over the same period investors faced the lowest average tax burden in Greece – a dividend tax exemption country and the only mandatory dividend country in our sample – and in Mexico, Finland, New Zealand, and Norway. The within-country standard deviation ranges from 10.8% to 20.5%, and the within-country differences between maximum and minimum tax rates from 25% to 38%, for Norway, Sweden, the Netherlands, Japan, the US and Finland, which provide the most variation in dividend tax rates over the sample period (Table 3, Panel A, and Figure 1). In contrast, we observe the most stable tax treatment of dividends in Greece, Mexico, Austria, Poland, and Portugal, where the personal income tax rate fluctuates within a narrow band of at most 5 percentage points

[14] The Rydqvist et al prediction seems to be borne out in US dividend policy: Chetty and Saez (2005) and Perez-Gonzalez (2003) show that firms with a large share of institutional (tax exempt) ownership exhibit smaller changes in policy after the 2003 tax cut. For our sample, which contains many non-US firms, tax exempt investors may be a smaller factor. Unfortunately, we lack the requisite ownership data to test whether there is a similar pattern in our sample.

difference between peak and lowest taxation over the sample period. On average, the difference between maximum and minimum dividend tax rate in our sample countries in 1990-2008 is 19.9%, thus underpinning the substantial time-variant differences in dividend tax rates.

Capital gains taxation across countries is special in many respects and often strongly intertwined with the legal treatment of share repurchases. For example, in some European countries share repurchases were either difficult to implement (for example, France) or illegal (for example, Germany and Sweden) until the turn of the 3rd millennium (Rau and Vermaelen 2002, DeRidder 2009). Moreover, in some countries with high taxes on dividends and low capital gains taxes (such as in Belgium, in the Netherlands before 2001, and in Switzerland since 1998), specific tax provisions existed to discourage share repurchases. In Japan, restrictions on corporate share repurchases thwarted corporations from buying back their own shares until enactment of a special law in 1995. Since the mid-1990s, the Japanese government has gradually relaxed and removed restrictions on share repurchases, originally as a part of emergency economic measures to revitalize the economy and its tumbling stock market (Hashimoto 1998). In Panel B of Table 2 we report capital gains tax rates across our sample countries that take these effects into consideration. The tax rates are applicable to investors with non-substantial shareholdings and holding periods that qualify as long-term investments in accordance with country-specific tax legislation. We show that over the sample period, on average, the most unfavorable tax environment for capital gains prevailed in Denmark, the UK, Australia, the Netherlands, and Canada, while in eight countries capital gains are generally tax exempt. We observe peak capital gains tax rates in the Netherlands (1990-2000), Australia (1990-1999), Poland (1994-1996), and Switzerland (1998-2007). The range of capital gains tax rates is substantial – from 0.0% to 60.0%. With standard deviation greater than 14.5% and differences between maximum and minimum tax rate of 31% to 60%, the Netherlands, Switzerland, Belgium, and Poland exhibit the largest within-country variation in capital gains tax rates across countries (Table 2, Panel B, and Figure 2). In contrast, capital gains taxation is constant in 1990-2008 in Austria, Germany, Greece, Korea, Mexico, New Zealand, and Portugal. On average, the within-country difference between maximum and minimum capital gains tax rate in our sample countries in 1990-2008 is 18.7%, thus providing further ample identifying variation in corporate payout taxation.

3. Data sample

3.1 Firm data

We source our firm-level data from the July 2009 edition of the WorldScope database and restrict our analysis to those countries for which conclusive tax data for the full sample period could be obtained. To ensure a meaningful basis for the calculation of our country-level statistics we also exclude from our sample firms from countries for which we have less than 10 observations after the below sample

adjustments. The start year of our analysis is 1990.[15] Since accounting data are often reported and collected with a delay, we use data through 2008. We collect data on active as well as dead and suspended listings that fulfill our data requirements to avoid survivorship bias.

Table 3 Panel A summarizes the composition of our sample. Financial and utility firms have motives to pay out cash that are different from non-financial firms (see e.g., Dittmar 2000 and Fama and French 2001). We therefore restrict our sample to non-financial and also non-utility firms, defined as firms with SIC codes outside the intervals of 4,900-4,949 and 6,000-6,999. We also exclude firms without an SIC code. We further restrict our sample to firms with non-missing values for dividends to common and preferred shareholders, net income, sales, and total assets for at least 4 consecutive years in the 1988-2008 period. From the original set of firms, we finally eliminate the following firms: firms with erroneous or missing stock price, dividends, or share repurchase information, firms whose dividends exceed sales, firms with an average weekly capital gain of over 1,000% in one year and finally, firms with closely held shares exceeding 100% or falling short of 0%. To prevent extreme values and outliers from distorting our results we further eliminate, when appropriate, observations of our dependent and independent variables that are not within the 1st and the 99th percentile of observations, and we also drop firm observations with total assets less than USD 10 million (see Baker, Stein, and Wurgler 2003). This returns our basic sample of 7,661 companies (81,222 firm-year observations) from 25 countries. We obtain annual personal income tax, and capital gains tax data for the 25 countries in our sample from Jacob and Jacob (2010). This comprehensive tax data set allows a heretofore unavailable, thorough analysis of payout taxes and the allocation of investment within a multi-country, multi-year framework. We also cross-check our tax classifications and rates against those reported in Rydqvist, Spizman, and Strebulaev (2010) who examine the effect of equity taxation on the evolution of stock ownership patterns in many countries. As in this paper, Rydqvist et al use the top statutory tax rate on dividends and the tax rate on capital gains that qualify as long-term to conduct their analysis.

3.2 Investment variables

Table 3 Panel B presents summary statistics for our investment variables. Our proxies for firm investment are threefold. First, we create variable *Investment*, defined as additions to fixed assets other than those associated with acquisitions[16] (capital expenditure) normalized by total assets. Second, we

[15]We start our analysis in 1990 for two reasons. First, WorldScope provides less than comprehensive coverage of individual data items for non-U.S. firms before 1990. An earlier start may thus have biased our results for earlier sub-periods away from international evidence towards evidence from North America. Second, 1990 is a historically logical year to begin. With the transformation into capitalist, democratic systems in 1990, many former communist countries have only begun to incorporate dividends and capital gains taxation in their tax laws.

[16] It includes additions to property, plant and equipment, and investments in machinery and equipment.

include *PPE Growth*, the growth in plant, property, and equipment from *t-1* to *t* divided by the end-of-year *t-1* assets. Our final measure of investment intensity is *Asset Growth*, the ratio of growth in total assets normalized by total assets of the firm. The numerator in our investment variables is measured one year after our total assets variable, the denominator. Before computing investment, we translate capital expenditures, PPE, and total assets in US dollars into real terms (base year 2000) by using the US GNP deflator (World Development Indicators, Worldbank 2010). In our sample, firms on average have capital expenditures amounting to 5.9% of the value of their prior year total assets. The average growth rate in plant, property, and equipment is 8.1% and the average growth rate in total assets of 7.9%. The range of values of investment is considerable – from 0.8% (10^{th} percentile) to 12.7% (90^{th} percentile) (*Investment*), -13.8% to 29.0% (*PPE Growth*), or -17.0% to 30.8% (*Asset Growth*).

3.3 Tax variables

Summary statistics for tax variables and controls are presented in Panel C of Table 3. All tax rates that we employ apply to investors with non-substantial shareholdings and holding periods that qualify as long-term investments in accordance with country-specific tax legislation. We construct three tax variables.

Dividend Tax is the personal income tax rate on dividends in a country and year (in %).[17] Its range of values is wide, from 0% to 66.2% with mean dividend tax burden of 27.8% and standard deviation of 12.6%, reflecting the considerable variation of payout taxes across countries and over time. *Effective Tax C* is the country-specific weighted effective corporate payout tax rate (in %). It is calculated by weighting the effective tax rate on dividends and share repurchases by the importance of dividends and share repurchases as payout channels in a country over the 1990-2008 period. With this measure, we follow prior analyses of effective capital gains taxation and assume the effective tax rate on capital gains from share repurchases to be one-fourth of the statutory tax rate (see La Porta et al 2000 and Poterba 1987). This way, we control for the effect that capital gains are taxed only at realization and that thus the effective capital gains tax rate may be significantly lower than the statutory rate.[18] The importance weight of dividends in a country is calculated by averaging the dividend-to-assets ratio across firms and years, and then dividing by the average total payout ratio (sum of dividends and share repurchases normalized

[17] Imputation credits and country-specific tax exemptions available to investors have been taken into account when calculating this "effective" rate. For example, as per the definition of imputation systems above, if the tax rate on dividend income is 50% and the available imputation credit is 20% then the 'effective' rate we employ is 30%. If, as for example in Germany from 2001-2008, 50% of dividend income is tax exempt, then the effective rate is half the statutory tax rate.

[18] The assumption that the true tax rate is a quarter of the stated rate is not important to our conclusions. We get very similar magnitudes using other assumptions (including anything in the [0,1] range).

by total assets) across firms and years. The share repurchase weight is calculated analogously.[19] *Average Tax C*, the country weighted average tax, is an alternative measure of the average corporate payout tax rate (in %). It is obtained by weighing each year's dividend and statutory capital gains tax rate by the relative importance of dividends and share repurchases as payout channels in a country over the sample period.[20]

In principle, there are reasons to prefer either of the measures. The dividend tax rate disregards the tax burden of repurchases, but requires no assumptions about the capital gains taxes incurred when firms retain earnings (i.e. retaining earnings makes the share price higher, thereby increasing current capital gains sellers of share, reducing future capital gains taxes for buyers). We have also rerun all our regressions with a weighted average of tax rates where we allowed weights to vary not only by country but also by year (i.e. there is one set of weights for each country-year, which is applied to tax rates that also may vary by country-year). The country-average tax rate may be unrepresentative if the mix of payout varies a lot, but raises fewer endogeneity concerns. In practice, country average tax rates and country-year average tax rates are very similar, and the regression results are very close, so we do not report results for the latter. The mean values of our *Effective Tax C* and *Average Tax C* variables are 18.3% and 24.5%, with standard deviations 9.1% and 10.3%. Figure 3 illustrates the inverse cumulative distribution function (CDF) of tax rates across observations in our sample. As is evident, the variation in tax rates is considerable by any of our three tax measures, reflecting the substantial tax experimentation taking place during our sample period. Because of the uneven number of firms across countries, long-lived tax systems in large countries (the US and Japan) produce lots of data.

3.4 Other variables

Our firm-level variables measure internal funds, capital structure, Tobin's Q, and growth. The availability of internal funds for investment is measured with three alternative variables: a) *Cash Flow* is the funds from operations of the company measured as the ratio of cash flow relative to total assets, b) *Cash* is defined cash holdings over total assets, and c) *EBITDA* measures earnings before interest, tax, and depreciation as a fraction of total assets. Unlike cash flow, EBITDA does not include tax payments, or increases in working capital.

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[19] Throughout we use cash dividends only, to avoid that differences in the tax treatment of cash and stock dividends infect our results. Our share repurchase variable is measured by the actual funds used to retire or redeem common or preferred stock and comes from the cash flow statement.

[20] Weighing the capital gains tax by the prevalence of repurchases has the important advantage of automatically dealing with limitations on repurchases. If a country has high taxes on dividends and low taxes on repurchases, but severely restricts repurchases through laws and regulations, it is not fair to say that payout faces low taxes. Because we weight by actual quantities, we will put a small weight on the low payout tax rate.

We measure capital structure through leverage, defined as total book debt over total book assets. We include Tobin's Q, the ratio between the market value and replacement value of the physical assets of a firm (*Q*). This variable can measure future profitability, that is, the quality of investment opportunities, as well as measurement error arising from accounting discrepancies between book capital and economic replacement costs. We include the natural logarithm of growth in sales from year *t-2* to *t* (*Sales Growth*) and the relative size of a firm (*Size*) to control for the fact that smaller, high growth firms have greater profitable investment opportunities than bigger and more mature companies. We measure the relative size of a firm as the percentage of sample firms smaller than the firm for each country in each year. The numerator in our firm-level controls is measured one year after our total assets variable, the denominator. All values for these control variables in US dollars are converted into real terms (base year 2000) by using the US GNP deflator.

4. Tests and results

4.1 Internal resources and investment under different taxes: non-parametric results

The simplest way of testing how payout taxes impact investment of firms with and without access to internal equity is to track firm investment around tax reforms. We do this in our panel sample by sorting firms in each country-year into quintiles based on the ratio of cash flow to assets. This is meant to capture firms' ability to finance investment internally.[21] We then calculate average investment over assets for each group in each country-year cell. We demean these ratios by country-year, to account for cross-country and time variation in average investment levels. Next we identify tax changes, using the country-weighted average payout tax rate (*Average Tax C*, results are similar with the two alternative measures). We focus on events where payout taxes changed by at least three percentage points. We exclude any events with fewer than thirty observations (firms) in the first year of the tax change. To avoid overlapping periods, and following Korinek and Stiglitz (2009), we further exclude events where a substantial tax cut (increase) is followed by a tax increase (cut) within two years following the original reform (Sweden 1994/1995, Australia 2000/2001, Norway 2001/2002, and Korea 1999/2001). As Korinek and Stiglitz show, where firms perceive tax changes as only temporary, tax changes may generate smaller effects. Since tax reform is often debated extensively, it seems possible that these tax reversals can be predicted by some firms and investors. We further exclude an event where the effects of the payout tax change overlap with a substantial corporate tax reform (Korea 1994). The remaining 29 events include fifteen events with an average tax drop of 9.8 percentage points (median 5.5) and fifteen events with an average tax increase of 8.4 percentage points (median 5.6).

[21] Sorting on related variables such as Net Income/Assets gives very similar results.

For every event, we track the average ratio of investment to lagged assets for firms in each quintile in the three years leading up to the tax change, the first year when the new rules apply, and the two years following the tax change. Average differences in investment between high and low cash flow firms around the tax events are shown in Figure 4. This graph shows the difference between the average investment of the low and high cash flow quintiles. The point estimate is positive in all years, i.e. the firms with high internal cash flows tend to invest more. There is no apparent trend in the investment rate difference prior to a tax reform. After a tax reform, however, the investment difference follows the direction of the tax change (e.g. the difference increases when taxes are raised and falls when taxes are reduced).

In Table 4, we provide a detailed analysis of the relative investment of high and low cash flow firms. The table shows average investment (demeaned by country year) for both pre- and post-reform periods, and for the two groups of firms. The difference and difference-in-difference estimates are shown as well. The time period analyzed around tax events is from four years before to two years after the reform. The effects are in line with the hypothesis that higher taxes should be associated with relatively higher investment in those firms that have access to internal cash (Column 3, Panels A and B). After payout tax increases (decreases) the importance of the availability of internal resources for high investment increases (decreases) significantly. On average, the difference in investment between low and high cash flow firms increases from 5.33% to 7.59% following a payout tax increase. When payout taxes are cut, the difference in investment falls from 7.27% to 5.54%. These results are consistent with the prediction that corporate payout taxes drive a wedge between the cost of inside and outside equity and that high such taxes favor investment by firms with internal resources.

The tax-based theory of the cost of capital wedge suggests that firms with inside funding should not respond to tax incentives (they are "new view" firms). Nevertheless, there is movement in the high cash flow group of firms in Table 4 (after a tax increase, they increase investment relative to the median firm), disagreeing with this prediction. There are four possible explanations for the investment changes made for high cash flow firms. First, countercyclical fiscal policy could generate patterns in aggregate investment consistent with Table 4. In principle, forces of political economy could produce endogeneity in either direction: tax increases may be more likely in contractions when the government budget is in deficit or in expansions when there is less political pressure to stimulate the economy with fiscal expansion. Investment tends to fall after tax reductions and rise after tax increases, which might be due to countercyclical tax policy (i.e. taxes are raised at times when investment is temporarily low and can be expected to increase). This type of endogeneity is a key motivator for our approach of using difference-in-difference tests with demeaned investment. By looking at relative cross-firm differences in investment

within a country and year, we difference out aggregate level effects.[22] A second possibility is that agency problems are a driver of investment in our sample firms in a way consistent with Chetty and Saez (2010): when tax rates go up, pressure to pay out cash is reduced, permitting managers to undertake excessive investment. Unlike the new view, this theory predicts that cash rich firms will respond to tax changes, and that aggregate investment may respond perversely to payout taxes. Third, cash rich firms may experience increase investment opportunities when cash poor firms withdraw. Finally, the aggregate patterns may be related to the permanence of tax changes. Korinek and Stiglitz (2009) predict that a tax cut which is expected (by firms) to be temporary can lead to inter-temporal tax arbitrage: firms want to take advantage of the temporarily low tax by paying out more cash, and do so in part by reducing investment. This tax arbitrage is done by mature (i.e. cash rich) firms who generate the bulk of payout. Thus, there are four reasons that the investment of cash rich firms is correlated with tax changes in the direction evident in Table 4. Importantly, under all four scenarios, our inferences based on the relative investment of high and low cash flow firms remains valid, i.e. the difference-in-difference result tells us that low payout taxes favors cash poor firms in a relative sense. Interpreting aggregate correlations is much more complicated, and we do not hope to be able to tell the possible explanations of the aggregate pattern apart. We believe the lessons learned from the cross-sectional differences are less ambiguous and of great potential importance for understanding corporate investment and for setting public policy.

The estimated difference-in-difference estimate varies considerably across events. Figure 5 plots the empirical densities of difference-in-difference estimates for tax decrease and increase events. Two (three) of the fifteen (fourteen) tax decreases (increases) have difference-in-difference effects that are in conflict with our hypothesis. On the contrary, one third of the tax decreases reduce the difference in the ratio of investment to assets between high and low cash flow firms by more than 2.5 percentage points – more than one third of the pre-tax change differences. 40% of the tax raises increased the wedge in investment between high and low cash flow firms by more than 2.5 percentage points, i.e. more than 50% of the pre-tax change differences.

4.2 Internal resources and investment under different taxes: OLS results

[22] We expect that endogeneity between payout tax changes and the dispersion of investment (as opposed to the level) is much less likely to be important. The correlation table in Appendix A.IX supports this expectation. It also highlights that tax changes are at best weakly related to other macroeconomic determinants that affect the level of investment in an economy. Tax changes are only weakly correlated with current and prior year GDP growth and not significantly related to other macroeconomic variables with the potential to influence investment: inflation, and cost for setting up businesses (see e.g., Djankov et al. 2010), and government spending measured by subsidies, military expenditures and R&D expenditures. We also implement several robustness tests to control for government policy in various ways (see Section 5).

Compared to the non-parametric tests, the regressions have several advantages. They use more of the variation in the data, and can easily integrate both tax increases and decreases in the same specifications. They also allow for more detailed controls of firm heterogeneity. However, it is harder to study the detailed time patterns in the regression tests. By construction, regressions put more weight on those events that happen in countries with many firms (i.e., Japan and the US),[23] although in principle that can be changed by using GLS (we do not do this, although we always cluster errors by country-year, so that we properly take into account the amount of statistical power we have).[24] The regressions exploit all of the variation in tax rates that is visible in Figure 3.

For our baseline tests, we regress investment on firm controls, fixed effects for firms and for country-year cells, and the interaction of the payout tax rate with cash flow (we do not include the level of the tax, since this is absorbed by the country-year fixed effects).[25] We control for relative size, Tobin's q, cash flow, and leverage. We include firm and country-year fixed effects in all our regressions. These help control for business cycles and other macro-economic factors. The main variable of interest is the interaction of internal resources (cash flow) and taxes. If taxes raise the relative cost of external equity, we expect high taxes to coincide with a stronger effect of cash flow on investment (since high cash flow means a firm can finance more investment with cheap internal equity). We therefore predict that the interaction coefficient should be positive. Regression results are reported in Table 5, for each of the three tax variables. The estimated coefficient for the tax-equity interaction variable is consistently positive and significant. In other words, the higher payout taxes are, the stronger is the tendency for investment to occur where retained earnings are high. As predicted by the tax wedge theory, payout taxes "lock in" investment in firms generating earnings and cash flow. The estimated magnitudes are large. For example, going from the 25th percentile of the country-weighted average tax rate (15.0%) to the 75th percentile (32.2%) implies that the effective coefficient on cash flow increases by 0.029, an increase by 32.8% over

[23] We get similar results when excluding Japanese and U.S. firms (Table A.I of the Appendix).

[24] We also test the robustness of our results to regression specifications in which we cluster standard errors at the country level and at the country-industry level. Standard errors for the cash flow*tax interactions obtained from these additional specifications are very similar to those in our baseline tests. They are reported in Table A.II of the Appendix.

[25] For brevity, in what follows we only discuss the results obtained by using our *Investment* dependent variable. The results using our alternative measures of investment, *PPE Growth* and *Asset Growth*, align very closely with the results reported in this section. The results are displayed in Table A.III of the Appendix. Of the six coefficient estimates for the interaction of the payout tax rate with cash flow, five are significantly different from zero. We also ensure robustness of our results to alternative ways of scaling our measures of investment. In what follows, we use book assets to scale investment. As our sample includes smaller and nonmanufacturing firms with modest fixed assets and varying degrees of intangible assets this appeared the logical approach (cf. Baker, Stein, and Wurgler 2003). Nevertheless, following Fazzari, Hubbard, and Petersen (1988) and Kaplan and Zingales (1997) we also investigate robustness of our results to using the alternative denominators property, plant, and equipment (PPE) and the book value of fixed assets to scale investment. The estimated coefficients for the tax-cash flow interaction variable are again consistently positive and significant when we use these alternative scale variables for investment.

the conditional estimate at the 25th percentile. Using the country-weighted effective tax rate, the effect is slightly larger. Going from the 25th percentile (7.8%) to the 75th percentile (25.2%) implies that the effective coefficient on cash flow increases by 0.037, 36.6% more than the baseline estimate in Table 5.

One implication of this is that it appears a large part of the cash flow coefficient in investment regressions may reflect the differential cost of capital for firms with and without access to internal funds (the literature has mainly focused on financial constraints and varying investment opportunities as explanations of such coefficients). The high R-squared in the regressions in Table 5 stems largely from the many firm fixed effects included. On their own, these explain about 52% of the variation in investment rates. This suggests that they may be important to include, and we maintain them in all regressions. In fact, their inclusion does not change our estimates for the tax-cash flow interaction noticeably.

We next use alternative measures of internal equity to check the robustness of our results thus far. We use the ratio of EBITDA to lagged assets as an alternative flow measure, and cash to lagged assets as a stock measure. Conceptually, a stock measure may be more natural than a flow measure, but cash may be financed on the margin by debt, in which case this becomes less informative about whether the firm has internal equity. In Table 6, both measures are interacted with all three tax variables. Of the six coefficient estimates, five are significantly different from zero. The magnitudes are smaller than those reported for cash flow in Table 5. We have also used further measures of internal resources, such as net income, or operating income. Results are similar (Table A.IV of the Appendix).

In a next step, we consider more flexible econometric specifications. Thanks to the panel structure of the data set, we can allow the coefficient on cash flow to vary across countries and years, in essence replicating the identification strategy of the many studies exploiting the 2003 tax cut in the US (for seventy nine changes across 25 countries). In Table 7 we report regressions including interactions of cash flow with both country and year indicator variables. Allowing the slope on cash flow to vary by country, we can rule out any time-invariant differences in the relation between payout taxes and the allocation of investment in different countries. For example, accounting differences could make cash flow less precisely measured (reported) in some countries, where we would therefore see a smaller slope on cash flow due to attenuation bias. As long as such issues are time-invariant, we can eliminate any effect on our results by including the interaction of country fixed effects with cash flow. The coefficient estimates for the cash flow-payout tax interaction remain statistically significant, and are somewhat large across the board (the firm controls have coefficients that are very similar to base line specifications). In fact, allowing these extra controls the estimated magnitudes are larger than those estimated in Table 5. The effective coefficient on the cash flow*tax interaction increases by 0.0002 (dividend tax), 0.0006 (Effective Tax C), and 0.0004 (Average Tax C) when compared to the coefficients reported in Table 4.

The R-squared increases by about twenty-five basis points. Thus, a more conservative estimation technique gives a more precise result in line with the predictions of the tax wedge theory.

With the more demanding flexible specifications we address one additional concern. We want to repeat our analysis using cash flow percentile ranks rather than the raw cash flow measure. This addresses concerns that despite our eliminating extreme observations of our key independent variables our results may be sensitive to outliers or to cross-country variation in the standard deviation of cash flow.[26] The results using cash flow percentile ranks are reported in Table 8. Coefficient estimates are more significant than those for the raw CF variables. T-statistics for the coefficients on our cash flow * tax interactions are very high.

An auxiliary prediction of the theory of tax-induced cost differences between internal and external equity is that high taxes reduce the need to reallocate resources from profitable to unprofitable firms. Therefore, high taxes should reduce the amount of equity issues.[27] This provides an additional falsification test. We test this by using firm-level data on payout tax and quantities of equity raised. If we cannot see a negative correspondence between payout tax and amount of equity issues, it becomes less plausible that our tax measure properly captures variation in the cost of equity. Table 9 presents tests of the predicted negative relation between taxes and equity issues in our sample. To help control for market timing (as opposed to payout tax timing), we control for recent stock return in the equity issues regressions. As predicted, the coefficient estimate is negative for all three measures of taxes. A ten percentage point increase in the dividend tax rate (the country average payout tax rate) predicts a drop in equity issuance by 9% (12%) of the unconditional mean. High payout taxes are associated with both low investment and low equity issuance among firms with low profits. This is consistent with taxes as a driver of the cost of capital. It also suggests one channel through which the differential investment responses to taxes come about: with lower taxes, domestic stock markets reallocate capital to firms without access to internal cash.

4.3 Difference-in-difference analysis: old view firms vs. new view firms

We next sort firms by their likely access to the equity market. This is an important distinguishing feature between new view and old view models. According to the new view, all firms finance internally (on the margin), and therefore do not respond to taxes on payout. According to the old view, all firms finance their investment externally (again, on the margin), and therefore respond to taxes on payout (their

[26] Dependent variables are truncated, so to some extent this is already addressed.

[27] The same prediction applies to payout: lower taxes should be associated with more payout. However, this prediction is less unique. If firms perceive tax changes as predictable, they may attempt to time payout to times when taxes are low (e.g., Korinek and Stiglitz 2009). It therefore seems that testing equity issues provides better discrimination among theories than testing payout volumes.

cost of capital increases in such taxes). We hypothesize that the two assumptions fit different firms. By sorting firms by access to the equity market, we may be able to test the two theories. We attempt to sort firms into those that can source funds in the equity markets (old view) and firms that have to rely more on internal resources to finance investment (new view). To classify firms, we use three methods: predicted equity issues, actual equity issues in preceding years, and the KZ index of financial constraints (Kaplan and Zingales 1997).[28]

We estimate the effect of taxation on the cash flow sensitivity of investment separately for the groups of firms. In Table 10, Panel A, we sort firms based on the predicted probability that a firm issues shares using common share free float, share turnover, sales growth, leverage, market capitalization and market-to-book. We define firms as old view firms if predicted equity sales are above 2% of lagged assets. In Panel B, we define firms as old view firms if the sum of the net proceeds from the sale/issue of common and preferred stock over the preceding year exceeded zero, and as new view firms otherwise[29]. In Panel C, we classify firms as new view if the KZ index of financial constraints is above 0.7, and otherwise as old view firms. For all three classifications, there is a sizable difference in the effect of taxation on the marginal source of funds for investment between old view firms and new view firms. The differences between the coefficients are statistically significant at the 5% level or better in each pair of regressions. For old view firms, the cash flow coefficient is always sensitive to tax rates, as predicted. For new view firms, the coefficient estimate is positive but smaller and insignificant in all cases.

4.4 Governance and the impact of taxation on the cash flow sensitivity of investment

Studies of the 2003 US tax cut found that governance variables tended to have a large impact on firm responses to the tax cut (Brown et al 2007 and Chetty and Saez 2005). Chetty and Saez (2010) model this, and suggest that poorly governed firms have CEOs who invest for reasons unrelated to the marginal cost and value of investment (i.e., they are unresponsive to the cost of capital). When taxes fall, such CEOs switch from excessive investment to payout, and so lower taxes have important welfare benefits. One prediction of their model is that poorly governed firms will not respond as much to tax changes as well governed firms. To identify governance, we look at directors' ownership stakes (including officers') in the company. This is based on the notion that only owners with large stakes have both the power and the incentive to make sure the firm is maximizing value (Shleifer and Vishny 1986, Jensen and Murphy 1990). Additionally, the measure seems plausibly institution-independent, i.e. we expect it to be meaningful across countries and time. Our sample countries vary substantially in terms of legal

[28] Note that we cannot condition on payout to distinguish financially constrained vs. unconstrained firms, since payout may be determined simultaneously with investment, which is our dependent variable.

[29] Our results are robust to using the dividend tax rate and the country-weighted effective tax rate instead of the country-weighted average tax rate for this analysis (Tables A.V and A.VI of the Appendix).

institutions, ownership structure, and other factors. Finally, this measure can be calculated for many of our sample firms (about three quarters of observations).

To calculate the fraction of shares held by insiders we use the sum of the outstanding shares of a company held by directors and officers (if above the local legal disclosure requirement) relative to total shares outstanding.[30] The median ownership stake held by insiders is 4.4% for the firms in our sample. With standard deviation of 18.9% and interquartile range of 16.6%, the variation of insider ownership across firms and years is substantial. Particularly low insider ownership stakes are observed, for example, for companies Johnson & Johnson (US, 0.1%), Samsung Fine Chemicals (KOR, 0.1%), and Rentokil (UK, 0.1%). High ownership concentration is observed for, for example, Archon (US, 89%), Grupo Embotella (MEX, 72.4%), and Maxxam (US, 65%). As a comparison, currently over 12% of shares in Microsoft are held by corporate insiders. We observe the lowest insider ownership stakes in Austria (median value of 0.2%), the Netherlands (0.4%), and Japan (0.4%). High ownership concentration is found in Greece (42.6%), Italy (35.9%), and Belgium (11.1%). In the U.S., approximately 8.9% in a company are held by directors and officers in our sample.

We sort firms into four quartiles, with respective averages of 0.27%, 2.5%, 10.7% and 41.8% insider ownership.[31] When sorting by insider ownership, and running separate regressions for each subsample, we find that firms with very low insider ownership show much less response to taxes (Table 11). The coefficient estimate is insignificant for the three groups of firms with the lowest ownership and significant for the group with high insider ownership.[32] This is consistent with the Chetty and Saez'(2010) predictions that CEOs with incentives more in line with investors make decisions that are more responsive to tax incentives. More generally, the results may suggest that some firms are more responsive to changes in the cost of capital. However, the differences of the coefficient estimates across groups are not statistically significant, and are therefore only suggestive. Since insiders are individuals, this result also highlights that where the marginal shareholder is more likely to be a taxable investor, the tax effects may be stronger.

[30] We obtain insider ownership data from the September 2010 version of the Worldscope database. The disadvantage of Worldscope is that it reports current insider ownership at any given time (or latest available) only. Thus, we have to assume that the fraction of shares held by directors and officers at the time we accessed the data is informative about the fraction of shares historically held by insiders. Prior evidence in the literature suggests that this aspect of the ownership structure usually changes slowly (Zhou, 2001).

[31] We get similar results when sorting for each country separately.

[32] We get very similar results when we use the dividend tax rate and the country-weighted effective tax rate instead of the country-weighted average tax rate for this analysis (Tables A.VII and A.VIII of the Appendix).

5. Robustness to endogeneity concerns about payout taxes

We next turn to several important additional robustness tests. One central concern about our results is that tax changes are just fragments of larger policy changes in an economy which coincide with tax reforms and change firms' investment behavior. After all, governments are unlikely to set their tax policies completely independently of other developments in an economy. In particular, our tests (regressions and non-parametric tests) might be biased if tax changes were motivated by factors related to the relative investment of cash-rich and -poor firms. If, for example, taxation, cash flow and investment all change simultaneously in response to other macroeconomic determinants or government policies then we need to be concerned about endogeneity.

Throughout our analyses we have used a number of checks to ensure robustness of our results to endogeneity concerns. For example, in our non-parametric test we have relied on differences in investment across firms instead of investment levels. Similarly, in all regressions we include country-year dummies to ensure that average investment is taken out (and, likewise, any particular government investment initiative that may inflate investment in a given year). Nevertheless we turn to several important additional robustness checks below. They address concerns that tax rates change in response to policy variables or macroeconomic determinants that might also affect the allocation of investment across firms (thus causing false positive conclusions about taxation).

We now consider further features of the tax system. We first want to control for the corporate tax rate. Corporate taxes may be connected to payout taxes for many reasons, including government budget trade-offs, and political preferences (i.e. pro-business). Corporate taxes might also affect how important internal resources are for firms.[33] Therefore, if different features of the tax code are correlated, an empirical link between payout taxes and relative investment across firms might be reflective of a true relationship between corporate taxes and relative investment. To make sure our results are not biased in either direction we include the interaction of corporate tax with firm cash flows, we include an interaction of corporate taxes and cash flow in a regression. Here, we need to make a distinction between imputation system and other tax regimes. In imputation systems, corporate and payout taxes are particularly strongly intertwined as corporate tax at the firm level is "pre-paid" on behalf of shareholders and can be credited against payout taxes at the individual shareholder level. Thus, the corporate tax rate is in some way a measure of investor taxes.

To distinguish tax systems we thus also add an interaction of cash flow*corporate tax with the dummy variable *Imp* which takes the value of 1 for imputation systems, and zero otherwise. The results are reported in Table 12. The interaction of corporate tax with cash flow is insignificant in all

[33] For example, if many firms are financially constrained, they may be unable to respond to lower corporate tax rates by investing more. In that case, lower tax rates may coincide with lower coefficients on internal resources.

specifications, suggesting that outside of imputation systems[34], the corporate tax rate is not related to our findings. The triple interaction with the imputation system dummy is positive and significant, suggesting that in imputation systems[35], internal cash flow is a stronger predictor of investment when taxes are high. In other words, internal resources appear to matter more when corporate taxes are high. One interpretation of this coefficient is that when taxes are high, financial constraints bind more than at other times (see e.g. Rauh 2006). Importantly for our purposes, the interaction of cash flow and payout tax is not much affected. The coefficient estimates remain significant (although the significance is somewhat lower for the dividend tax rate), and very close to the baseline regressions in magnitude.

Apart from corporate income taxes, we are also concerned about other features of the tax system. Changes to payout taxes may coincide with modifications to the tax code apart from the corporate tax rate. We therefore introduce a set of broad measures of public sector policy as covariates, which may make investment more profitable. More generally, this way we can address legislative endogeneity concerns: if firms with little internal equity increase investment following a payout tax reduction, is that because of the tax cut or did these firms just lobby to make the investment they were planning to do anyway more profitable? We collect alternative indicators of policy preferences for the economies in our sample from the World Development Indicators (World Bank, 2010). We opt for four indicators that measure government policy in three distinct dimensions: government stimulus, consumption climate, and legal environment. We sequentially include each policy control and its interaction with cash flow. To control for the effect of government stimulus programs that may affect investment we use control variables *Subsidies, Grants, Social Benefits* and *Military Expenditure.* The former measures government transfers on current account to private and public enterprises, and social security benefits in cash and in kind (relative to total government expense) (Table 13, Panel A). The latter includes all current and capital expenditures on the armed forces (relative to GDP) (Panel B). We measure governments' stance on consumption through control variable *Sales and Turnover Tax*. It measures the tax burden on goods and services relative to the value added of industry and services (Panel C).[36] Finally, we measure public spending on research through *R&D Expenditures* as a fraction of GPD. It measures expenditures on basic research, applied research, and experimental development. (Panel D). We use the more demanding flexible specifications to perform this additional check. Coverage for the world development indicators is generally poorer than for our tax variables over the sample period. In three of the four additional specifications the number of observations is at best half compared to our baseline specifications. Results

[34] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, the United States (all in 2008).

[35] Australia, Canada, Japan, Korea, Mexico, UK (all in 2008).

[36] It includes general sales and turnover or value added taxes, selective taxes on services, taxes on the use of goods or property, taxes on extraction and production of minerals, and profits of fiscal monopolies.

are reported in Table 13. Despite the reduction in sample size and the additional policy controls the coefficient for the cash flow*tax interaction remains strong and significant in all but two specifications.[37]

6. Conclusions

Our results have three main implications. First, it appears that payout taxes drive the allocation of capital across firms. High taxes lock in capital in those firms that generate internal cash flows, ahead of those firms that need to raise outside equity. If firms have different investment opportunities, this means that tax rates change the type of investments being made. For example, high payout taxes may favor established industries. Taxes on payout may be as important for investment decisions and the cost of capital as the corporate income tax.[38]

Second, the effect of payout taxes is related to both access to the equity market and governance. Firms which can access the equity market, "old view" firms, are the most affected by tax changes. Firms whose only source of equity finance is internal are less affected by taxes, as predicted by the "new view". A final source of heterogeneity is governance. Firms where decision makers have low financial stakes are less affected by tax changes, reflecting their propensity to make investment decisions for reasons unrelated to the cost of capital.

Third, the relation between cash flow and investment (see e.g. Fazzari, Hubbard, Petersen 1988, Kaplan and Zingales 1997, Lamont 1997) appears to partially reflect the difference in the cost of capital between firms with and without access to inside equity. Firms invest more if they have easy access to more resources (see e.g. Lamont 1997 and Rauh 2006), especially internal cash flows. There is a potentially important tax channel through which internal resources affect investment: having internal cash flows implies a lower after-tax cost of equity capital. Thus, tax policy offers one important potential channel for affecting the access to investment resources by firms without retained earnings.

[37] When we include all four policy controls the reduction in the number of observations is immense – 77%. Nevertheless, for two of our three tax variables the influence of taxation on the cash flow sensitivity of investment remains statistically significant.

[38] In fact, US tax receipts data suggest that payout taxes are quite relevant. From 1960 to 2009, the share of corporate income taxes in U.S. Federal tax receipts fell from 24% to 10% (IRS 2009). A study by the Department of the Treasury, Office of Tax Analysis suggested that individual income taxes on dividends were 13% of Federal tax receipts in 2005. In other words, payout-related taxes may currently raise more revenue than corporate income taxes.

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Figure 1

Personal Tax Rates on Dividend Income – High Variation Countries

This figure shows dividend tax rates for the six countries in our sample with the largest within-country variation in personal income tax rates on dividend income over the 1990-2008 period.

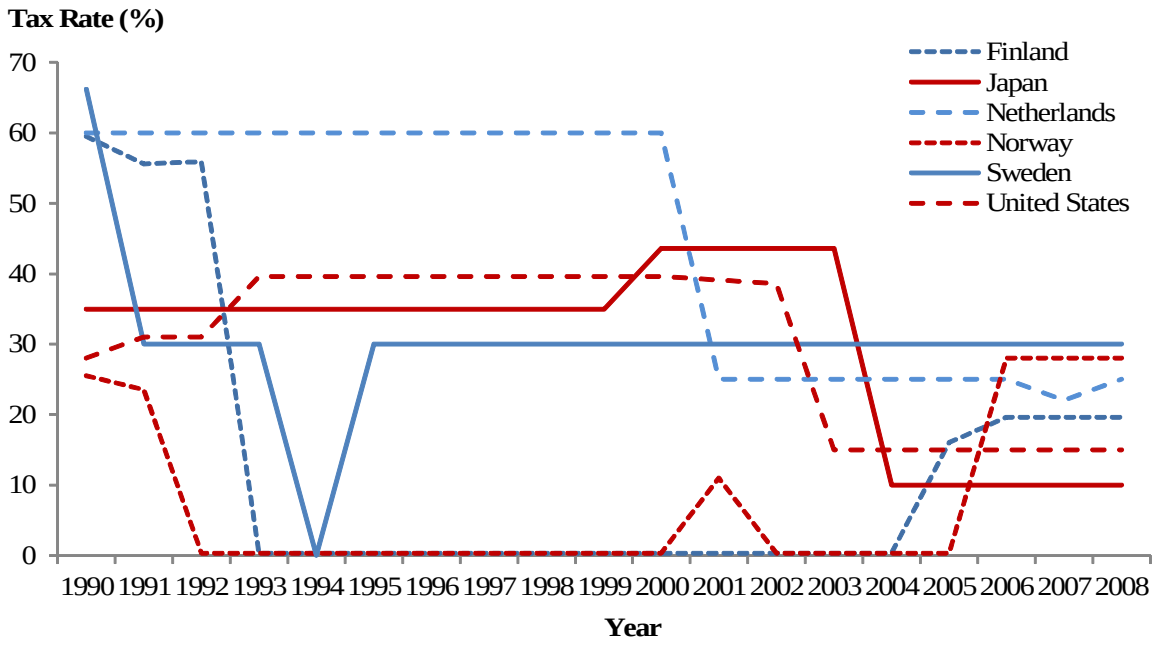

Figure 2

Capital Gains Tax Rates – High Variation Countries

This figure shows taxation of share repurchases for the six countries in our sample with the largest within-country variation in tax rates on capital gains over the 1990-2008 period.

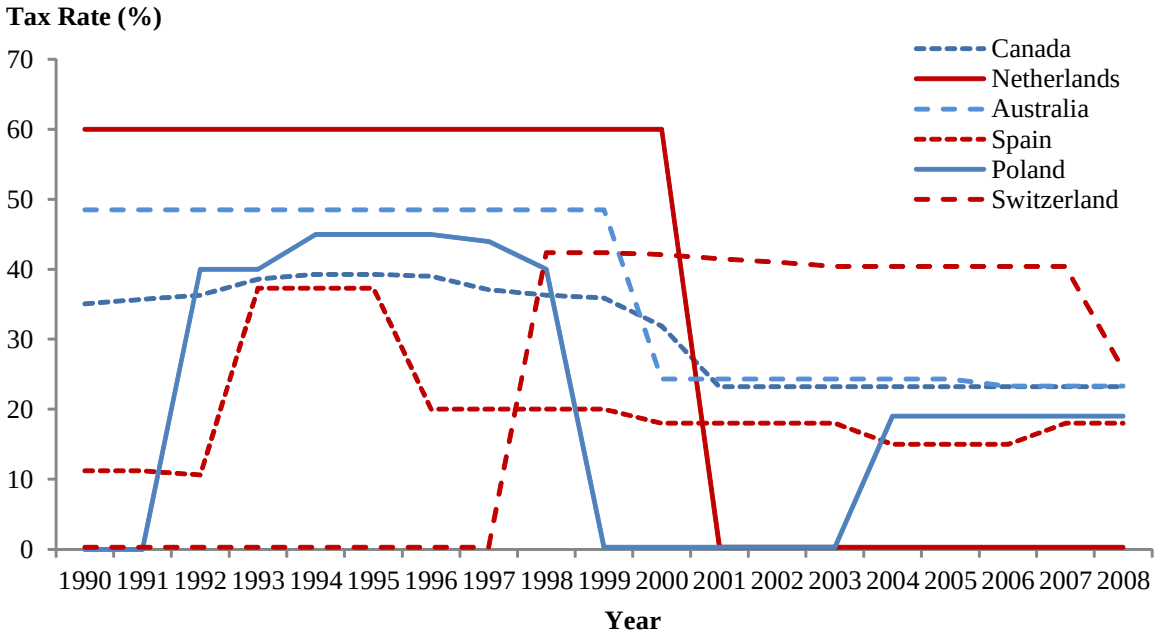

Figure 3
Tax Rates – Distribution over Sample

This figure illustrates the distribution of tax rates across 81,222 observations in our sample over the 1990-2008 period. The graph is a transposed cumulative distribution function with number of observations on the x-axis and tax rates on the y-axis. *Dividend Tax* is the personal income tax rate on dividends (in %). *Effective Tax C* is the country-weighted effective corporate payout tax rate (in %). It is obtained by weighting each year's dividend and effective capital gains tax rates by the relative importance of dividends and share repurchases as payout channels (relative to total corporate payout) in a country over the sample period. The effective tax rate on share repurchases equals one-fourth of the statutory capital gains tax rate. *Average Tax C* is an alternative measure of the average corporate payout tax rate (in %). It is calculated by weighting each year's dividend and statutory capital gains tax rates by the relative importance of dividends and share repurchases as payout channels (relative to total corporate payout) in a country over the sample period.

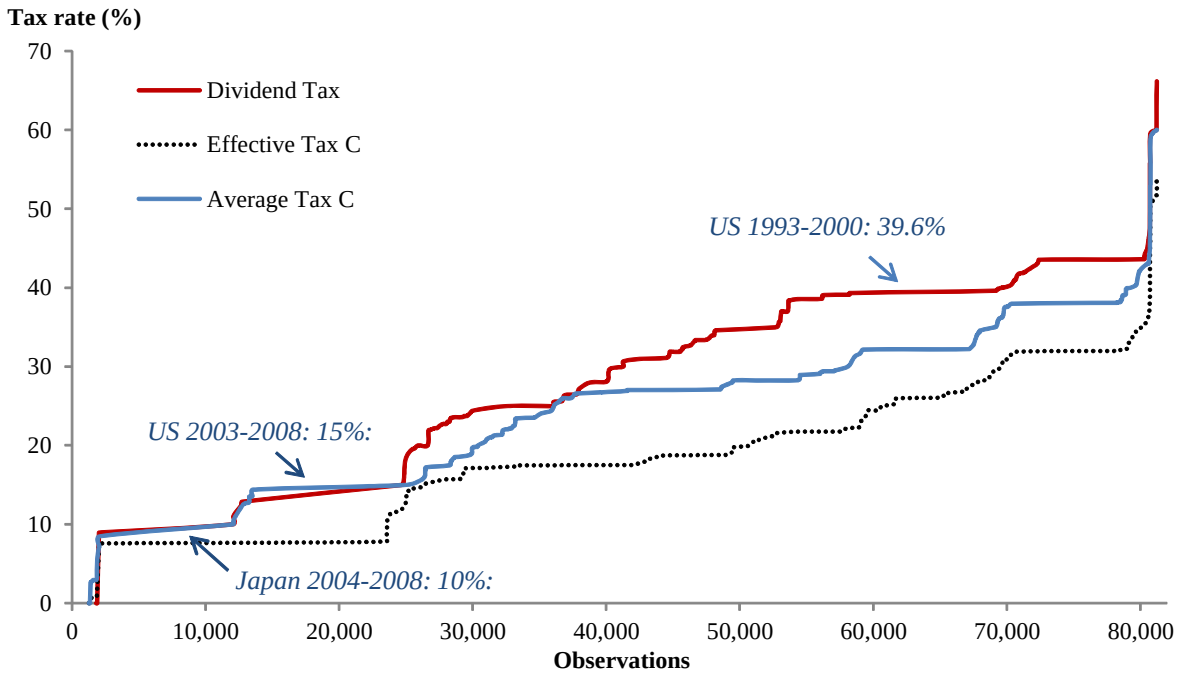

Figure 4
Average Investment by High and Low Cash Flow Firm Quintiles Around Payout Tax Changes of at Least 3 Percentage Points, 1992-2006

This figure shows the average investment by cash flow group for three years around 15 payout tax decreases and 14 payout tax increases in 1992-2006 with at least 30 observations in the country-year. We measure investment by capital expenditures normalized by prior-year total assets (CapEx/A) and demean investment by country-year cell. We then sort firms in each country-year cell into five quintiles according to their cash-flow, and calculate average investment for each quintile. The 14 payout tax increase events are Australia 1993, Canada 1993, Denmark 1993 Denmark 2001, Germany 1994, Germany 1995, Finland 2005, Finland 2006, France 1997, Japan 2000, Norway 2006, Poland 2004, Switzerland 1998, and the US 1993. The 15 tax decrease events include Belgium 2002, Canada 1996, Canada 2001, Canada 2006, Germany 2001, France 2002, Italy 1998, Japan 2004, Netherlands 2001, Poland 2001, Spain 1996, Spain 1999, Spain 2003, US 1997, and the US 2003.

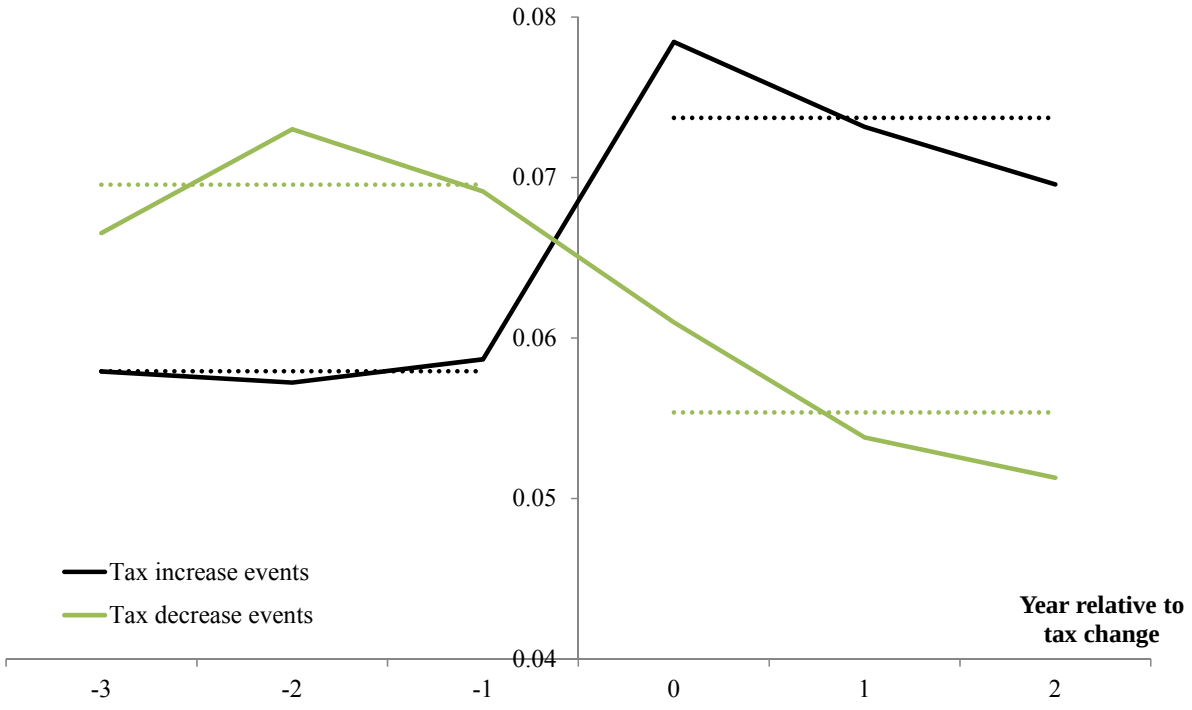

Figure 5
Difference-in-Difference Estimates, Empirical Distribution

This figure presents the empirical distribution of difference-in-difference estimates around tax increase and decrease events. Events are included if they represent a 3 percentage points or larger change in the tax rate, if there are at least 30 firm observations for each year around the change, and if they occur during 1992-2006. For each event, we sort firms in each year into five groups based on cash flows. For each year, the difference in the average investment to lagged assets between the firm quintiles with the highest and lowest cash flows is calculated. The difference-in-difference estimate for each event is defined as the change in this difference from the three years before to the three year after the tax change. The graph presents tax decreases and increases separately.

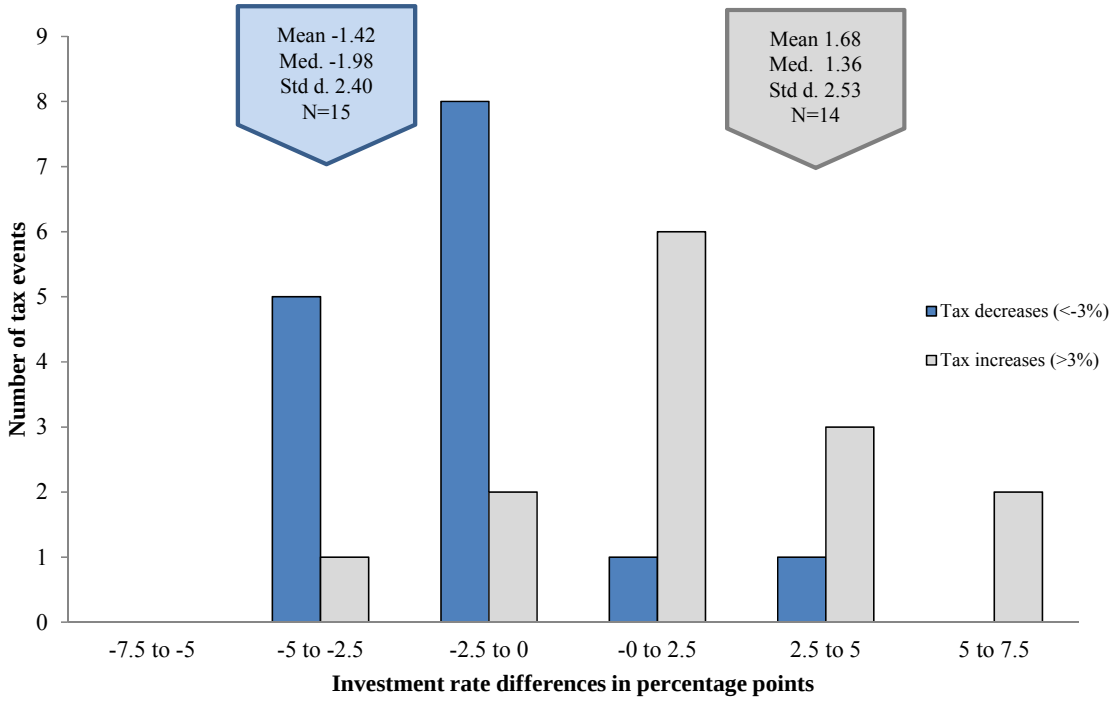

Table 1
Tax Regimes Across 25 Countries (1990-2008)

This table reports prevailing tax regimes across 25 countries over the 1990-2008 period. CL, FI, PI, SR, and TE abbreviate classical corporate taxation system, full imputation system, partial imputation system, shareholder relief system, and dividend tax exemption system, respectively. [1] – Split-rate system for distributed and retained earnings. [2] – Individuals had the option to accumulate the dividend grossed up applying a factor of 1.82 combined with a tax credit of 35% on the grossed up dividend. This mechanism is similar to a full imputation system (Source: OECD).

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Australia	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI
Austria	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Belgium	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Canada	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI
Denmark	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	SR	SR	SR	SR
Finland	PI	PI	PI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	SR	SR	SR	SR
France	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	SR	SR	SR	SR
Germany	FI[1]	FI[1]	FI[1]	FI[1]	FI[1]	FI[1]	FI[1]	FI[1]	FI[1]	FI[1]	FI[1]	SR	SR	SR	SR	SR	SR	SR	SR
Greece	-	-	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE	TE
Hungary	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Ireland	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	CL	CL	CL	CL	CL	CL	CL	CL	CL
Italy	FI	FI	FI	FI	FI	FI	FI	FI	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Japan	CL	CL	CL	CL	CL	CL	CL	CL	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Korea	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI
Mexico	FI[2]	FI[2]	TE	TE	TE	TE	TE	TE	TE	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI
Netherlands	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	SR	SR	SR	SR	SR	SR	SR	SR
New Zealand	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI
Norway	SR	SR	FI	FI	FI	FI	FI	FI	FI	FI	FI	PI	FI	FI	FI	FI	SR	SR	SR
Poland	-	-	-	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Portugal	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Spain	CL	CL	CL	CL	CL	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	SR	SR
Sweden	CL	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Switzerland	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	SR	SR
United Kingdom	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI
United States	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	SR	SR	SR	SR	SR	SR

Table 2
Personal Income Tax Rates and Capital Gains Tax Rates Across 25 Countries (1990-2008)

This table shows effective corporate payout tax rates across 25 countries over the 1990-2008 period. Panel A reports personal income tax rates on dividend income (in %). Panel B reports capital gains tax rates (in %). All capital gains tax rates reported are effective rates incurred by investors with non-substantial shareholdings and holding periods that qualify as long-term investments in accordance with country-specific tax legislation. For example in Denmark, Germany or the United States, capital gains from long-term shareholdings are taxed at the lower rate reported in Panel B. Austria, Italy, and Netherlands are examples for countries where capital gains from substantial shareholdings are taxed at higher rates. A shareholding qualifies as substantial if it exceeds a certain threshold in share capital (for example 5% in the Netherlands). See Jacob and Jacob (2010) for a detailed description of applied tax rates.

Panel A: Personal Income Tax Rates on Dividend Income (in %)

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Australia	15.2	15.2	15.2	23.0	23.0	19.5	19.5	19.5	19.5	19.5	22.0	26.4	26.4	26.4	26.4	26.4	23.6	23.6	23.6
Austria	25.0	25.0	25.0	25.0	22.0	22.0	22.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Belgium	25.0	25.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Canada	38.3	39.1	40.1	43.5	44.6	44.6	37.0	35.8	34.6	33.6	33.2	31.9	31.9	31.9	31.9	31.9	24.4	24.1	23.6
Denmark	60.9	45.0	45.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	45.0
Finland	59.5	55.6	55.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	19.6	19.6	19.6
France	39.9	39.9	39.9	41.8	41.8	42.6	39.0	43.4	41.9	41.9	40.8	40.1	35.6	33.5	33.9	32.3	32.7	32.7	32.7
Germany	26.6	29.7	29.7	26.6	32.9	38.5	38.5	38.5	37.0	37.0	34.0	25.6	25.6	25.6	23.7	22.2	22.2	23.7	26.4
Greece	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hungary	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	25.0	25.0	10.0	10.0
Ireland	35.8	35.7	32.0	30.7	30.7	32.0	32.5	34.4	39.3	39.3	44.0	42.0	42.0	42.0	42.0	42.0	42.0	41.0	41.0
Italy	21.9	21.9	23.4	23.4	23.4	23.4	22.2	22.2	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Japan	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	43.6	43.6	43.6	43.6	10.0	10.0	10.0	10.0	10.0
Korea	47.3	47.3	47.3	47.3	38.4	37.0	33.4	33.4	33.4	22.7	22.7	33.4	28.1	28.1	28.1	31.1	31.1	31.1	31.1
Mexico	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	25.0	25.0	25.0	25.0	25.0	25.0	22.0	25.0
New Zealand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	8.9	8.9	8.9	8.9	8.9	9.0	8.9	12.9
Norway	25.5	23.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0	0.0	28.0	28.0	28.0
Poland	-	-	-	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0	19.0	19.0	19.0	19.0	19.0
Portugal	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Spain	46.0	46.0	43.0	46.0	46.0	38.4	38.4	38.4	38.4	27.2	27.2	27.2	27.2	23.0	23.0	23.0	23.0	18.0	18.0
Sweden	66.2	30.0	30.0	30.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Switzerland	40.9	40.9	41.5	42.4	42.4	42.4	42.4	42.4	42.4	42.4	42.1	41.5	41.0	40.4	40.4	40.4	40.4	40.4	25.7
United Kingdom	20.0	20.0	20.0	22.6	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
United States	28.0	31.0	31.0	39.6	39.6	39.6	39.6	39.6	39.6	39.6	39.6	39.1	38.6	15.0	15.0	15.0	15.0	15.0	15.0

Panel B: Capital Gains Tax Rates (in %)

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Australia	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	24.3	24.3	24.3	24.3	24.3	24.3	23.3	23.3	23.3
Austria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belgium	41.0	39.0	39.0	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Canada	35.1	35.7	36.3	38.6	39.3	39.3	39.0	37.1	36.3	35.9	31.9	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2
Denmark	0.0	0.0	0.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	45.0
Finland	23.8	27.8	27.9	25.0	25.0	25.0	28.0	28.0	28.0	28.0	29.0	29.0	29.0	29.0	29.0	28.0	28.0	28.0	28.0
France	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.9	19.9	26.0	26.0	26.0	26.0	26.0	26.0	27.0	27.0	27.0	30.1
Germany	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Greece	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hungary	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	20.0	20.0	20.0
Ireland	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Italy	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Japan	35.0	35.0	35.0	35.0	35.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	10.0	10.0	10.0	10.0	10.0
Korea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mexico	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Norway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	28.0	28.0
Poland	-	-	40.0	40.0	45.0	45.0	45.0	44.0	40.0	0.0	0.0	0.0	0.0	0.0	19.0	19.0	19.0	19.0	19.0
Portugal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	11.2	11.2	10.6	37.3	37.3	37.3	20.0	20.0	20.0	20.0	18.0	18.0	18.0	18.0	15.0	15.0	15.0	18.0	18.0
Sweden	33.1	30.0	25.0	25.0	12.5	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Switzerland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.4	42.4	42.1	41.5	41.0	40.4	40.4	40.4	40.4	40.4	25.7
United Kingdom	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	18.0
United States	28.0	28.0	28.0	28.0	28.0	28.0	28.0	20.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0	15.0	15.0	15.0

Table 3
Sample Overview and Summary Statistics

The sample consists of 7,661 firms in 25 countries for 1990-2008 presented in Panel A. Summary statistics for investment variables are presented in Panel B. *Investment* refers to capital expenditure in year *t* divided by the end-of-year *t-1* assets. *PPE Growth* refers to growth in plant, property, and equipment from *t-1* to *t* divided by the end-of-year *t-1* assets, and *Asset Growth* is defined as the growth rate of assets over the prior year. Summary statistics for independent variables are presented in Panel C. *Dividend Tax* is the personal income tax rate on dividends (in %). *Effective Tax C* is the country-weighted effective corporate payout tax rate (in %). It is obtained by weighting each year's dividend and effective capital gains tax rates by the relative importance of dividends and share repurchases as payout channels (relative to total corporate payout) in a country over the sample period. The effective tax rate on share repurchases equals one-fourth of the statutory capital gains tax rate. *Average Tax C* is an alternative measure of the average corporate payout tax rate (in %). It is calculated by weighting each year's dividend and statutory capital gains tax rates by the relative importance of dividends and share repurchases as payout channels (relative to total corporate payout) in a country over the sample period. *Cash Flow* is the ratio of cash flow in year *t* relative to prior year total assets. *Cash* is defined as cash holdings over prior year assets. *EBITDA* measures earnings before interest, tax, and depreciation in year *t* as a fraction of *t-1* total assets. *Q* is defined as the market-to-book ratio, that is, the market value divided by the replacement value of the physical assets of a firm. *Sales Growth* is the logarithm of the growth rate of sales from *t-2* to *t*. *Leverage* is the ratio of year *t* total debt to prior year total assets, and *Size* is the relative firm size measured as the percentage of firms in the sample that are smaller than this firm. All variables are in real USD (base year 2000).

Panel A: Sample Overview

Country	N(Firms)	N(Obs)	Country	N(Firms)	N(Obs)	Country	N(Firms)	N(Obs)
Australia	261	1,879	Hungary	13	111	Poland	70	403
Austria	26	332	Ireland	18	252	Portugal	28	269
Belgium	38	463	Italy	66	925	Spain	41	577
Canada	320	2,525	Japan	2,071	22,347	Sweden	100	1,112
Denmark	65	867	Korea	477	4,528	Switzerland	85	1,136
Finland	57	727	Mexico	39	401	UK	470	6,054
France	212	2,608	Netherlands	68	894	USA	2,720	28,439
Germany	245	3,067	New Zealand	31	272	**Total**	**7,661**	**81,222**
Greece	99	519	Norway	41	515			

Panel B: Summary Statistics for Investment

	N	Mean	Standard Deviation	10^{th} Percentile	Median	90^{th} Percentile
Investment	81,222	0.0594	0.0676	0.0083	0.0398	0.1271
PPE Growth	77,626	0.0805	0.2364	-0.1377	0.0514	0.2898
Asset Growth	81,222	0.0785	0.3128	-0.1702	0.0338	0.3079

Panel C: Summary Statistics for Independent Variables

	N	Mean	St. Dev.	10^{th} %	Median	90^{th} %
Dividend Tax	81,222	27.7640	12.5679	10.0000	30.0000	43.6000
Effective Tax C	81,222	18.2530	9.1225	7.6536	17.5143	31.9932
Average Tax C	81,222	24.1584	10.3002	10.0000	26.9082	38.0938
Cash Flow	81,222	0.0696	0.1043	-0.0217	0.0720	0.1767
Cash	81,222	0.1480	0.1883	0.0127	0.0922	0.3409
EBITDA	81,222	0.0957	0.1139	-0.0066	0.1008	0.2138
Q	81,222	2.1270	2.9255	0.7524	1.2183	4.0391
Sales Growth	81,222	0.1114	0.3924	-0.2719	0.0896	0.5080
Leverage	81,222	0.2607	0.2345	0.0031	0.2276	0.5313
Size	81,222	0.6306	0.2404	0.2800	0.6571	0.9363

Table 4
Average Investment and Cash Flow around Payout Tax Changes

Panel A of this table shows the average investment for bottom and top quintiles of cash flow to assets around 14 payout tax increases (*Average Tax C*) in 1990-2008 of at least 3 percentage points and with at least 30 observations in the country-year. Panel B illustrates the difference in investment between top and bottom cash flow quintiles around 15 payout tax decreases. We measure investment by capital expenditure in year *t* divided by the end-of-year *t-1* assets. The table also shows the difference between groups and periods, and the difference-in-difference estimate. Standard errors are in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively. The 31 tax events are listed in Figure 4.

Panel A: 14 Tax Increase Events

	Low Cash Flow Firms	High Cash Flow Firms	Difference between Groups
	(1)	(2)	(3)
Pre-reform Period$_{t-4;t-1}$	-0.0230***	0.0307***	0.0533***
	(0.0015)	(0.0038)	(0.0046)
Post-reform Period $_{t;t+2}$	-0.0278**	0.0481***	0.0759***
	(0.0025)	(0.0037)	(0.0051)
Difference between Periods	-0.0048*	0.0173***	**0.0226*** **
	(0.0029)	(0.0053)	**(0.0069)**

Panel B: 15 Tax Decrease Events

	Low Cash Flow Firms	High Cash Flow Firms	Difference between Groups
	(1)	(2)	(3)
Pre-reform Period$_{t-4;t-1}$	-0.0232***	0.0495***	0.0727***
	(0.0024)	(0.0035)	(0.0046)
Post-reform Period $_{t;t+2}$	-0.0163***	0.0390***	0.0554***
	(0.0029)	(0.0030)	(0.0042)
Difference between Periods	0.0068*	-0.0105**	**-0.0173*** **
	(0.0038)	(0.0046)	**(0.0062)**

Table 5
Firm Investment and Internal Resources under Various Tax Regimes

This table reports linear regression results for firm investment behavior, estimated over the 1990-2008 period. The dependent variable is *Investment*, defined as capital expenditure in year *t* divided by the end-of-year *t-1* assets. We use *Cash Flow* as a measure of firm's availability of internal resources for investment. *Cash Flow* is the ratio of cash flow in year *t* relative to prior year total assets. See Table 3 for a description of the other independent variables included in the regressions. In column (1) we measure firms' tax burden on corporate payouts (*Tax*) as the personal income tax rate on dividends (*Dividend Tax*). Column (2) uses the country-weighted effective tax rate (*Effective Tax C*), and column (3) employs the country-weighted average tax rate (*Average Tax C*). Country-year interaction indicator variables are included in all specifications. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate	Country-Weighted Effective Tax Rate	Country-Weighted Average Tax Rate
	(1)	(2)	(3)
Cash Flow*Tax	0.0009**	0.0021***	0.0017***
	(0.0004)	(0.0006)	(0.0005)
Cash Flow	0.0749***	0.0644***	0.0599***
	(0.0115)	(0.0101)	(0.0123)
Sales Growth	0.0157***	0.0156***	0.0156***
	(0.0011)	(0.0011)	(0.0011)
Leverage	0.0374***	0.0373***	0.0373***
	(0.0029)	(0.0029)	(0.0029)
Size	0.0025	0.0031	0.0030
	(0.0040)	(0.0040)	(0.0040)
Q	0.0011***	0.0011***	0.0010***
	(0.0001)	(0.0001)	(0.0001)
Firm FE	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Observations	81,222	81,222	81,222
R-squared	0.5779	0.5781	0.5781

Table 6
Firm Investment and Internal Resources under Various Tax Regimes – Alternative Measures

This table reports linear regression results for firm investment behavior, estimated over the 1990-2008 period. The dependent variable is *Investment*, defined as capital expenditure in year *t* divided by the end-of-year *t-1* assets. We use two alternative measures of firm's availability of internal resources for investment. *Cash* is defined as cash holdings over prior year assets (columns (1), (3), (5)). *EBITDA* measures earnings before interest, tax, and depreciation in year *t* as a fraction of *t-1* total assets (columns (2), (4), (6)). See Table 3 for a description of the other independent variables included in the regressions. In columns (1) and (2) we measure firms' tax burden on corporate payouts (*Tax*) as the personal income tax rate on dividends (*Dividend Tax*). Columns (3) and (4) use the country-weighted effective tax rate (*Effective Tax C*), and columns (5) and (6) employ the country-weighted average tax rate (*Average Tax C*). Country-year interaction indicator variables are included in all specifications. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate		Country-Weighted Effective Tax Rate		Country-Weighted Average Tax Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Cash*Tax	0.0005**		0.0006*		0.0005*	
	(0.0002)		(0.0003)		(0.0002)	
EBITDA*Tax		0.0003		0.0010**		0.0009**
		(0.0003)		(0.0004)		(0.0003)
Cash	0.0014		0.0060		0.0028	
	(0.0060)		(0.0054)		(0.0063)	
EBITDA		0.0395***		0.0319***		0.0283***
		(0.0085)		(0.0075)		(0.0089)
Sales Growth	0.0213**	0.0188***	0.0213**	0.0188***	0.0213**	0.0188***
	(0.0011)	(0.0012)	(0.0011)	(0.0012)	(0.0011)	(0.0012)
Leverage	0.0331**	0.0366***	0.0331**	0.0366***	0.0332**	0.0365***
	(0.0030)	(0.0031)	(0.0029)	(0.0030)	(0.0029)	(0.0030)
Size	0.0062	0.0038	0.0060	0.0042	0.0062	0.0041
	(0.0041)	(0.0040)	(0.0041)	(0.0040)	(0.0041)	(0.0040)
Q	0.0013**	0.0013***	0.0013**	0.0013***	0.0013**	0.0013***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	81,222	81,222	81,222	81,222	81,222	81,222
R-squared	0.5688	0.5707	0.5687	0.5708	0.5687	0.5708

Table 7
Firm Investment and Internal Resources under Various Tax Regimes – Flexible Specifications

This table reports linear regression results for firm investment behavior, estimated over the 1990-2008 period. The dependent variable is *Investment*, defined as capital expenditure in year *t* divided by the end-of-year *t-1* assets. We use *Cash Flow* to measure firms' availability of internal resources for investment. *Cash Flow* is the ratio of cash flow in year *t* relative to prior year total assets. See Table 3 for a description of the other independent variables included in the regressions. In column (1) we measure firms' tax burden on corporate payouts (*Tax*) as the personal income tax rate on dividends (Dividend *Tax*). Column (2) uses the country-weighted effective tax rate (*Effective Tax C*), and column (3) employs country-weighted average tax rate (*Average Tax C*). Country-year interaction indicator variables are included in all three specifications. We also include the interaction of Cash Flow with both country and year indicator variables. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate	Country-Weighted Effective Tax Rate	Country-Weighted Average Tax Rate
	(1)	(2)	(3)
Cash Flow*Tax	0.0011**	0.0027***	0.0021***
	(0.0005)	(0.0008)	(0.0006)
Sales Growth	0.0158***	0.0157***	0.0157***
	(0.0011)	(0.0011)	(0.0011)
Leverage	0.0373***	0.0372***	0.0372***
	(0.0029)	(0.0029)	(0.0029)
Size	0.0035	0.0040	0.0038
	(0.0040)	(0.0040)	(0.0040)
Q	0.0009***	0.0009***	0.0009***
	(0.0001)	(0.0001)	(0.0001)
Firm FE	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Year FE*CashFlow	Yes	Yes	Yes
Country FE*CashFlow	Yes	Yes	Yes
Observations	81,222	81,222	81,222
R-squared	0.5803	0.5805	0.5804

Table 8
Firm Investment and Internal Resources under Various Tax Regimes – Cash Flow Percentile Ranks

This table reports linear regression results for firm investment behavior, estimated over the 1990-2008 period. The dependent variable is *Investment*, defined as capital expenditure in year *t* divided by the end-of-year *t-1* assets. We use the interaction of payout tax with the cash flow percentile rank (*CF Rank*) as explanatory variable. See Table 3 for a description of the other independent variables included in the regressions. Country-year interaction indicator variables are included in all specifications. In columns (2), (4), and (6) we also include the interaction of Cash Flow with both country and year indicators for the more demanding flexible specifications. Standard errors (shown in parentheses) allow for heteroskedasticity. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate		Country-Weighted Effective Tax Rate		Country-Weighted Average Tax Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
CF Rank*Tax	0.0008***	0.0008***	0.0012***	0.0013***	0.0010***	0.0010***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE*CashFlow	No	Yes	No	Yes	No	Yes
Country FE*CashFlow	No	Yes	No	Yes	No	Yes
Observations	81,222	81,222	81,222	81,222	81,222	81,222
R-squared	0.5795	0.5818	0.5795	0.5817	0.5796	0.5818

Table 9
External Equity Financing and Tax Regimes

This table presents linear regression results for external financing behavior, estimated over the 1990-2008 period. The dependent variable is the value of new equity issues to start-of-year book value of assets. Observations where the dependent variable exceeds 0.15 are excluded. See Table 3 for a description of the independent variables included in the regressions. In column (1) we measure firms' tax burden on corporate payouts (*Tax*) as the personal income tax rate on dividends (*Dividend Tax*). Column (2) uses the country-weighted effective tax rate (*Effective Tax C*), and column (3) employs the country-weighted average tax rate (*Average Tax C*). Coefficient estimates are based on baseline specifications with country-fixed effects and year-fixed effects. Standard errors (shown in parentheses) are heteroskedasticity-robust and clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate	Country-Weighted Average Tax Rate	Country-Weighted Average Tax Rate
	(1)	(2)	(3)
Tax	-0.0001***	-0.0002***	-0.0002***
	(0.0000)	(0.0001)	(0.0001)
Cash Flow	-0.0088***	-0.0089***	-0.0088***
	(0.0031)	(0.0031)	(0.0031)
Stock Price Appreciation	0.0112***	0.0112***	0.0112***
	(0.0009)	(0.0009)	(0.0009)
Sales Growth	0.0048***	0.0047***	0.0047***
	(0.0006)	(0.0006)	(0.0006)
Leverage	0.0085***	0.0085***	0.0085***
	(0.0017)	(0.0017)	(0.0017)
Size	0.0073***	0.0072***	0.0072***
	(0.0025)	(0.0025)	(0.0025)
Q	0.0006***	0.0006***	0.0006***
	(0.0001)	(0.0001)	(0.0001)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	33,280	33,280	33,280
R-squared	0.3819	0.3815	0.3819

Table 10
Old and New View Firms and the Link between Payout Taxes and Cash Flow

This table presents coefficient estimates for Cash Flow*Tax interaction using the country-weighted average tax rate (*Average Tax C*). We define firms as old view firms if predicted net proceeds from the sale/issue of common and preferred stock to lagged assets exceeds 2% (Panel A) or if previous years' sales of shares divided by lagged book assets exceeded zero (Panel B) or if the firm has low financial constraints (using the KZ Index of financial constraints, with a cutoff of 0.7, see text for detail). We predict issues of common stock by common share free float, share turnover, sales growth, leverage, market capitalization and Tobin's q. *b* is the coefficient estimate, (se) is the heteroskedasticity-robust standard error clustered by country-years, *t-stat* is the t-statistic of the significance of coefficient *b*, and *n* is the number of observations. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Panel A: Predicted Equity Issues

Category	b	(se)	[t-stat]	N
New view firms; predicted equity issues < 2%	0.1012	(0.0847)	[1.19]	21,614
Old view firms; predicted equity issues > 2%	0.2042**	(0.0952)	[2.14]	13,770

Panel B: Previous year Equity Issues

Category	B	(se)	[t-stat]	n
New view firms; last year equity issues = 0	0.1159	(0.0764)	[1.52]	24,734
Old view firms; last year equity issues > 0	0.2588***	(0.0879)	[2.94]	32,663

Panel C: KZ Index of Financial Constraints

Category	b	(se)	[t-stat]	n
New view firms; low financial constraints	0.0787	(0.0733)	[1.07]	25,004
Old view firms; high financial constraints	0.1991***	(0.0671)	[2.97]	25,003

Table 11
Corporate Governance and the Link between Payout Taxes and Cash Flow

This table presents coefficient estimates for Cash Flow*Tax interaction using the country-weighted average tax rate (*Average Tax C*). Firms are sorted into quartiles of insider ownership, and regressions are estimated separately for each quartile. *b* is the coefficient estimate, (se) is the heteroskedasticity-robust standard error clustered by country-years, *t-stat* is the t-statistic of the significance of coefficient *b*, and *n* is the number of observations.***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Quartile of insider ownership	Range of ownership	B	(se)	[t-stat]	n
Low ownership	0-0.8%	0.0012	(0.0010)	[1.19]	15,338
2	0.8%-5.0%	0.0016	(0.0010)	[1.62]	14,942
3	5.0%-19.4%	0.0014	(0.0009)	[1.55]	14,011
High ownership	19.4%-	0.0021**	(0.0009)	[2.46]	12,657

Table 12
Firm Investment and Internal Resources under Various Tax Regimes – Control for Corporate Income Tax

This table replicates regressions for investment behavior from Table 4, estimated over the 1990-2008 period, but features the corporate tax rate as an additional explanatory variable for investment. *Corporate Tax* is the statutory tax rate on corporate income. We additionally interact *CashFlow*, *CashFlow*CorporateTax*, and *CorporateTax* with the indicator variable *Imp*, which is equal to 1 for imputation tax systems and zero otherwise. Baseline regression controls are as in Table 4. Country-year interaction indicator variables and interactions between the corporate tax rate and cash flow are included in all specifications. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate	Country-Weighted Average Tax Rate	Country-Weighted Average Tax Rate
Cash Flow*Tax	0.0007*	0.0012**	0.0015***
	(0.0004)	(0.0006)	(0.0005)
CashFlow* CorporateTax	0.0016	0.0016	0.0017
	(0.0013)	(0.0014)	(0.0014)
CashFlow*Imp* CorporateTax	0.0048**	0.0045**	0.0044**
	(0.0019)	(0.0020)	(0.0020)
Baseline Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Observations	81,222	81,222	81,222
R-squared	0.5788	0.5788	0.5788

Table 13
Impact of Taxation on the Cash Flow Sensitivity of Investment – Robustness to Other Macroeconomic Determinants of Investment

This table reports coefficients for the cash flow*tax interaction in the linear regressions for firm investment behavior, estimated over the 1990-2008 period. Regression specifications are as in Table 8 but additional macroeconomic determinants of investment are included as controls. Those are *Subsidies, Grants, Social Benefits*, which include all government transfers on current account to private and public enterprises, and social security benefits in cash and in kind (Panel A); *Military Expenditure* as a fraction of GDP, which includes all current and capital expenditures on the armed forces (Panel B), *Sales and Turnover Tax*, which measure taxes on goods and services as a fraction of value added of industry and services (Panel C); and the *R&D Expenditure* as a fraction of GDP, which includes all expenditures for research and development covering basic research, applied research, and experimental development (Panel D). Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate	Country-Weighted Effective Tax Rate	Country-Weighted Average Tax Rate
	(1)	(2)	(3)
Panel A: Subsidies, Grants, Social Benefits			
Cash Flow *Tax	0.0012	0.0026***	0.0018**
	(0.0007)	(0.0007)	(0.0007)
Observations	41,577	41,577	41,577
R-squared	0.6044	0.6048	0.6045
Panel B: Military Expenditure			
Cash Flow *Tax	0.0008**	0.0021***	0.0016***
	(0.0004)	(0.0006)	(0.0005)
Observations	81,222	81,222	81,222
R-squared	0.5780	0.5781	0.5781
Panel C: Sales and Turnover Tax			
Cash Flow *Tax	0.0009	0.0024**	0.0012*
	(0.0007)	(0.0010)	(0.0007)
Observations	39,608	39,608	39,608
R-squared	0.6019	0.6021	0.6019
Panel D: R&D Expenditure			
Cash Flow *Tax	0.0004	0.0011*	0.0009*
	(0.0003)	(0.0005)	(0.0005)
Observations	61,963	61,963	61,963
R-squared	0.6128	0.6128	0.6128

Appendix

Table A.I
Firm Investment and Internal Resources under Various Tax Regimes – Tests without U.S. and Japan

This table replicates regressions for investment behavior from Table 4, estimated over the 1990-2008 period, but excludes firms from U.S. and Japan. Baseline regression controls are as in Table 4. Country-year interaction indicator variables are included in all specifications. In columns (2), (4), and (6) we also include the interaction of cash flow with both country and year indicator variables. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate		Country-Weighted Effective Tax Rate		Country-Weighted Average Tax Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Cash Flow *Tax	0.0017**	0.0044***	0.0021**	0.0055***	0.0013*	0.0040***
	(0.0007)	(0.0010)	(0.0009)	(0.0011)	(0.0007)	(0.0010)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year*CashFlow	No	Yes	No	Yes	No	Yes
Country*CashFlow	No	Yes	No	Yes	No	Yes
Observations	30,436	30,436	30,436	30,436	30,436	30,436
R-squared	0.5214	0.5262	0.5213	0.5262	0.5212	0.5261

Table A.II
Firm Investment and Internal Resources under Various Tax Regimes – Different Clusters

This table replicates regressions for investment behavior from Table 4, estimated over the 1990-2008 period, but with different clusters. Baseline regression controls are as in Table 4. Country-year interaction indicator variables and interactions between the corporate tax rate and cash flow are included in all specifications. Standard errors (shown in parentheses) allow for heteroskedasticity. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	25 Country Clusters			220 Country-Industry Clusters		
	(1) DivTax	(2) EffTaxC	(3) AvgTaxC	(4) DivTax	(5) EffTaxC	(6) AvgTaxC
Cash Flow*Tax	0.0011	0.0027**	0.0021**	0.0011*	0.0027***	0.0021***
	(0.0006)	(0.0011)	(0.0009)	(0.0006)	(0.0009)	(0.0008)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year*CashFlow	Yes	Yes	Yes	Yes	Yes	Yes
Country*CashFlow	Yes	Yes	Yes	Yes	Yes	Yes
Observations	81,222	81,222	81,222	81,222	81,222	81,222
R-squared	0.5803	0.5805	0.5804	0.5803	0.5805	0.5804

Table A.III
Firm Investment and Internal Resources under Various Tax Regimes – Alternative Measures of Investment

This table replicates regressions for investment behavior from Table 4, estimated over the 1990-2008 period, but uses growth in plant, property, and equipment from *t-1* to *t* as dependent variable (columns (1) to (3), Panel A). In Column (4) to (6), Panel A assets growth from *t-1* to *t* is the dependent variable. Regressions in columns (1) to (3), Panel B use capital expenditure in year *t* divided by the end-of-year *t-1* plant, property, and equipment (*Capex/PPE*) as dependent variable. In Column (4) to (6), Panel B, capital expenditure in year *t* divided by the end-of-year *t-1* fixed assets (*Capex/FA*) is the dependent variable. Baseline regression controls are as in Table 4. Country-year interaction indicator variables and interactions between the corporate tax rate and cash flow are included in all specifications. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Panel A: PPE Growth and Assets Growth

	PPE Growth			Assets Growth		
	(1) DivTax	(2) EffTaxC	(3) AvgTaxC	(4) DivTax	(5) EffTaxC	(6) AvgTaxC
Cash Flow*Tax	0.0041*	0.0097***	0.0081***	0.0043	0.0118**	0.0097**
	(0.0022)	(0.0036)	(0.0030)	(0.0033)	(0.0052)	(0.0044)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year*CashFlow	Yes	Yes	Yes	Yes	Yes	Yes
Country*CashFlow	Yes	Yes	Yes	Yes	Yes	Yes
Observations	77,626	77,626	77,626	81,222	81,222	81,222
R-squared	0.4392	0.4394	0.4394	0.5501	0.5502	0.5502

Panel B: Capex/PPE and Capex/FA

	Capex/PPE			Capex/FA		
	(1) DivTax	(2) EffTaxC	(3) AvgTaxC	(4) DivTax	(5) EffTaxC	(6) AvgTaxC
Cash Flow*Tax	0.2605**	0.6234***	0.5105***	0.0039*	0.0079**	0.0061**
	(0.1189)	(0.1626)	(0.1346)	(0.0022)	(0.0031)	(0.0025)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year*CashFlow	Yes	Yes	Yes	Yes	Yes	Yes
Country*CashFlow	Yes	Yes	Yes	Yes	Yes	Yes
Observations	78,911	78,911	78,911	80,969	80,969	80,969
R-squared	0.4350	0.4351	0.4351	0.4490	0.4491	0.4491

Table A.IV
Firm Investment and Internal Resources under Various Tax Regimes – Alternative Measures of Internal Resources

This table reports linear regression results for firm investment behavior, estimated over the 1990-2008 period. The dependent variable is *Investment*, defined as capital expenditure in year *t* divided by the end-of-year *t-1* assets. We use another alternative measure of firm's availability of internal resources for investment. *NetIncome* is defined as net income over prior year assets. *OpIncome* is defined as operating income over prior year assets. See Table 3 for a description of the other independent variables included in the regressions. Country-year interaction indicator variables are included in all specifications. We additionally include the interaction of NetIncome and OpIncome respectively with both country and year indicator variables. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country-years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	Dividend Tax Rate		Country-Weighted Effective Tax Rate		Country-Weighted Average Tax Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
NetIncome *Tax	0.0005		0.0012**		0.0010**	
	(0.0003)		(0.0006)		(0.0005)	
OpIncome *Tax		0.0005		0.0014**		0.0011**
		(0.0004)		(0.0006)		(0.0005)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year* Income	Yes	Yes	Yes	Yes	Yes	Yes
Country*Income	Yes	Yes	Yes	Yes	Yes	Yes
Observations	81,188	81,120	81,188	81,120	81,188	81,120
R-squared	0.5723	0.5747	0.5723	0.5747	0.5723	0.5747

Table A.V
Old and New View Firms and the Link between Payout Taxes and Cash Flow – Dividend Tax Rate

This table presents coefficient estimates for Cash Flow*Tax interaction using the dividend tax rate (*Dividend Tax C*). We define firms as old view firms if predicted net proceeds from the sale/issue of common and preferred stock to lagged assets exceeds 2% (Panel A) or if previous years' sales of shares divided by lagged book assets exceed zero (Panel B) or if the firm has low financial constraints (using the KZ Index of financial constraints, with a cutoff of 0.7, see text for details). We predict issues of common stocks by past issuances, free float, stock turnover, sales growth, leverage, size and Tobin's q. *b* is the coefficient estimate, (se) is the heteroskedasticity-robust standard error clustered by country-years, *t-stat* is the t-statistic of the significance of coefficient *b*, and *n* is the number of observations. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Panel A: Predicted Equity Issues

Category	b	(se)	[t-stat]	N
New view firms; predicted equity issues < 2%	0.0893	(0.0589)	[1.52]	21,614
Old view firms; predicted equity issues > 2%	0.1215*	(0.0625)	[1.94]	13,770

Panel B: Previous year Equity Issues

Category	B	(se)	[t-stat]	n
New view firms; last year equity issues = 0	0.1029	(0.0682)	[1.51]	24,734
Old view firms; last year equity issues > 0	0.1138	(0.0700)	[1.63]	32,663

Panel C: KZ Index of Financial Constraints

Category	b	(se)	[t-stat]	n
New view firms; low financial constraints	0.0315	(0.0689)	[0.46]	25,004
Old view firms; high financial constraints	0.1261**	(0.0509)	[2.48]	25,003

Table A.VI
Old and New View Firms and the Link between Payout Taxes and Cash Flow – Country-Weighted Effective Tax Rate

This table presents coefficient estimates for Cash Flow*Tax interaction using the country-weighted effective tax rate (*Effective Tax C*). We define firms as old view firms if predicted net proceeds from the sale/issue of common and preferred stock to lagged assets exceeds 1% (Panel A) or if precious years' sales of shares divided by lagged book assets exceed zero (Panel B) or if the firm has low financial constraints (using the KZ Index of financial constraints, with a cutoff of 0.7, see text for details). We predict issues of common stocks by past issuances, free float, stock turnover, sales growth, leverage, size and Tobin's q. *b* is the coefficient estimate, (se) is the heteroskedasticity-robust standard error clustered by country-years, *t-stat* is the t-statistic of the significance of coefficient *b*, and *n* is the number of observations. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Panel A: Predicted Equity Issues

Category	b	(se)	[t-stat]	N
New view firms; predicted equity issues < 2%	0.1125	(0.0945)	[1.19]	21,614
Old view firms; predicted equity issues > 2%	0.1899*	(0.1114)	[1.70]	13,770

Panel B: Previous year Equity Issues

Category	b	(se)	[t-stat]	n
New view firms; last year equity issues = 0	0.1698*	(0.0976)	[1.74]	24,734
Old view firms; last year equity issues > 0	0.2759***	(0.0878)	[3.14]	32,663

Panel C: KZ Index of Financial Constraints

Category	b	(se)	[t-stat]	n
New view firms; low financial constraints	0.1188	(0.0799)	[1.49]	25,004
Old view firms; high financial constraints	0.2330***	(0.0786)	[2.96]	25,003

Table A.VII
Corporate Governance and the Link between Payout Taxes and Cash Flow– Dividend Tax Rate

This table presents coefficient estimates for Cash Flow*Tax interaction using the statutory dividend tax rate (*Dividend Tax*). Firms are sorted into quartiles of insider ownership, and regressions are estimated separately for each quartile. b is the coefficient estimate, (se) is the heteroskedasticity-robust standard error clustered by country-years, t-stat is the t-statistic of the significance of coefficient b, and n is the number of observations.***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Quartile of insider ownership	Range of ownership	B	(se)	[t-stat]	n
Low ownership	0-0.8%	0.0009	(0.0009)	[1.0296]	15,338
2	0.8%-5.0%	0.0013*	(0.0007)	[1.7725]	14,942
3	5.0%-19.4%	0.0005	(0.0007)	[0.6666]	14,011
High ownership	19.4%-	0.0009	(0.0006)	[1.5839]	12,657

Table A.VIII
Corporate Governance and the Link between Payout Taxes and Cash Flow– Country-Weighted Effective Tax Rate

This table presents coefficient estimates for Cash Flow*Tax interaction using the country-weighted effective tax rate (*Effective Tax C*). Firms are sorted into quartiles of insider ownership, and regressions are estimated separately for each quartile. *b* is the coefficient estimate, (se) is the heteroskedasticity-robust standard error clustered by country-years, *t-stat* is the t-statistic of the significance of coefficient *b*, and *n* is the number of observations.***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Quartile of insider ownership	Range of ownership	b	(se)	[t-stat]	n
Low ownership	0-0.8%	0.0009	(0.0012)	[0.78]	15,338
2	0.8%-5.0%	-0.0001	(0.0011)	[-0.10]	14,942
3	5.0%-19.4%	0.0018*	(0.0010)	[1.91]	14,011
High ownership	19.4%-	0.0031***	(0.0009)	[3.50]	12,657

Table A.IX
Correlation between Tax Changes and Macroeconomic Factors

This table reports correlation coefficients for 444 country-year observations. *ΔDivTax* is the change in the dividend tax rate from t-1 to t. *ΔAvgTax* (*ΔEffTax*) represents the change in country-weighted average (effective) payout tax rate. As macroeconomic variables we include GDP Growth, subsidies, cost for startups (*Cost Startup*), inflation, military expenditures and R&D expenditures by the government. P-values are shown in parentheses. Insignificant correlations ($p \geq 0.1$) are reported in italics.

	ΔDivTax	ΔAvgTax	ΔEffTax	GDP Growth$_t$	GDP Growth$_{t-1}$	Subsidies	Cost Startup	Inflation	Military Expenditures	R&D Expenditures
ΔDivTax	1									
ΔAvgTax	0.936	1								
	(0.000)									
ΔEffTax	0.985	0.970	1							
	(0.000)	(0.000)								
GDP Growth	0.112	0.094	0.117	1						
	(0.018)	(0.048)	(0.014)							
GDP Growth$_{t-1}$	0.153	0.116	0.145	0.516	1					
	(0.001)	(0.015)	(0.002)	(0.000)						
Subsidies	*-0.023*	-0.011	-0.016	-0.238	-0.263	1				
	(0.685)	(0.849)	(0.778)	(0.000)	(0.000)					
Cost Startup	*-0.022*	*-0.022*	*-0.043*	0.236	0.158	*0.088*	1			
	(0.785)	*(0.790)*	*(0.603)*	(0.004)	(0.054)	*(0.311)*				
Inflation	*0.019*	*0.010*	*0.015*	-0.108	*-0.055*	-0.201	0.164	1		
	(0.688)	*(0.826)*	*(0.749)*	(0.019)	*(0.243)*	(0.000)	(0.045)			
Military Expenditures	*-0.024*	*-0.021*	*-0.022*	-0.029	*-0.056*	-0.150	*0.086*	*0.067*	1	
	(0.617)	*(0.667)*	*(0.652)*	(0.535)	*(0.235)*	(0.009)	*(0.293)*	*(0.143)*		
R&D Expenditures	*-0.020*	*-0.003*	*-0.001*	-0.218	-0.165	0.336	-0.568	-0.515	*0.038*	1
	(0.746)	*(0.968)*	*(0.987)*	(0.000)	(0.007)	(0.000)	(0.000)	(0.000)	*(0.541)*	