# The cash flow sensitivity of cash dividends in different dividend taxation systems[1]

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**Abstract**

This paper investigates the cash flow sensitivity of cash dividends in different cash dividend taxation systems. Using a cross-country study, we find that a firm's dividend policy in a single dividend taxation system (relative to a double dividend taxation system) is more sensitive to cash flow as measured by the propensity to initiate a cash dividend, propensity to pay a cash dividend, and in the size of the cash dividend. The cash flow sensitivity of cash dividends is asymmetric – firms in single taxation systems more aggressively adjust dividend policy when confronted with negative rather than positive cash flows. Our findings are qualitatively identical before and after the 2003 dividend tax cut in the United States.

# 1 Introduction

Dividend taxation policies differ by sovereign state. For example, in the United States firms pay corporate taxes on profit, distribute cash dividends from after-tax profit, and then individuals pay personal taxes on cash dividends.[2] We refer to the cash dividend taxation system of the United States as a double taxation system. In contrast, New Zealand and Australia use an imputation taxation system where an individual, who receives after corporate tax dividends, pays the difference between their personal and corporate tax rate on those cash dividends. Specifically, when a shareholder files their individual tax return, she includes an imputation credit against dividend income so that she is effectively taxed on the difference between the corporate and personal tax rates.[3] We refer to the cash dividend taxation systems of New Zealand and Australia as single taxation systems.[4]

This study broadly contributes to the literature regarding the influence of taxation systems on firm policies such as capital structure and investment.[5] More specifically, we investigate the influence of taxation policy on the cash flow sensitivity of cash dividends. Pattenden and Twite (2008) study the changes to firm dividend policy as the taxation system in Australia changed from a double taxation to an imputation taxation system.[6] They find that during this taxation system change, dividend initiations and payout levels increased, but Pattenden and Twite (2008) omit from their study changes in the cash flow sensitivity of dividends. In a cross country study, Jacob and Jacob (2013a) find a negative relationship between dividend tax levels and the cash flow sensitive of several measures dividend payouts, but do not measure dividend payouts as a percentage of cash flow. Also, they offer evidence that dividend payout policy is elastic to dividend tax rates.

Our study reveals that firm dividend policy in a single dividend taxation system (relative to a double dividend taxation system) is more sensitive to cash flow. Specifically, firms in taxation imputation systems respond more aggressively to cash flow as measured by the propensity to initiate a cash dividend, propensity to pay a cash dividend, and in the size of the cash dividend.

[2] In the United States, investors in most cases currently pay the capital gains tax rate of 15% on cash dividends.

[3] This condition holds for fully imputed dividends.

[4] For exposition purposes we refer to the cash dividend taxation systems of New Zealand and Australia as "single taxation systems."

[5] For a review of the literature see Hanlon and Heitzman (2010) and Shackelford and Shevlin (2001).

[6] In a related study, Rau and Vermaelen (2002) investigate changes in share repurchase decisions in the United Kingdom as the taxation system changed from an imputation to a double taxation system.

Our identification strategy is to compare firms in New Zealand to firms in the United States and firms in Australia to firms in the United States. In every case, the interactions between a country dummy variable (New Zealand or Australia) and firm cash flow is positive, statistically significant at less than the 1% level, and economically important in explaining the propensity to initiate and pay dividends as well as the size of the dividend. Overall, our results advance that the taxation system has an important effect on dividend policy.

The influence of the taxation system on the cash flow sensitivity of cash dividends is economically important.[7] For a New Zealand firm (relative to a United States firm) a one standard deviation increase in cash flow, implies a 31% increase in the propensity to initiate a dividend, a 23% increase in the propensity to pay a dividend, and a 32% increase in the dividend payout ratio.[8] To place these percentage changes in context, we interpret them relative to changes in standard deviations. Specifically, for a New Zealand firm (relative to United States firm) a one standard deviation increase in cash flow implies an increase of 0.08 standard deviations in the propensity to initiate a dividend, an increase of 0.27 standard deviations in the propensity to pay a dividend, and an increase of 0.22 standard deviations in the size of the dividend as measure by dividend payout ratio. The economic magnitudes are qualitatively similar when comparing Australian firms versus United States firms.

A firm in a imputation taxation system only accrues imputation credits through profit. As a result, firm dividend policy should reflect that stockholders prefer dividends with imputation credits to ones without imputation credits. Thus, a firm in a tax imputation system lacks the incentive to pay a dividend without positive cash flow. To explore if the sensitivity to cash flow is asymmetric, we decompose our cash flow measure into two variables – one with positive and the other with negative realizations of cash flow. Our tests support an asymmetric response of cash dividends to cash flow. For example, firms in imputation taxation systems more aggressively adjust dividend policy to negative cash flows than positive cash flows. An implication is that the dividend policy of New Zealand and Australian firms is less sticky than United States firms, which is driven in large part by the willingness to more aggressively adjust dividend policy in the face of negative cash flows.

[7]Our primary measure of cash flow is EBITDA to Total Assets.

[8]In our primary test we define the dividend payout ratio as cash dividends divided by EBITDA.

Our sample period is from 1989 through 2015. In the United States, the 2003 Jobs and Growth Tax Relief Reconciliation Act changed the personal dividend taxation rate for most investors to the long term capital gain rate of 15%.[9] For most investors, the act allowed them to retain more of their dividend income. For example, an investor that received a $100 dividend and is in the 33% tax bracket retained $66 in 2012 and $85 in 2003, representing an increase in after tax cash of approximately 29%. The survey evidence of Brav, Graham, Harvey, and Michaely (2005) suggests United States firms did not alter dividend policy after the 2003 dividend tax cut. Another strand of the literature suggests the dividend tax act prompted firms to increase dividends (Chetty and Saez, 2005, 2006, Poterba, 2004). If the act prompted US firms to increase the use and size of dividends, then our results should plausibly differ in periods before and after the dividend tax cut of 2003.

To investigate, we re-estimate our tests over the period 1989 through 2002 and 2004 through 2015. We obtain qualitatively similar results. More specifically, the differences in dividend cash flow sensitivity between New Zealand and Australian firms (relative to United States firms) are very close before and after the dividend tax cut of 2003. Thus, our findings are consistent with the survey evidence of Brav, Graham, Harvey, and Michaely (2005). We interpret our results as suggesting a tax change may need to exceed a *threshold* to change firm dividend policy. For example, if the tax act had decreased the dividend tax rate to 14%, which is lower than the long term capital gains rate of 15%, firms might have adjusted dividend policy behavior. From this perspective, we offer evidence that caution regarding interpreting tax policy changes on firm dividend policy responses using elasticities.

In our main empirical tests, we control for a number of firm characteristics including engagement in research in development, asset growth, size as measured by total assets, long term book debt, earned to common equity, industry, and year. Despite these controls there might be an omitted variable that is correlated with the interaction of cash flow and the country dummy. For example, suppose a United States firm compensates executives using stock options, but similar New Zealand and Australian firms do not. Because cash dividends decrease the stock price, a United States firm may distribute a smaller percentage of cash flow as cash dividends than comparable Australian and New Zealand firms. To control for time invariant firm heterogeneity,

[9] The 15% tax rate holds for investors in the marginal tax bracket of 25% or higher.

we follow Li, Griffin, Yue, and Zhao (2013) and use a hierarchical model.[10] The firm effect in the hierarchical model controls for firm level time invariant omitted variables of which executive compensation strategies plausibly fit under. In this robustness test, the coefficient estimates associated with the interaction of cash flow with country remain statistically significant at less than the 1% level. The economic magnitude of the effect of cash flow on the both the propensity to initiate and pay a dividend remains qualitatively similar. However, the economic magnitude of the effect of cash flow on the dividend payout ratio decreases by about 50%.[11] Although we can not rule out that there is a time varying omitted variable that drives our results, the idea that our findings support causality rather than correlation is reinforce by Pattenden and Twite (2008), who use the enactment of an imputation tax system in Australian as a natural experiment.

We conduct several additional robustness tests. First, we estimate all our tests using a different measure of cash flow (EBIT vs. EBITDA). Second, we conduct subsample analysis to see if our results are driven by regulations in the Utility Industry, greater proportion of technology companies in the United States sample, and the tendency of United States firms to not repatriate cash from international operations. Specifically, we estimate using three different sub-samples of firms where we: i) drop firms in the Utility Industry, ii) drop firms engaged in R&D, and iii) drop United States firms with international operations. Third, to further check if our results are due to sample selection issues, we use propensity score matching to estimate differences between the United States and New Zealand and Australia, respectively. The results from these three tests are qualitatively identical to the main results.

Our study contributes to the extensive literature on cash flow sensitivity. Fazzari, Hubbard, and Petersen (1988) advance that firms with high cash flow sensitivity of investment are more financially constrained. Likewise, Almeida, Campello, and Weisbach (2004) propose that the cash flow sensitivity of cash measures financial constraints. Lintner (1956) advances that firms seek to pay a constant stream of dividends, which implies firms first choose a dividend level and then choose other uses for cash flow – dividends are first order. Consistent with the idea that dividends are first order, Almeida, Campello, and Weisbach (2004) deduct dividends from

[10]In our study, each firm is perfectly correlated with country, so it is not possible to use firm fixed effects. In a cross country setting, Li, Griffin, Yue, and Zhao (2013) test for the effect of culture on risk taking and need to estimate the influence of both firm characteristics and country level cultural characteristics on firm risk taking.

[11]A one standard deviation increase in cash flow implies a 16% (rather than 32%) increase in the dividend payout ratio.

their cash flow measure then test the cash flow sensitivity of cash. Our evidence that firms in imputation taxation systems more aggressively adjust dividends to cash flow (especially negative cash flow realizations) suggests that the cash flow measure of Almeida, Campello, and Weisbach (2004) may be correct in the United States but should not include a deduction for dividends in dividend imputation taxation systems.

The remainder of the paper is structured as follows. Section 2 briefly reviews the literature on dividend payments and its determinants. Section 3 shows the difference in taxation policy between a single and double taxation system as well as develops hypotheses. Section 4 describes the dataset and variable construction. Section 5 details the methodology used in our analysis and tests the hypotheses. Section 6 tests the results for robustness to alternative samples, methods, and specifications. Section 7 concludes.

## 2 Literature Review

Analysis of dividend policy is motivated by the dividend irrelevance proposition of Miller and Modigliani (1961). They demonstrate that in a frictionless market investors are not concerned with the firm's dividend policy as they can choose to sell a portion of their portfolio for cash (homemade dividends). This allows investors to replicate the payout of a firm that pays dividends (provided both firms are identical in all aspects apart from their dividend policy). Since the payouts are the same, the investor is indifferent to whether a firm pays dividends; implying, the value of the firm remains unchanged, making firm dividend policies irrelevant. The propensity of firms to pay dividends (despite the irrelevance proposition) is known as the "Dividend Puzzle" (Black, 1976). This section briefly discusses dividend smoothing, why firms pay dividends, and the effect of taxes on firm dividend policy.

### 2.1 Dividend smoothing

Lintner (1956) investigates the tendency of firms to maintain a stable dividend policy. He advances that managers believe the market places a high premium on firms with a stable dividend policy, which creates the incentive for managers to smooth dividends. Leary and Michaely (2011) use alternative econometric methods to Lintner's original model to estimate dividend smoothing. They document an increase in dividend smoothing over the last 80 years and show that dividend smoothing is most common among firms that are not financially constrained. On the other hand, they show that smaller and younger firms with lower dividend yields, volatile earnings and returns, as well as firms with fewer or more dispersed analyst forecasts smooth less. While Leary and Michaely (2011) explore dividend smoothing, they do not study the effect of taxation policies on dividend smoothing.

## 2.2 Why do firms pay dividends?

Black's (1976) "Dividend Puzzle" precipitated many theories on why firms pay a dividend including the Jensen (1986) agency theory, the DeAngelo and DeAngelo (2006) life cycle theory, as well as a large number of signaling theories.

Firms may pay dividends to overcome agency issues. Jensen's agency theory suggests that managers may not act in the best interest of shareholders. Shareholders want management to act in a way that increases shareholder wealth, but managers may aim to maximize their own utility, either by growing the company to increase power and compensation or by funding private benefits. As such, managers may use free cash flows to achieve these objectives(Yermack, 2006). As a result, conflicts of interest arise between managers and shareholders regarding the use of free cash flows. Jensen (1986) advocates that firms with free cash flow increase debt and distribute excess cash through dividends, which reduces the amount of free cash available to the manager. Also, should the firm not uphold its promise of interest and principal payments the debtholders may exercise the control right to take the firm into bankruptcy court – a threat which decreases the managers incentive to engage in moral hazard. The use of debt with cash dividends as a means to discipline the behavior of managers is more important in larger firms with large cash flows and low growth prospects (Jensen, 1986).

Firms may pay dividends to signal quality. Theories about signaling using dividends advance that managers elect to pay a dividend to communicate positive information about a firm's performance to investors (Bhattacharya, 1979, Hakansson, 1982, Miller and Rock, 1985). Companies increase dividend payouts as an indicator that the firm is doing well. Signaling is a costly way of communicating information. Under signaling theories, weak firms are not able to follow strong firms that pay dividends, leaving only strong companies paying out large or stable dividends.

Firms may pay dividends to return cash to shareholders as investment opportunities change over the firm's life cycle. DeAngelo and DeAngelo (2006) suggest that the optimal payout policy is driven by the need to distribute firm's free cash flow. DeAngelo and DeAngelo (2006) proposed a life cycle theory based on the Jensen (1986) agency theory, Fama and French (2001) and Grullon, Michaely, and Swaminathan (2002) firms opportunity set theory. DeAngelo and DeAngelo (2006) suggest that firms pay fewer dividends when investment opportunity exceeds internal capital. In contrast, when internal capital exceeds investment opportunities, firms return free cash flows through dividends for shareholders. Consistent with the life cycle theory, DeAngelo and DeAngelo (2006) find that the propensity to pay dividends is positively related to the ratio of retained earnings to equity, their primary proxy for a firm's life cycle stage.

Denis and Osobov (2008) explore the international evidence on the determinants of dividend policies. They find that the propensity to pay dividends is higher among large profitable firms for which retained earnings comprise a large fraction of total equity. Thus, their international evidence supports the US evidence of DeAngelo, DeAngelo, and Skinner (2004). Denis and Osobov (2008, page 63) argue against signaling theories and write:

> Moreover, dividends are concentrated among the largest, most profitable, payers in all six countries. This concentration casts further doubt on signaling as a first-order determinant of dividends in that dividends appear to be paid by precisely those firms that are least in need of signaling their profitability (i.e., those with the highest earnings).

Other studies find evidence consistent with signaling. Motivated by tax differences between Hong Kong (no taxes on dividends) and US firms, Chemmanur, He, Hu, and Liu (2010) study differences in dividend smoothing between the two countries. Chemmanur, He, Hu, and Liu (2010) argue that the lack of dividends on taxes and high concentrated ownership imply that changes to dividends are less costly in Hong Kong than the US. In other words, due to the tax differences, dividends are a costly signal for US firms, but not for Hong Kong firms. Although the need for signaling should increase with dispersed ownership (higher information asymmetry), Chemmanur, He, Hu, and Liu (2010) find no effect from ownership concentration on dividend policy. However, Dewenter and Warther (1998) find that the information environment of Japanese firms affects dividend policy. Hail, Tahoun, and Wang (2014) find that an improvement in the information environment through the adoption of IFRS accounting standards results in fewer dividend initiations and more dividend cuts. Lastly, He, Ng, Zaiats, and Zhang (2017) find that firms in countries with relatively weak investor protections use dividends to decrease agency issues. Overall, these studies advance that signaling through dividends plays a role in firm dividend policy.

### 2.3 Taxes and dividend policy under alternative taxation systems.

In their influential survey paper, Brav, Graham, Harvey, and Michaely (2005, page 487) write:

> Executives indicate that taxes are a second-order payout policy concern. Most say that tax considerations are not a dominant factor in their decision about whether to pay dividends or increase dividends, or in their choice between payout in the form of repurchases or dividends.[12]

Their conclusions are based on survey evidence of US financial executives. Another strand of the literature suggests the dividend tax act prompted firms to increase dividends (Chetty and Saez, 2006, 2005, Poterba, 2004). Due to the lack of clarity regarding the effect of the 2003 dividend tax reduction on US firm payout policy, we conduct a sub-sample analysis as a robustness test.

Taxation policies vary across nations. Firms aim to maximize after tax shareholder wealth, which implies minimizing the taxation impact to both the firm and investors. While Denis and Osobov (2008) explore the reasons firms in six countries pay dividends, they do not study the effect of taxation policies on the propensity to pay dividends. To address the influence of taxation on payout policy, Jacob and Jacob (2013b) construct a measure of the dividend tax penalty for twenty-five countries and show that share repurchases increase with the dividend tax penalty. Also, Jacob and Jacob (2013a) advance that the cash flow sensitivity of dividends decreases with the dividend tax rate. Thus, there finding suggest firm dividend policy is elastic to tax rate changes.

Dividend imputations help to reduce the effect of taxation on cash dividends through a credit system that reduces double taxation on the firm's profits. Pattenden and Twite (2008) explore changes in dividend policy during the introduction of the imputation system in Australia. Under a dividend imputation system, shareholders are given credits for the corporate taxes paid, which

[12] According to Google Scholar, Brav, Graham, Harvey, and Michaely (2005) has been cited 1909 times as of 10 August 2017.

may be used to offset their personal income tax on cash dividends. Using this change in the dividend tax system as a natural experiment, Pattenden and Twite (2008) find that dividend initiations, payout measures, and dividend reinvestment plans increase with the introduction of a dividend imputation taxation system. Their findings are consistent with firms preferences for the distribution of cash dividends under a imputation taxation system and suggest that firm dividend policy may be more influenced by tax policies than the US evidence suggests in Brav, Graham, Harvey, and Michaely (2005).

# 3 Taxation policy and hypothesis development

## 3.1 Taxation policies

Table 1 provides four scenarios of a firm, who earns \$100 in pre-tax profit, and chooses to distribute the entire profit as a cash dividend under taxation scenarios. Without loss of generality, we assume there is one investor with one share. Columns (1) through (3) represents the New Zealand imputation tax system with an imputed dividend percent of 100%, 0%, and 80%, respectively. Column (2) is equivalent to a double taxation system. Column (4) represents the tax system in the United States.

Under an imputation system the investor receives tax credits for the taxes paid by the firm on profits. As a result, the investor only pays the difference between her personal tax rate and the corporate tax rate as shown in Column (1). As such, the investor receives 67% of the total firm's profits. In comparison, under the New Zealand counter-factual double taxation system in Column (2), the investor only receives 48% of the firm's profits. This is because the investor pays 33% tax on the dividend she receives, which is in addition to the firm paying tax on its profits. In Column (3) represents hybrid of Columns (1) and (2). In this case, the This results in the investor only receiving 48% of the firms original profits, which in absolute terms 19% less than that of an investor under an imputation system.

The United States uses a double dividend taxation system. Dividends are incorporated into an investor's annual income, which is subject to tax rate of 15%. Column (4) of Table 1 provides an example of an investor living in the United States with an annual income of at least 40,000 \$US, which places the investor in the 25% marginal tax bracket where the 15% dividend tax applies. For illustrative purposes, we assume a 35% corporate tax rate. In the double taxation system of the United States, the investor in the United States receives 55% of the firms profits. As a result, dividends in the United States are effectively taxed twice. This makes cash dividends less attractive for a United States investor as compared to investors in dividend imputation taxation systems.

The investor retention rate shown at the bottom of Table 1 is

$$\text{Investor retention rate} = \alpha(1 - \tau_P) + (1 - \alpha)(1 - \tau_C)(1 - \tau_P), \tag{1}$$

where $\alpha$ is the imputation percentage, $\tau_P$ the personal tax rate, $\tau_C$ the corporate tax rate. In a 100% imputation setting $\alpha = 1$ and investors retain $1 - \tau_P$ of firm profits that are distributed via dividends. In a double taxation (0% imputation setting) $\alpha = 0$ and investors retain $(1 - \tau_C)(1 - \tau_P)$ of firm profits that are distributed via dividends. When dividends are not fully imputed, Equation (1) shows that the investor retention rate is a weighted average of single and double taxation systems.[13]

### 3.2 Hypotheses

Our example in Table 1 motivates our hypotheses. In summary, if a New Zealand firm with $100 in pre-tax profit chooses to distribute that profit as cash, the New Zealand investor nets $67. In contrast, if a United States firm with $100 in profit chooses to distribute that profit as cash, the United States investor nets $55. The $12 difference illustrates that the distribution of firm profits through cash dividends is relatively less costly in dividend imputation tax systems than in double dividend tax systems. From this perspective, we posit that the sensitivity of cash flow to firm dividend policy is higher in imputation taxation systems than in double dividend tax systems. This idea leads to the following hypotheses:

**Hypothesis 1.** *The sensitivity to cash flow in explaining the propensity to initiate dividends is higher in single dividend taxation systems than in double dividend tax systems, ceterus paribus.*

**Hypothesis 2.** *The sensitivity to cash flow in explaining the propensity to pay dividends is higher in single dividend taxation systems than in double dividend tax systems, ceterus paribus.*

[13]The total tax rate on firm profits distributed through dividends is $\alpha\tau_P + (1 - \alpha)[1 - (1 - \tau_C)(1 - \tau_P)]$. See Appendix A.1 for the derivation.

**Hypothesis 3.** *The sensitivity to cash flow in explaining dividend size is higher in single dividend taxation systems than in double dividend tax systems, ceterus paribus.*

In a imputation taxation system, a firm only earns imputation credits through positive profit. Firm dividend policy should reflect the fact that stockholders prefer dividends with imputation credits to ones without imputation credits.[14] Thus, a firm in a imputation taxation system lacks the incentive to pay a dividend without positive cash flow, which leads to the following hypothesis.

**Hypothesis 4.** *The sensitivity to negative versus positive cash flow realizations in explaining the propensity to initiate and pay dividends as well as dividend size is higher in single dividend taxation systems than in double dividend tax systems, ceterus paribus.*

# 4 Data and Variable Construction

## 4.1 Data

We collect firm level data using Compustat Global Fundamentals Annual for firms in New Zealand and Australian and North American Fundamentals Annual for firms in the United States. Data includes information on dividend payment, total assets, number of outstanding shares and also common equity. We follow filters used in prior literature and drop firm-year observations with negative total assets or revenue. In keeping with the methodology of Fama and French (2001), we eliminate financial companies (SIC codes 6000-6999). While Fama and French (2001) also eliminate utility companies (SIC codes 4900-4949) from their analysis, the importance of utility companies in New Zealand precludes their initial removal as this would eliminate approximately 25% of the New Zealand observations. After completing these filters, out dataset includes 191 New Zealand firms with 2,028 firm-year observations, 2,339 Australian firms with 23,332 firm-year observations and 15,217 United States firms with 140,536 United States firm-year observations with a data from 1989 to 2015.[15] Our sample of New Zealand,

[14]In New Zealand, individual investors at the top marginal tax rate would pay 5% on fully imputed dividends versus 33% on dividends with no imputation credits.

[15]The number of observations is from the regressions conducted in Table 6.

Australian, and United states firms is much larger than the sample from these countries used in Jacob and Jacob (2013a).[16] All variables are winsorized at the 1% level in both tails.

In the sections below, please refer to Table 2 for variable definitions and to Table 3 for summary statistics. The summary statistics are broken out by New Zealand, Australian, and United States firms.

### 4.1.1 Dependent Variables

To test the sensitivity of cash flow on the propensity to initiate a dividend, we construct the variable *Initiate Dividend (0/1)* which is set to one when when the firm pays a dividend in year $t$, but did not pay a dividend in year $t-1$. All other firm-year values are set to zero. Table 3 shows that during the sample period 5.96% of New Zealand firms, 3.97% of Australian firms, and 3.25% of United States firms initiate a dividend.

To test the sensitivity of cash flow on the propensity to pay dividends, we construct *Pay Dividend (0/1)* which is set to one if the firm pays a dividend and zero otherwise. For US firms, Compustat North America Fundamental Annual records a dividend of zero when a firm does not report a dividend payment. For New Zealand and Australian data, Compustat Global Fundamental Annual reports cash dividends, but records as missing cash dividends of zero. To correct, for New Zealand and Australian firms we set *Pay Dividend (0/1)* to zero if the value is recorded as missing. This edit applies only to New Zealand and Australian observations. Table 3 shows that during the sample period 57.6% of New Zealand, 26.6% of Australian, and 31.0% of US firms pay a dividend.

To test the sensitivity of cash flow on the size of the dividend, we use the *Dividend Payout Ratio* as a measure of the size of the dividend. The common definition of the dividend payout ratio is dividends per share divided by the earnings per share, which is equivalent to dividends divided by earnings. Because our paper is focused on the sensitivity of dividends to cash flow, in our main tests we construct *Dividend Payout Ratio* as *Cash Dividends* divided by *EBITDA*. We construct a second version of the *Dividend Payout Ratio* as *Cash Dividends* divided by *EBIT*. Our tests explain dividends as a percentage of cash flow. In contrast, Jacob and Jacob

[16]The sample in Jacob and Jacob (2013a) study consists of 24 New Zealand firms with 224 firm-year observations, 262 Australian firms with 1,777 firm-year observations and 2,639 United States firms with 26,142 United States firm-year observations with a data from 1989 to 2015.

(2013a) measure dividend payout the as a percentage of the market value of equity.[17] Table 3 shows that during the sample period the mean *Dividend Payout Ratio* using *EBITDA* is 18.8% for New Zealand firms, 7.69% for Australian firms, and 5.99% for US firms whereas the mean *Dividend Payout Ratio* using *EBIT* is 25.9% for New Zealand firms, 9.95% for Australian firms, and 8.21% for US firms.

#### 4.1.2 Cash flow sensitivity

The literature on the sensitivity of cash flow to financial policies is extensive. We briefly comment on the literature to motivate our tests. Lintner (1956) advances that firms seek out a "relatively fixed percentage pay-out." Lintner (1956, Page 97) writes:

> . . . , savings in a given period generally are largely a by-product of dividend action taken in terms of pretty well practices and policies; dividends are rather seldom a by-product of current decisions regarding the desired magnitude of savings as such.

From this perspective, dividends represent a first order decision in the sense that a firm first chooses a dividend level and then subsequently chooses other cash policies. In other strands of the literature cash flow decisions indicate financial constraints. For example, Fazzari, Hubbard, and Petersen (1988) advance that firms with higher cash flow sensitivity to investment are more financially constrained. Likewise, Almeida, Campello, and Weisbach (2004) propose the cash flow sensitivity of cash as a measure of financial constraint. However, consistent with the idea that dividends are a first order decision, Almeida, Campello, and Weisbach (2004) definition of cash flow excludes dividends.[18]

Relative to our research questions both EBITDA and EBIT represents cash that might be distributed by the firm to shareholders. To test the sensitivity of cash flow on cash dividend policy, we construct *EBITDA to Assets* as an independent variable. In robustness tests, we test using *EBIT to Assets*.[19] To control for other country specific effects, we construct the indicator variables *New Zealand (0/1)* and *Australia (0/1).* To test differences between countries in the sensitivity of cash flow to dividend policy, we construct the iterations *EBITDA to Assets* ∗

[17] For this alternative measure, cash dividends increase both the numerator (dividends) and the denominator (market value).

[18] Almeida, Campello, and Weisbach (2004, page 1787) define "*CashFlow* as the ratio of earnings before extraordinary items and depreciation (minus dividends) to totals assets . . . "

[19] In Compustat Operating Income and EBITDA are equivalent.

*NZ* and *EBITDA to Assets* $*$ *AUS*. In our tests, the coefficient associated with the interaction terms represents the difference in the sensitivity to cash flow of dividend policy in an single (New Zealand or Australia) versus double (United States) dividend tax system.

#### 4.1.3 Control Variables

In our testing, we use several controls. Denis and Osobov's (2008) show that the likelihood of paying dividends is associated with firm size, growth opportunities and profitability. There is also a strong association with the ratio of retained earnings to total equity. Due to difference is technological intensity between companies listed in New Zealand and Australia, we construct *R&D to Assets*. If a firm does not report R&D, Compustat records the value as missing. We set missing R&D to zero for New Zealand, Australia, and US firm-year observations. Consistent with the importance of controlling for R&D, Table 3 shows that during the sample period the mean *R&D to Assets* is 1.94% for New Zealand firms, 1.58% for Australian firms, and 6.19% for US firms.

Cash required for asset growth and interest payments may limit the ability of a firm to pay dividends. A firm with high asset growth has less cash available for distribution to shareholders. To control for firm demand for internal financing, we construct *Asset Growth*. Table 3 reports that during the sample period the mean *Asset Growth* is 3.59% for New Zealand firms, -0.39% for Australian firms, and 3.53% for US firms. Likewise, firms with high levels of debt most pay creditors ahead of stockholders. To control for the cash demands of debt, we construct *LT Book Debt to Assets*.

Large firms are likely more mature in their life cycle and less financially constrained. We construct *Total Assets* to control for size. In constructing our variable, we take the natural logarithm of total assets. Table 3 shows that during the sample period the mean *Total Assets* is 4.77 for New Zealand firms, 3.41 for Australian firms, and 4.69 for US firms. To control for firms with a large stock of retained versus common equity, we construct *Earned to Common Equity*. These firms have reach a point in their lifecycle where they are more able to distribute dividends.

To control for industry differences in dividend policy, we assign each firm to one of ten Fama and French (1997) Industries and construct a matrix of indicator variables *Industry*. To control for changes in macroeconomic conditions and other time effects, we construct a matrix of year indicator variables *Year*.

## 5 Testing Approach and Results

The general structure of our testing model is:

$$Y_{it} = f(\alpha + \beta CF_{it} + \lambda Country_i + \delta CF_{it} * Country_i + \mathbf{X}\beta + \epsilon_{it}), \tag{2}$$

where $i$ represents the firm and $t$ represents the year. When testing Hypotheses 1 and 2, $Y_{it}$ is either *Initiate Dividend (0/1)* and *Pay Dividend (0/1)*, respectively and the functional form $f(.)$ is logistic. When testing Hypothesis 3, $Y_{it}$ is *Dividend Payout Ratio* and the functional form $f(.)$ is linear. In our main testing $CF$ (Cash Flow) is measured as *EBITDA to Assets*, but in robustness testing we define cash flow as *EBIT to Assets*. $Country_i$ is either the indicator variable *New Zealand (0/1)* or *Australia (0/1)*, respectively. The variable of interest is the interaction term $CF_{it} * Country$ where $\delta$ represents the cash flow sensitivity of the firm in a dividend imputation system relative to a double taxation system. $\mathbf{X}\beta$ represents matrix of controls including *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, *Earned to Common Equity*, *Industry*, and *Year*. Lastly, $\alpha$ represents the constant term in the regression and $\epsilon_{it}$ is the error term. We cluster standard errors by firm.

In Section 5.4, we test for an asymmetric response to positive and negative cash flow realizations and estimate

$$\begin{aligned} Y_{it} = & f(\alpha + \beta_1 CF^+_{it} + \beta_2 \mid CF^-_{it} \mid + \lambda Country_i + \mathbf{X}\beta \\ & + \delta_1 CF^+_{it} * Country_i + \delta_2 \mid CF^-_{it} \mid * Country_i + \epsilon_{it}), \end{aligned} \tag{3}$$

where $CF^+_{it}$ represents non-negative realizations of cash flow (and zero otherwise) and $\mid CF^-_{it} \mid$ represents the absolute value of negative realizations of cash flow (and zero otherwise). $\beta_1$ and $\beta_2$ represent dividend sensitivities to positive and negative cash flow realizations. $\delta_1$ and $\delta_2$ represent the differences in sensitivities to positive and negative cash flow realizations (in a dividend imputation versus a double taxation system).

In robustness testing, we modify our base testing model. In Section 6.6, we estimate

$$Y_{it} = f(\alpha + \beta CF_{it} + \lambda Country_i + \delta CF_{it} * Country_i + \mathbf{X}\beta + \mu_i + \epsilon_{it}), \tag{4}$$

where $\mu_i$ is a firm effect. Because $\mu_i$ is perfectly correlated with $Country_i$, we can not use fixed effects. Rather, we follow Li, Griffin, Yue, and Zhao (2013) estimate a hierarchical linear model where $\mu_i$ is a random intercept, which controls for time invariant firm heterogeneity.

### 5.1 Testing Hypothesis 1 – Initiate dividend

Table 4 shows estimation results of Eq. (2) where the dependent variable is *Initiate Dividend (0/1)* and the functional form is logistic. Columns (1), (2), and (3) report estimation results for subsamples of New Zealand, Australia, and the United States firms, respectively. Consistent with prior literature, the coefficient associated with *EBITDA to Assets* is positive and statistically significant at less than the 1% level in each country subsample. Column (4) reports results for the sample consisting of both New Zealand and United States firms. Likewise, Column (5) reports results for the sample consisting of both of Australia and United States firms. Columns (4) and (5) report that the coefficients associated with *EBITDA to Assets* $*$ *NZ* and *EBITDA to Assets* $*$ $AUS$ are both positive and statistically significant at less than the 1% level, which indicates that the sensitivity of cash flow in explaining the propensity to initiate dividends is higher in single dividend tax systems (New Zealand and Australia) than in double dividend tax systems, ceterus paribus, which supports Hypothesis 1.

In a LPM (Linear Probability Model) regression coefficients represent marginal effects. In contrast, the marginal effects estimated from the Logit Model change over the domain of a non-linear CDF (Cumulative Density Function). Because the coefficients in a LPM are easy to interpret, we estimate a LPM of Eq. (2) where the dependent variable is *Initiate Dividend (0/1)* and use the coefficient estimates from the LPM to assess economic importance. In the estimated LPM, the coefficients associated with *EBITDA to Assets* $*$ *NZ* and *EBITDA to Assets* $*$ $AUS$ are 0.077 and 0.057, respectively. Both coefficients are statistically significant at less than the 1% level. To understand the economic importance of these coefficients, we evaluate changes in the propensity to initiate a dividend from a one standard deviation increase in cash flow.

For New Zealand firms, a one standard deviation increase in *EBITDA to Assets*, implies a 1.8% (0.077*0.236) increase in the *Initiate Dividend (0/1)* relative to US firms, which represents a 31% increase from the New Zealand mean *Initiate Dividend (0/1)* of 5.96%. Also, the 5.96% increase is equivalent to an increase of 0.08 (0.018/0.237) standard deviations of *Initiate Dividend (0/1)* for New Zealand firms. For Australian firms, a one standard deviation increase in *EBITDA to Assets*, implies a 2% (0.056*0.353) increase in the *Initiate Dividend (0/1)* relative to US firms. This represents a 50% increase from the Australian mean *Initiate Dividend (0/1)* of 3.97%. Also, the 3.97% increase is equivalent to an increase of 0.10 (0.02/0.195) standard deviations of *Initiate Dividend (0/1)* for Australian firms. We find slightly larger economic magnitudes using Logit estimation.[20] Overall, the sensitivity to cash flow in explaining the propensity of New Zealand and Australian firms to initiated dividends relative to US firm is economically important.

## 5.2 Testing Hypothesis 2 – Pay dividend

Table 5 shows estimation results of Eq. (2) where the dependent variable is *Pay Dividend (0/1)* and the functional form is logistic. Columns (1), (2), and (3) report estimation results for New Zealand, Australia, and the United States firms, respectively. Consistent with prior literature, the coefficient associated with *EBITDA to Assets* is positive and statistically significant at less than the 1% level in each country subsample. Column (4) reports estimation results for the sample consisting of both New Zealand and United States firms. Likewise, Column (5) reports results for the sample consisting of both of Australia and United States firms. Columns (4) and (5) report that the coefficients associated with *EBITDA to Assets* $*$ *NZ* and *EBITDA to Assets* $*$ *AUS* are both positive and statistically significant at less than the 1% level, which indicates that the sensitivity of cash flow in explaining the propensity to pay dividends is higher in single dividend tax systems (New Zealand and Australia) than in double dividend tax systems, ceterus paribus, which supports Hypothesis 2.

[20] Using our Logit estimation results, we estimate marginal effects at the variable means. The marginal effect of cash flow on dividend initiation for US firms is $\frac{dy}{dx}$ =0.017, which is estimated from the coefficient associated with *EBITDA to Assets*. The marginal effect of cash flow on dividend initiation for New Zealand firms is $\frac{dy}{dx}$ =0.13, which represents the combined effects of coefficients associated with *EBITDA to Assets* and *EBITDA to Assets* $*$ *NZ*. The difference of approximate 0.11 represents the incremental effect of cash flow on dividend initiation for New Zealand relative to US firms. Likewise, the marginal effect of cash flow on dividend initiation is 0.015 for US and 0.086 for Australian firms (difference of 0.071), respectively.

To interpret the economic magnitudes cash flow on the propensity to pay a dividend, we again estimate a LPM of Eq. (2) where the dependent variable is *Pay Dividend (0/1)*. In the estimated LPM, the coefficients associated with *EBITDA to Assets* $*$ *NZ* and *EBITDA to Assets* $*$ *AUS* are 0.561 and 0.249, respectively. Both coefficients are statistically significant at less than the 1% level. To understand the economic importance of these coefficients, we evaluate changes in the propensity to pay a dividend from a one standard deviation increase in cash flow.

For New Zealand firms, a one standard deviation increase in *EBITDA to Assets*, implies a 13.2% (0.56*0.236) increase in the *Pay Dividend (0/1)* of New Zealand firms relative to US firms, which represents a 23% increase from the New Zealand mean *Pay Dividend (0/1)* of 57.6%. Also, the 23% increase is equivalent to an increase of 0.27 (0.132/0.494) standard deviations of *Pay Dividend (0/1)* for New Zealand firms. Likewise, a one standard deviation increase in *EBITDA to Assets*, implies a 8.8% (0.249*0.353) increase in the *Pay Dividend (0/1)* relative to US firms, which represents a 33% increase from the Australian mean *Pay Dividend (0/1)* of 26.6%. Also, the 33% increase is equivalent to an increase of 0.20 (0.088/0.442) standard deviations of *Pay Dividend (0/1)* for Australian firms. Again, we find larger economic magnitudes using Logit estimation.[21] All in all, our evidence shows the economic magnitude of the sensitivity of cash flow in explaining the propensity to pay dividend for New Zealand and Australian firms (relative to US firms) is large when measured in either percentage or standard deviation terms.

### 5.3 Testing Hypothesis 3 – Size of dividend

Table 6 shows estimation results of Eq. (2) where the dependent variable is *Dividend Payout Ratio* and the functional form is linear. Columns (1), (2), and (3) report estimation results for New Zealand, Australia, and the United States firms, respectively. Consistent with prior literature, the coefficient associated with *EBITDA to Assets* is positive and statistically significant at less than the 1% level in each country subsample. Column (4) reports estimation results for the sample consisting of both New Zealand and United States firms. Likewise, Column (5)

[21] We also estimate marginal effects from the Logit Model. The marginal effect of cash flow on the propensity to pay a dividend for US firms is $\frac{dy}{dx}$ =0.371, which is estimated from the coefficient associated with *EBITDA to Assets*. The marginal effect of cash flow on propensity to pay a dividend for New Zealand firms is $\frac{dy}{dx}$ =1.614, which is estimated from both the coefficients associated with *EBITDA to Assets* and *EBITDA to Assets* $*$ *NZ*. The difference of approximately 0.70 represents the incremental effect of cash flow on propensity to pay a dividend for New Zealand relative to US firms. Likewise, the marginal effect of cash flow on the propensity to pay a dividend is 0.357 for US and 0.644 for Australian firms (difference of 0.287), respectively.

reports results for the sample consisting of both of Australia and United States firms. Columns (4) and (5) report that the coefficients associated with *EBITDA to Assets* ∗ *NZ* and *EBITDA to Assets* ∗ *AUS* are both positive and statistically significant at less than the 1% level, which indicates that the sensitivity of cash flow in explaining the size of the dividend is higher in single dividend tax systems (New Zealand and Australia) than in double dividend tax systems, ceterus paribus, which supports Hypothesis 3.

The implied economic magnitudes are economically important. A one standard deviation increase in *EBITDA to Assets*, implies a 6% (0.254*0.236) increase in the *Dividend Payout Ratio* of New Zealand firms relative to US firms, which represents a 32% increase from the New Zealand mean *Dividend Payout Ratio* of 18.8%. Also, the 6% increase is equivalent to an increase of 0.22 (0.06/0.267) standard deviations of *Dividend Payout Ratio* for New Zealand firms. Likewise, a one standard deviation increase in *EBITDA to Assets*, implies a 2.3% (0.065*0.353) increase in the *Dividend Payout Ratio* of Australian firms relative to US firms, which represents a 30% increase from the Australian mean *Dividend Payout Ratio* of 7.69%. Also, the 2.3% increase is equivalent to an increase of 0.12 (0.023/0.187) standard deviations of *Dividend Payout Ratio* for Australian firms. Thus, our evidence shows the economic magnitude of the sensitivity of cash flow in explaining the size of the dividend for New Zealand and Australian firms (relative to US firms) is large when measured in either percentage or standard deviation terms.

### 5.4 Testing Hypothesis 4 – Asymmetric cash flow sensitivity

Table 7 summarizes estimation of Equation (3) where cash flow is decomposed into strictly positive or negatives measures. $EBITDA^{+}$ equals either cash flow (for non-negative values) or zero (for negative values), respectively. $|EBITDA^{-}|$ equals the absolute value of cash flow (for negative values) or zero (for positive values), respectively. In Columns (1) through (4) the functional form is Logistic and cash flow is defined as *EBIT to Assets*. All estimations control for year and industry as well as *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity*.

Hypothesis 4 posits an asymmetric effect of positive and negative cash flows on dividend policy. For negative realizations of EBITDA, the dividend payout ratio is negative whereas *Cash Dividends* are strictly non-negative. To insure in our testing that the LHS variable is always non-negative, we estimate Equation (3) using *Cash Dividends* as the dependent variable. Because *Cash Dividends* is not scaled, our measure of cash flow is *EBITDA*. Using this approach the interpretation of coefficients is clear – a positive coefficient associated with $EBITDA^{+}$ implies an increase in dividend payments and a negative coefficient associated with $|EBITDA^{-}|$ implies a decrease in dividend payments. Because *Cash Dividends* is either left censured at zero or positive, we use Tobit estimation. Columns (4) and (5) of Table 7 report the results. We also include the controls *R&D*, *Change in Assets*, *Total Assets*, *Long Term Debt*, and *Earned minus Common Equity* as well as controls for industry and year. To conserve space and avoid repetition, Table 7 does not report estimation results for the control variables.

In Columns (1) through (6) of Table 7 the coefficient associated with $EBITDA^{+}$ is positive and statistically significant at less than the 1% level, which indicates that cash dividend policies (dividend initiation, dividend payment, and dividend size) of firms in both imputation taxation and double taxation systems are positively influenced by positive cash flow realizations. Thus, results for positive cash flows are similar to tests of Hypotheses 1 through 3. In contrast, the coefficient associated with $|EBITDA^{-}|$ is statistically no different than zero in Columns (1) through (4). Thus, for US firms negative cash flows do not influence either the propensity to initiate or pay dividends. However, the coefficient associated with $|EBITDA^{-}|$ is statistically significant at less than the 1% level in Columns (5) and (6), which indicates that US firms decrease cash dividends when confronted by negative cash flows. These findings provide some indication that US firm dividend policy is less responsive to negative cash flow realizations.

We next discuss the sensitivity of dividend policy to positive and negative cash flows of New Zealand and Australian firms (relative to US firms). We find:

- For New Zealand versus US firms, in Columns (1), (3), and (5) the coefficients associated with $EBITDA^{+} * NZ(0/1)$ are statistically no different than zero. Thus, the dividend policy of New Zealand firms in response to positive cash flows is similar to the US. In contrast, the coefficients associated with $|EBITDA^{-}| * NZ(0/1)$ are statistically significant at less than the 1% level.

- Columns (1), (3), and (5) report the coefficients associated with $EBITDA^{+} * NZ(0/1)$ and $|EBITDA^{-}| * NZ(0/1)$ are (-0.02 vs. -7.4), (1.65 vs. -10.1), and (0.01 vs -4.3), respectively. Thus, the coefficient magnitudes, and hence economic magnitudes, associated with $EBITDA^{+} * NZ(0/1)$ are much smaller than $|EBITDA^{-}| * NZ(0/1)$.

- For Australia versus US firms, in Columns (2), (4), and (6) the coefficients associated with $EBITDA^{+} * AUS(0/1)$ and $|EBITDA^{-}| * AUS(0/1)$ are statistically significant at less than the 1% level.

- Columns (2), (4), and (6) report the coefficients associated with $EBITDA^{+} * AUS(0/1)$ and $|EBITDA^{-}| * AUS(0/1)$ are (1.5 vs. -6.7), (2.9 vs. -8.5), and (0.08 vs -0.66), respectively. Thus, the coefficient magnitudes, and hence economic importance, associated with $EBITDA^{+} * AUS(0/1)$ are much smaller than $|EBITDA^{-}| * AUS(0/1)$.

Consistent with Hypothesis 4, our findings show that New Zealand and Australian firms (relative to US firms) more aggressively adjust dividend policy to negative versus positive cash flows.

# 6 Robustness

## 6.1 Robustness – Estimation before and after 2003 tax reform

In their survey paper, Brav, Graham, Harvey, and Michaely (2005, page 487) write:

> While a minority of executives in that survey say that reduced dividend taxation would lead to dividend increases at their firms, more that two-thirds say that the dividend tax reduction would definitely not or probably not affect their dividend decisions. For initiations, only 13% say that the tax curt will lead to the firm initiating dividends.

Thus, the survey evidence suggest that the cash flow sensitivity of cash dividends in United States firms is plausibly stable after the tax reform act. In contrast, Jacob and Jacob (2013a) suggests that firms decrease cash dividends as the tax rate on dividends increases. From this perspective, the 2003 tax change should positively influences United States firms to increase the use of cash dividends, implying that differences in the cash flow sensitivity of dividend payout policy between the single and double taxation system countries should decline after 2003.

Table 8 summarizes time period estimation results where the dependent variable is either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)* or the *Dividend Payout Ratio*. For comparison purposes, Column (1) reports the full sample results. Column (2) shows results for 1989 through 2002. We omit observations in 2003. Column (3) shows results for 2004 through 2015. The year of the tax reform change is not included in the regression. All estimations include the controls *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity* and include controls for Industry, Country, and Year.

Panel A reports the coefficient associated with *EBITDA to Assets* $*$ *NZ* for each dependent variable by time period. Column (2) shows that coefficients associated with *EBITDA to Assets* $*$ *NZ* in explaining *Initiate Dividend (0/1)* and *Pay Dividend (0/1)* are positive but statistically no different than zero in the 1989 through 2002 period.[22] However, the coefficient associated with *Dividend Payout Ratio* is of relatively high magnitude and is statistically significant at less than the 1% level. During the 2004-2015 period, the coefficients associated with *EBITDA to Assets* $*$ *NZ* in explaining *Initiate Dividend (0/1)*, *Pay Dividend (0/1)*, and *Dividend Payout Ratio* are positive and statistically significant at less than the 1% level.

Panel B reports the coefficient associated with *EBITDA to Assets* $*$ *AUS* for each dependent variable by time period. For each time period and for each dependent variable the coefficients are positive and statistically significant at less than the 1% level.

Overall, this robustness test is consistent with the idea that the dividend tax cut of 2003 did not create incentives for US firms to more aggressively use cash dividends. We interpret this result as suggesting firm policy does not continuously respond to dividend tax changes. For example, consider a counter-factual where the United States reduces the dividend tax to 14%. As 14% is under the long term capital gains tax rate of 15%, firms would have a strong incentive to use cash dividends in lieu of share repurchases. Thus, one might expect a jump when the 15% threshold is crossed.

## 6.2 Tax deferral strategies

The example in Section 3.1 illustrates how tax policy influences the percentage of pre-tax profit that is received by the stockholder; however, investors are likely to engage in strategies that minimize their taxes. For example, by holding stocks that pay cash dividends in an IRA (Individual Retirement Account), a United States investor defers taxes on cash dividends until

[22] In our sample, the number of observations of New Zealand firm dividend payments is lower in the period prior to 2003 than in the period after 2003. For example, there are 370(801) observations of New Zealand firm dividend payments before(after) 2003.

the IRA is redeemed in retirement, which is plausibly decades from the date of the dividend payment. Likewise, a tax exempt institution in New Zealand or Australia may not be able to use imputation credits. For example, Hathaway and Officer (2004) estimate that only 50% of Australian shareholders redeem imputation credits. Also, Henry (2011) provides evidence of dividend-policy clienteles in Australia – foreign institutional investors prefer capital accumulation whereas domestic investors prefer cash dividend payments. Relative to our study, if investor tax strategies perfectly overcome differences in taxation between and imputation and double taxation system, then we would expect to not reject the null hypotheses in our tests. Thus, both the inability to use imputation credits and tax strategies to defer or not pay taxes on dividends work against us finding differences in firm dividend policies between different taxation systems.

### 6.3 Robustness – Alternative measure of cash flow

In this section, we check if our results are sensitive to the choice of the cash flow measure. We estimate the models shown in Tables 4, 5, and 6 using *EBIT* rather than *EBITDA* as the measure of cash flow. Table 9 summarizes estimation of Equation (2) where cash flow is measured as *EBIT* (Earnings before interest and taxes). The functional form of Equation (2) is logistic in Columns (1) and (2) and linear in Column (3). The table reports the coefficient associated with *EBIT to Assets* ∗ *NZ* or *EBIT to Assets* ∗ *AUS*. The coefficient associated with *EBIT to Assets* ∗ *NZ* is estimated from a sample of New Zealand and US firms. The coefficient associated with *EBIT to Assets* ∗ *AUS* is estimated from a sample of Australian and US firms. Column (1) reports estimation results for Hypothesis 1 with *Initiate Dividend (0/1)* as the dependent variable. The coefficients associated with *EBIT to Assets* ∗ *NZ* and *EBIT to Assets* ∗ *AUS* are statistically significant at less than the 1% level. Column (2) reports estimation results for Hypothesis 2 with *Pay Dividend (0/1)* as the dependent variable. The coefficients associated with *EBIT to Assets* ∗ *NZ* and *EBIT to Assets* ∗ *AUS* are statistically significant at less than the 1% level. Column (3) reports estimation results for Hypothesis 3 with *Dividend Payout Ratio* as the dependent variable. The numerator of the *Dividend Payout Ratio* is *EBIT*. The coefficients associated with both *EBIT to Assets* ∗ *NZ* and *EBIT to Assets*

$*$ *AUS* are statistically significant at less than the 1% level. This test provides evidence that our results are not sensitive to an alternative measure of cash flow.

### 6.4 Robustness – Sample selection

This section investigate if our results are driven by sample selection issues. Table 10 summarizes subsample estimation results where the dependent variable is either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)* or the *Dividend Payout Ratio.* For comparison purposes, Column (1) reports the full sample results. Panel A reports the coefficient associated with *EBITDA to Assets* $*$ *NZ* for each dependent variable by subsample. Panel B reports the coefficient associated with *EBITDA to Assets* $*$ *AUS* for each dependent variable by subsample. All estimations include the controls *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity* and include controls for Industry, Country, and Year.

First, due to the limited sample of New Zealand firms we did not follow other studies and initially drop firms in the Utility Industry. To address if our results are due to keeping firms in Utility Industry in the data set, we drop utilities from our sample and re-estimate our tests using EBITDA as the measure of cash flow. Column (2) of Panel A provides the coefficients associated with *EBITDA to Assets* $*$ *NZ*. In every case, the coefficients are statistically significant at less than the 1% level and further the coefficient signs and magnitudes in Column (2) are qualitatively identical to Column (1). Column (2) of Panel B provides the coefficients associated with *EBITDA to Assets* $*$ *AUS*. In every case, the coefficients are statistically significant at less than the 1% level and further the coefficient sign and magnitudes in Column (2) are qualitatively identical to Column (1).

Second, the R&D intensity of US firms is much higher than in New Zealand or Australia. Although we control directly for R&D intensity it is possible the our findings are due to the low cash flow sensitivity to cash dividends of R&D firms. To address if our results are due to the inclusion of firms that engage in R&D, we drop firms that engage in R&D from our sample and re-estimate our tests using EBITDA as the measure of cash flow. Column (3) of Panel A provides the coefficients associated with *EBITDA to Assets* $*$ *NZ*. In explaining the *Pay Dividend (0/1)* and *Dividend Payout Ratio*, the coefficients are statistically significant at less than the 1% level. In explaining *Initiate Dividend (0/1)*, the coefficient is statistically significant at less than the

5% level. Also, the coefficient signs and magnitudes in Column (3) are qualitatively identical to Column (1). Column (3) of Panel B provides the coefficients associated with *EBITDA to Assets* ∗ *AUS*. In every case, the coefficients are statistically significant at less than the 1% level and further the coefficient sign and magnitudes in Column (3) are qualitatively identical to Column (1).

Third, to avoid US taxes, US firms with international operations tend to hold high levels of cash in foreign subsidiaries. This incentive to not repatriate cash may downward bias the cash flow sensitivity of US firms to dividend policy. To check if this repatriation issue biases our estimates, we drop US firms with international operations from the sample. Column (4) drops US firms with international operations. Column (4) of Panel A provides the coefficients associated with *EBITDA to Assets* ∗ *NZ*. In every case, the coefficients are statistically significant at less than the 1% level and further the coefficient signs and magnitudes in Column (4) are qualitatively identical to Column (1). Column (4) of Panel B provides the coefficients associated with *EBITDA to Assets* ∗ *AUS*. In every case, the coefficients are statistically significant at less than the 1% level and further the coefficient sign and margnitudes in Column (4) are qualitatively identical to Column (1).

In summary, our subsample analysis suggests that our results are not due to sample selection issues related to the inclusion of Uility firms, higher engagement in R&D of US firms, and the incentive of US firms to not repatriate cash flow to pay dividends.

### 6.5 Robustness – Propensity score matching

This table summarizes propensity score estimation results. In Panel A, treated firms are New Zealand firms. In Panel B, treated firms are Australian firms. The outcomes of interest include either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)* or the *Dividend Payout Ratio*. Columns (1) and (2) report the unconditional sample means for the outcomes of interest. Column (3) reports the difference between the unconditional means. Columns (4) and (5) report the Average Treatment Effect of the Treated (ATET) for each outcome of interest. The treatment assignment variables are *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, *Earned to Common Equity*, *Industry*, and *Year*. Column (4) matches each New Zealand or Australia firm to the closest United States firm. Column (5) matches each New Zealand or

Australia firm to the four closest nearest neighbor United States firms. The results in Column (4) and (5) are qualitatively identical so we discuss the Column (4) results.

Tables 4, 5 and 6 show that both *New Zealand (0/1)* and *Australia (0/1)* positively explain *Initiate Dividend (0/1)*, *Pay Dividend (0/1)*, and *Dividend Payout Ratio*.[23] Based on this evidence, we expect the ATET to be positive. In some cases, the unconditional differences in means is close to the ATET. For example, the sample mean of *Initiate Dividend (0/1)* is 5.96% in New Zealand and 3.25% in the US; implying an unconditional difference of 2.71%. When conditioning using the treatment assignment variables, the ATET is 2.66%. In contrast, the sample means of *Pay Dividend (0/1)* is 57.6% in New Zealand and 31% in the US; implying an unconditional difference of 26.6%. When conditioning using the treatment assignment variables, the ATET falls to 2.76%.

In one case, the direction of the difference changes. Specifically, the sample mean of *Pay Dividend (0/1)* is 26.6% in Australia and 31% in the US; implying an unconditional difference of -4.4%. The unconditional mean shows Australian firms are less likely to pay dividends than US firms. However, when conditioning using the treatment assignment variables, the ATET is 8.33%. Importantly, the treatment effect evidence suggests Austrailian firms are more likely to pay dividends, which matches our multivariate regression results.[24] Overall, the results of the propensity score matching tests support that firms in dividend imputation countries (New Zealand and Australia) are more likely to initiate and pay a dividend as well as pay higher cash dividends.

## 6.6 Robustness – Controlling for time invariant firm effects

In all our tests, we control for country and time effects. However, because country and firm are perfectly correlated, we can not use fixed effects estimation to control for time invariant firm heterogeneity. Because firms are nested within a country, we follow Li, Griffin, Yue, and Zhao (2013) and employ mixed effects estimation where each firm has a random intercept. Table 12 summarizes mixed effects estimation where each firm has a random intercept. The dependent variables are either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)*, or *Dividend Payout Ratio*.

[23] In one case, in Column (5) of Table 4 the coefficient associated with *Australia (0/1)* is not statistically significant.

[24] Note that the coefficient assoicated with *Australia (0/1)* in Column (5) of Table 5 is 0.468 and statistically significant at less than the 1% level.

Columns (1) and (2) report the coefficient associated with *EBITDA to Assets* $*$ *NZ*. Columns (3) and (4) report the coefficients associated with *EBITDA to Assets* $*$ *AUS*. Columns (1) and (3) report coefficients from Columns (4) and (5) from Tables 4, 5, and 6, respectively. Columns (2) and (4) report the coefficients from mixed effects estimation. All estimations include the controls *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity* and include controls for Industry, Country, and Year. In the last line of the table, the "Yes" in Columns (2) and (4) denotes that the mixed effects estimator controls for time invariant firm heterogeneity.

In every case, the coefficients associated with either *EBITDA to Assets* $*$ *NZ* or *EBITDA to Assets* $*$ *AUS* are statistically significant at the less than the 1% level. All, the signs of all coefficients are positive. The magnitude of the coefficients in explaining *Initiate Dividend (0/1)* are qualitatively identical. The magnitude of the coefficient associated with *EBITDA to Assets* $*$ *NZ* in explaining *Pay Dividend (0/1)* is qualitatively identical, whereas the magnitude of the coefficient associated with *EBITDA to Assets* $*$ *AUS* in explaining *Pay Dividend (0/1)* declines by approximately 28%. Lastly, the magnitude of both coefficients in explaining *Dividend Payout Ratio* decline by approximately 50%; however, the implied economic magnitudes remain economically important. A 50% reduction in the coefficient magnitude implies one standard deviation increase in *EBITDA to Assets* implies a 16% increase from the New Zealand mean *Dividend Payout Ratio* and a 15% increase from the Australian mean *Dividend Payout Ratio*.

## 7 Conclusion

We investigate the sensitivity of cash flow to dividend policy between different tax systems. We find the cash flow sensitivity of cash dividends in (imputation taxation versus double taxation systems) is higher as measured by the propensity to initiate a cash dividend, propensity to pay a cash dividend, and in the size of the cash dividend. Our results are economically important – for a New Zealand firm (relative to a United States firm) a one standard deviation increase in cash flow, implies a 31% increase in the propensity to initiate a dividend, a 23% increase in the propensity to pay a dividend, and a 32% increase in the dividend payout ratio.

Our findings suggest an asymmetric response to positive and negative cash flow realizations – firms in dividend imputation taxation systems appear to take into account investor preferences for dividends with imputation credits. Specifically, when a firm in imputation taxation system faces a negative cash flow realization the firm (relative to a firm in a double taxation system) decreases dividend initiation, payment and levels, leading to a less sticky dividend policy than a comparable United States firm.

The 2003 Jobs and Growth Tax Relief Reconciliation Act changed the personal dividend taxation rate for most investors to the long term capital gain rate of 15%. If firm dividend policy is elastic to dividend tax changes, we would expect our finds would differ before and after the dividend tax reduction. We find qualitatively identical results in sub-samples before and after tax act. Our findings are consistent with the idea that the 2003 dividend tax cut had a small or modest effect on US firm dividend policy. A policy implication is that using elasticities to estimate the influence of tax changes should be used with caution. More likely, a tax change may need to exceed a threshold to change firm behavior.

# A Appendix

## A.1 Derivation of the total tax rate

To show that the total tax rate is a weighted average of the single and double tax rate we re-arrange the total tax rate to find

$$\begin{aligned}
TTR &= \tau_C + \tau_P[(1 - \tau_C) + \alpha\tau_C] - \alpha\tau_C \\
&= \tau_P + \tau_C - \tau_C\tau_P - \alpha\tau_C + \alpha\tau_C\tau_p \\
&= \tau_P + \tau_C(1 - \tau_P) - \alpha\tau_C(1 - \tau_p) \\
&= \tau_P + (1 - \alpha)\tau_C(1 - \tau_P) \\
&= \tau_P + (1 - \alpha)[1 - (1 - \tau_C)(1 - \tau_P) - \tau_P] \\
&= \tau_P - (1 - \alpha)\tau_P + (1 - \alpha)[1 - (1 - \tau_C)(1 - \tau_P)] \\
&= \alpha\tau_P + (1 - \alpha)[1 - (1 - \tau_C)(1 - \tau_P)]. \qquad (5)
\end{aligned}$$

In the simplification, we use the identity $\tau_C(1 - \tau_p) = 1 - (1 - \tau_C)(1 - \tau_P) - \tau_P$.

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Table 1: Dividends under alternative tax systems

This table provides a numerical illustration of an investor receiving a dividend under the various taxation systems. In all cases, the pre-tax profit is \$100. Column (1) illustrates how a New Zealand firm transfers pre-tax profits under an imputation system with 100% imputed dividends. Column (2) illustrates how a New Zealand firm transfers pre-tax profits under an imputation system with 0% imputed dividends, which is equivalent to a double taxation system. Column (3) illustrates how a New Zealand firm transfer pre-tax profits under an imputation system with 80% imputed dividends. Column (4) illustrates how a United States firm transfers pre-tax profits after 2003. The total tax rate refers to the percentage of both corporate and personal taxes paid on the \$100 in pre-tax profits. The investor retention rate refers to the percentage of pre-tax profits retain by the investor.

| Item | Formula | (1) | (2) | (3) | (4) |
|---|---|---|---|---|---|
| Pre-tax profit | $\pi$ | \$100 | \$100 | \$100 | \$100 |
| Corporate tax rate | $\tau_C$ | 28% | 28% | 28% | 35% |
| Corporate taxes | $\pi\tau_C$ | \$28 | \$28 | \$28 | \$35 |
| After tax profit | $\pi(1-\tau_C)$ | \$72 | \$72 | \$72 | \$65 |
| Dividend | $\pi(1-\tau_C)$ | \$72 | \$72 | \$72 | \$65 |
| Imputation % | $\alpha$ | 100% | 0% | 80% | 0% |
| Imputation credit | $\pi\alpha\tau_C$ | \$28 | \$0 | \$22 | \$0 |
| Grossed-up dividend | $G=\pi[(1-\tau_C)+\alpha\tau_C]$ | \$100 | \$72 | \$94 | \$65 |
| Personal tax rate | $\tau_P$ | 33% | 33% | 33% | 15% |
| Pre-imputation taxes | $G\tau_P$ | \$33 | \$23.76 | \$31.15 | \$9.75 |
| Post-imputation taxes | $G\tau_P-\pi\alpha\tau_C$ | \$5 | \$23.76 | \$8.75 | \$9.75 |
| Total taxes | $\pi\tau_C+G\tau_P-\pi\alpha\tau_C$ | \$33 | \$51.76 | \$36.75 | \$44.75 |
| Total tax rate | $\alpha\tau_P+(1-\alpha)[1-(1-\tau_C)(1-\tau_P)]$ | 33.00% | 51.76% | 36.75% | 44.75% |
| Investor retention rate | $\alpha(1-\tau_P)+(1-\alpha)(1-\tau_C)(1-\tau_P)$ | 67.00% | 48.24% | 63.25% | 55.25% |

Table 2: Variable definitions

This table provides the variable name, definition, and Compustat variable name and/or formula.

| Variable | Definition | Compustat |
|---|---|---|
| *Cash Dividends* | Cash dividends paid by firm | dv |
| *Pay Dividend (0/1)* | 1 if firm pays dividend. 0 otherwise | |
| *Initiate Dividend (0/1)* | 1 if a firm starts paying a dividend, 0 otherwise | |
| *EBITDA* | Earnings before interest, taxes, depreciation and amortisation | ebitda |
| *EBIT* | Earnings before interest and taxes | ebit |
| *Dividend Pay Out Ratio* | Ratio of dividends to ebitda | dv/ebitda |
| *EBITDA to Assets* | Ratio of EBITDA to total assets | oibdp/at |
| *EBIT to Assets* | Ratio of EBIT to total assets | ebit/at |
| *R&D to Assets* | Ratio of research and development expense to total assets | xrd/at |
| *Asset Growth* | Percentage change in total assets | $\frac{at_t}{at_{t-1}}$-1 |
| *Total Assets* | Log of total assets | ln(at) |
| *Book Equity* | Common equity | be |
| *LT Book Debt to Assets* | Ratio of long term book debt to total assets | dltt/at |
| *Earned to Common Equity* | Ratio of Earned Equity to Total Common Equity | re/be |
| *New Zealand (0/1)* | 1 if New Zealand firm, 0 otherwise | |
| *Australia (0/1)* | 1 if Australian firm, 0 otherwise | |

Table 3: Summary statistics by country

This table reports the number of observations, the mean, and the standard deviation of each variable for New Zealand, Australia, and the United States. See Table 2 for variable definitions.

| | New Zealand | | | Australia | | | United States | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Obs | Mean | SD | Obs | Mean | SD | Obs | Mean | SD |
| *Cash Dividends* | 2,284 | 21.05 | 55.06 | 26,263 | 8.592 | 33.67 | 160,844 | 22.99 | 92.19 |
| *Pay Dividend (0/1)* | 2,284 | 0.576 | 0.494 | 26,263 | 0.266 | 0.442 | 160,844 | 0.310 | 0.463 |
| *Initiate Dividend (0/1)* | 2,064 | 0.0596 | 0.237 | 23,584 | 0.0397 | 0.195 | 144,360 | 0.0325 | 0.177 |
| *EBITDA* | 2,284 | 91.39 | 230.4 | 26,263 | 35.58 | 136.4 | 160,844 | 177.5 | 566.4 |
| *EBIT* | 2,283 | 56.33 | 133.7 | 26,263 | 21.81 | 92.11 | 159,862 | 114.7 | 384.8 |
| *Dividend Payout Ratio* (EBITDA) | 2,278 | 0.188 | 0.267 | 26,171 | 0.0769 | 0.187 | 160,552 | 0.0599 | 0.155 |
| *Dividend Payout Ratio* (EBIT) | 2,279 | 0.259 | 0.415 | 26,169 | 0.0995 | 0.279 | 159,574 | 0.0821 | 0.238 |
| *EBITDA to Assets* | 2,258 | 0.0643 | 0.236 | 25,860 | -0.112 | 0.353 | 160,089 | -0.00486 | 0.332 |
| *EBIT to Assets* | 2,257 | 0.0192 | 0.244 | 25,860 | -0.146 | 0.359 | 159,107 | -0.0572 | 0.348 |
| *R&D to Assets* | 2,258 | 0.0194 | 0.0770 | 25,860 | 0.0158 | 0.0667 | 160,089 | 0.0619 | 0.147 |
| *Asset Growth* | 2,041 | 0.0359 | 0.365 | 23,373 | -0.00390 | 0.760 | 143,783 | 0.0353 | 0.426 |
| *Total Assets* | 2,258 | 4.772 | 2.193 | 25,860 | 3.414 | 2.208 | 160,844 | 4.693 | 2.565 |
| *LT Book Debt to Assets* | 2,246 | 0.171 | 0.181 | 25,857 | 0.0881 | 0.165 | 160,089 | 0.199 | 0.239 |
| *Earned to Common Equity* | 2,253 | -0.460 | 6.301 | 25,881 | -2.266 | 9.490 | 156,622 | -0.551 | 9.012 |

Table 4: Testing Hypothesis 1 – Initiate dividends

This table shows estimation results of Equation (2) where the dependent variable is *Initiate Dividend (0/1)* and the functional form is logistic. All estimations include the independent variables *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, *Earned to Common Equity*, *Industry*, and *Year*. Columns (1), (2), and (3) report estimation results for New Zealand, Australia, and the United States firms, respectively. Column (4) reports results for the sample consisting of both New Zealand and United States firms and includes *New Zealand (0/1)* and *EBITDA to Assets ∗ NZ* as variables of interest. Column (5) reports results for the sample consisting of both of Australia and United States firms and includes *Australia (0/1)* and *EBITDA to Assets ∗ AUS* as variables of interest. The sample period is 1989 through 2015. Standard errors clustered by firm are shown in parentheses with less than 1%, 5%, and 10% levels of statistical significance denoted by *, **, and ***, respectively.

| | Dependent Variable: *Initiate Dividend (0/1)* | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Explanatory Variables | NZ | AUS | USA | NZ/USA | AUS/USA |
| *EBITDA to Assets* | 2.987*** | 3.726*** | 0.605*** | 0.601*** | 0.520*** |
| | (0.653) | (0.229) | (0.0869) | (0.0867) | (0.0852) |
| *New Zealand (0/1)* | | | | 0.297** | |
| | | | | (0.129) | |
| *EBITDA to Assets ∗ NZ* | | | | 2.100*** | |
| | | | | (0.601) | |
| *Australia (0/1)* | | | | | 0.0517 |
| | | | | | (0.0499) |
| *EBITDA to Assets ∗ AUS* | | | | | 3.632*** |
| | | | | | (0.208) |
| *R&D to Assets* | -0.677 | -1.579 | -0.791*** | -0.801*** | -0.944*** |
| | (1.502) | (1.495) | (0.260) | (0.259) | (0.261) |
| *Asset Growth* | 0.712 | -0.0166 | 0.350*** | 0.358*** | 0.241*** |
| | (0.490) | (0.0783) | (0.0666) | (0.0661) | (0.0591) |
| *Total Assets* | -0.0264 | 0.0867*** | -0.0161** | -0.0156** | 0.00312 |
| | (0.0548) | (0.0192) | (0.00757) | (0.00746) | (0.00681) |
| *LT Book Debt to Assets* | 0.402 | -0.538** | 0.321*** | 0.327*** | 0.284*** |
| | (0.578) | (0.258) | (0.0656) | (0.0652) | (0.0636) |
| *Earned to Total Common Equity* | 0.0118 | 0.0151*** | -0.00182 | -0.00179 | -0.000278 |
| | (0.0139) | (0.00346) | (0.00183) | (0.00183) | (0.00173) |
| *Industry* | Yes | Yes | Yes | Yes | Yes |
| *Year* | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 1,967 | 22,941 | 140,661 | 142,690 | 164,010 |
| $\chi^2$ | 144.3 | 1206 | 531.7 | 600.6 | 1226 |
| *Pseudo R-Square* | 0.101 | 0.151 | 0.0184 | 0.0194 | 0.0297 |

Table 5: Testing Hypothesis 2 – Pay dividend

This table shows estimation results of Equation (2) where the dependent variable is *Pay Dividend (0/1)* and the functional form is logistic. All estimations include the independent variables *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, *Earned to Common Equity*, *Industry*, and *Year*. Columns (1), (2), and (3) report estimation results for New Zealand, Australia, and the United States firms, respectively. Column (4) reports estimation results for the sample consisting of both New Zealand and United States firms and includes *New Zealand (0/1)* and *EBITDA to Assets ∗ NZ* as variables of interest. Column (5) reports results for the sample consisting of both of Australia and United States firms and includes *Australia (0/1)* and *EBITDA to Assets ∗ AUS* as variables of interest. The sample period is 1989 through 2015. Standard errors clustered by firm are shown in parentheses with less than 1%, 5%, and 10% levels of statistical significance denoted by *, **, and ***, respectively.

| | Dependent Variable: *Pay Dividend (0/1)* | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Explanatory Variables | NZ | AUS | USA | NZ/USA | AUS/USA |
| *EBITDA to Assets* | 7.111*** | 6.941*** | 2.160*** | 2.154*** | 2.074*** |
| | (1.263) | (0.305) | (0.139) | (0.139) | (0.139) |
| *New Zealand (0/1)* | | | | 1.084*** | |
| | | | | (0.168) | |
| *EBITDA to Assets ∗ NZ* | | | | 4.544*** | |
| | | | | (1.265) | |
| *Australia (0/1)* | | | | | 0.468*** |
| | | | | | (0.0583) |
| *EBITDA to Assets ∗ AUS* | | | | | 5.457*** |
| | | | | | (0.318) |
| *R&D to Assets* | -4.658* | 0.473 | -2.207*** | -2.213*** | -2.306*** |
| | (2.644) | (1.135) | (0.431) | (0.428) | (0.417) |
| *Asset Growth* | 0.366* | -0.334*** | -0.389*** | -0.375*** | -0.340*** |
| | (0.214) | (0.0606) | (0.0266) | (0.0267) | (0.0251) |
| *Total Assets* | 0.534*** | 0.773*** | 0.430*** | 0.429*** | 0.442*** |
| | (0.0979) | (0.0315) | (0.0115) | (0.0114) | (0.0106) |
| *LT Book Debt to Assets* | -0.732 | -0.842*** | -1.316*** | -1.304*** | -1.219*** |
| | (0.670) | (0.317) | (0.0812) | (0.0805) | (0.0773) |
| *Earned to Total Common Equity* | 0.0392 | 0.0456*** | 0.0114*** | 0.0115*** | 0.0145*** |
| | (0.0384) | (0.00620) | (0.00189) | (0.00189) | (0.00182) |
| *Industry* | Yes | Yes | Yes | Yes | Yes |
| *Year* | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 1,989 | 23,076 | 140,661 | 142,690 | 164,010 |
| $\chi^2$ | 201.9 | 1708 | 3533 | 3622 | 4745 |
| *Pseudo R-Square* | 0.378 | 0.531 | 0.279 | 0.281 | 0.296 |

Table 6: Testing Hypothesis 3 – Size of dividend

This table shows estimation results of Equation (2) where the dependent variable is *Dividend Payout Ratio* and the functional form is linear. All estimations include the independent variables *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, *Earned to Common Equity*, *Industry*, and *Year*. Columns (1), (2), and (3) report estimation results for New Zealand, Australia, and the United States firms, respectively. Column (4) reports estimation results for the sample consisting of both New Zealand and United States firms and includes *New Zealand (0/1)* and *EBITDA to Assets ∗ NZ* as variables of interest. Column (5) reports results for the sample consisting of both of Australia and United States firms and includes *Australia (0/1)* and *EBITDA to Assets ∗ AUS* as variables of interest. The sample period is 1989 through 2015. Standard errors clustered by firm are shown in parentheses with less than 1%, 5%, and 10% levels of statistical significance denoted by *, **, and ***, respectively.

| | Dependent Variable: *Dividend Payout Ratio* | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Explanatory Variables | NZ | AUS | USA | NZ/USA | AUS/USA |
| *EBITDA to Assets* | 0.226*** | 0.0832*** | 0.0354*** | 0.0348*** | 0.0286*** |
| | (0.0536) | (0.00736) | (0.00240) | (0.00243) | (0.00234) |
| *New Zealand (0/1)* | | | | 0.118*** | |
| | | | | (0.0114) | |
| *EBITDA to Assets ∗ NZ* | | | | 0.254*** | |
| | | | | (0.0373) | |
| *Australia (0/1)* | | | | | 0.0653*** |
| | | | | | (0.00344) |
| *EBITDA to Assets ∗ AUS* | | | | | 0.111*** |
| | | | | | (0.00605) |
| *R&D to Assets* | 0.0378 | 0.0520* | 0.00150 | 0.00174 | 0.000501 |
| | (0.114) | (0.0298) | (0.00335) | (0.00340) | (0.00348) |
| *Asset Growth* | -0.00399 | -0.00946*** | -0.0131*** | -0.0130*** | -0.0122*** |
| | (0.0156) | (0.00146) | (0.000996) | (0.00100) | (0.000857) |
| *Total Assets* | 0.0281*** | 0.0260*** | 0.00876*** | 0.00901*** | 0.0106*** |
| | (0.00630) | (0.00145) | (0.000435) | (0.000440) | (0.000418) |
| *LT Book Debt to Assets* | -0.184*** | -0.0157 | -0.0370*** | -0.0381*** | -0.0331*** |
| | (0.0526) | (0.0117) | (0.00304) | (0.00304) | (0.00294) |
| *Earned to Common Equity* | 0.00179* | 9.85e-05 | 0.000303*** | 0.000309*** | 0.000294*** |
| | (0.000954) | (8.39e-05) | (2.67e-05) | (2.70e-05) | (2.62e-05) |
| *Industry* | Yes | Yes | Yes | Yes | Yes |
| *Year* | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 2,028 | 23,332 | 140,536 | 142,564 | 163,868 |
| *R-squared* | 0.175 | 0.212 | 0.135 | 0.145 | 0.141 |

## Table 7: Testing Hypothesis 4 – Sensitivity to positive and negative cash flows

This table summarizes estimation of Equation (3) where cash flow is decomposed into two measures. *EBITDA* $^+$ equals either cash flow (for non-negative values) or zero (for negative values), respectively. |*EBITDA* $^-$| equals the absolute value of cash flow (for negative values) or zero (for positive values), respectively. In Columns (1) through (4) EBITDA is scaled by total assets. In Columns (5) and (6) EBITDA is a level and not scaled. The functional form is Logistic in Columns (1) through (4) and includes the controls *EBIT to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity*. The functional form is Tobit in Columns (5) and (6) and includes the controls *EBITDA*, *R&D*, *Change in Assets*, *Total Assets*, *Long Term Debt*, and *Earned minus Common Equity*. All estimations control for year and industry. Columns (1), (3), and (5) reports results from a sample of New Zealand and US firms. Columns (2), (4), and (6) reports results from a sample of Australian and US firms. The dependent variable is *Initiate Dividend (0/1)* in Columns (1) and (2), *Pay Dividend (0/1)* in Columns (3) and (4), and *Cash Dividends* in Columns (5) and (6). The sample period is 1989 through 2015. Standard errors are clustered by firm. Statistical significant at less than the 10%, 5%, and 1% level is denoted by *, ** and ***, respectively.

| | Dependent Variables | | | | | |
|---|---|---|---|---|---|---|
| | *Initiate Dividend (0/1)* | | *Pay Dividend (0/1)* | | *Cash Dividends* | |
| Explanatory Variables | (1) | (2) | (3) | (4) | (5) | (6) |
| *New Zealand (0/1)* | 0.644*** | | 1.534*** | | 62.71*** | |
| | (0.179) | | (0.248) | | (5.096) | |
| *Australia (0/1)* | | 0.407*** | | 0.860*** | | 33.33*** |
| | | (0.0729) | | (0.0783) | | (0.430) |
| *EBITDA* $^+$ | 1.762*** | 1.730*** | 4.297*** | 4.264*** | 0.125*** | 0.123*** |
| | (0.165) | (0.167) | (0.179) | (0.179) | (0.00774) | (0.00135) |
| *EBITDA* $^+$ $*$ *NZ(0/1)* | -0.0204 | | 1.625 | | 0.0136 | |
| | (0.956) | | (1.757) | | (0.0318) | |
| *EBITDA* $^+$ $*$ *AUS(0/1)* | | 1.471*** | | 2.883*** | | 0.0857*** |
| | | (0.342) | | (0.458) | | (0.00166) |
| \|*EBITDA* $^-$\| | -0.111 | -0.0518 | 0.0695 | 0.140 | -0.948*** | -0.885*** |
| | (0.0877) | (0.0859) | (0.108) | (0.105) | (0.100) | (0.0152) |
| \|*EBITDA* $^-$\| $*$ *NZ(0/1)* | -7.385*** | | -10.15*** | | -4.314** | |
| | (2.828) | | (3.303) | | (1.751) | |
| \|*EBITDA* $^-$\| $*$ *AUS(0/1)* | | -6.736*** | | -8.531*** | | -0.660*** |
| | | (1.249) | | (0.977) | | (0.0284) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Year* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 142,690 | 164,010 | 142,690 | 164,010 | 142,564 | 163,868 |
| *Left Censored* | | | | | 97,622 | 113,614 |
| *Uncensored* | | | | | 45,068 | 50,406 |
| $\chi^2$ | 707.5 | 1238 | 4339 | 5393 | | |
| *Psuedo* $R^2$ or $R^2$ | 0.0210 | 0.0314 | 0.288 | 0.302 | 0.132 | 0.134 |

Table 8: Robustness – Before and after 2003 dividend tax reform

This table summarizes time period estimation results where the dependent variable is either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)* or the *Dividend Payout Ratio*. For comparison purposes, Column (1) reports the full sample results. Column (2) shows results for 1989 through 2002. Column (3) shows results for 2004 through 2015. Panel A reports the coefficient associated with *EBITDA to Assets ∗ NZ* for each dependent variable by time period. Panel B reports the coefficient associated with *EBITDA to Assets ∗ AUS* for each dependent variable by time period. Observations is reported where *Initiate Dividend (0/1)* is the dependent variable. All estimations include the controls *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity* and include controls for Industry, Country, and Year. Standard errors are clustered by firm. Statistical significant at less than the 5% and 1% level is denoted by** and ***, respectively.

| Panel A: New Zealand vs. USA time period tests | | | |
|---|---|---|---|
| | *EBITDA to Assets ∗ NZ* | | |
| | (1) | (2) | (3) |
| Dependent Variable | 1989-2015 | 1989-2002 | 2004-2015 |
| *Initiate Dividend (0/1)* | 2.100*** | 0.708 | 2.301*** |
| *Pay Dividend (0/1)* | 4.544*** | 1.335 | 6.632*** |
| *Dividend Payout Ratio* | 0.254*** | 0.319*** | 0.240*** |
| Observations | 142,690 | 85,241 | 51,988 |
| **Panel B: Australia vs. USA time period tests** | | | |
| | *EBITDA to Assets ∗ AUS* | | |
| | (1) | (2) | (3) |
| Dependent Variable | 1989-2015 | 1989-2002 | 2004-2015 |
| *Initiate Dividend (0/1)* | 3.632*** | 2.827*** | 3.649*** |
| *Pay Dividend (0/1)* | 5.457*** | 3.052*** | 6.670*** |
| *Dividend Payout Ratio* | 0.111*** | 0.139*** | 0.0992*** |
| Observations | 164,010 | 90,219 | 67,402 |

Table 9: Robustness – Alternative cash flow measure

This table summarizes estimation of Equation (2) where cash flow is measured as *EBIT* (Earnings before interest and taxes). The functional form of Equation (2) is logistic in Columns (1) and (2) and linear in Column (3). The table reports the coefficient associated with *EBIT to Assets* ∗ *NZ* or *EBIT to Assets* ∗ *AUS*. The coefficient associated with *EBIT to Assets* ∗ *NZ* is estimated from a sample of New Zealand and US firms. The coefficient associated with *EBIT to Assets* ∗ *AUS* is estimated from a sample of Australian and US firms. Column (1) reports estimation results with *Initiate Dividend (0/1)* as the dependent variable. Column (2) reports estimation results with *Pay Dividend (0/1)* as the dependent variable. Column (3) reports estimation results with *Dividend Payout Ratio* as the dependent variable. The numerator of the *Dividend Payout Ratio* is *EBIT*. All estimations include the controls *EBIT to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity* and include controls for Industry, Country, and Year. The sample period is 1989 through 2015. Standard errors are clustered by firm. Statistical significant at less than the 5% and 1% level is denoted by ** and ***, respectively.

| | | Dependent Variable | |
|---|---|---|---|
| | *Initiate Dividend (0/1)* | *Pay Dividend (0/1)* | *Dividend Payout Ratio* |
| Variable of Interest | (1) | (2) | (3) |
| *EBIT to Assets* ∗ *NZ* | 2.426*** | 5.125*** | 0.335*** |
| *EBIT to Assets* ∗ *AUS* | 3.959*** | 6.493*** | 0.133*** |

Table 10: Robustness – Subsample analysis

This table summarizes subsample estimation results where the dependent variable is either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)* or the *Dividend Payout Ratio*. For comparison purposes, Column (1) reports the full sample results. Column (2) drops firms in the Utility Industry . Column (3) drops firms that engage in Research and Development. Column (4) drops US firms with international operations. Panel A reports the coefficient associated with *EBITDA to Assets* $*$ *NZ* for each dependent variable by subsample. Panel B reports the coefficient associated with *EBITDA to Assets* $*$ *AUS* for each dependent variable by subsample. Observations is reported where *Initiate Dividend (0/1)* is the dependent variable. All estimations include the controls *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity* and include controls for Industry, Country, and Year. Standard errors are clustered by firm. Statistical significant at less than the 5% and 1% level is denoted by** and ***, respectively.

| Panel A: New Zealand vs. USA subsample tests | | | | |
|---|---|---|---|---|
| | *EBITDA to Assets* $*$ *NZ* | | | |
| Dependent Variable | (1) | (2) | (3) | (4) |
| *Initiate Dividend (0/1)* | 2.100*** | 2.384*** | 1.732** | 2.093*** |
| *Pay Dividend (0/1)* | 4.544*** | 5.576*** | 4.341*** | 4.539*** |
| *Dividend Payout Ratio* | 0.254*** | 0.257*** | 0.305*** | 0.255*** |
| Observations | 142,690 | 124,736 | 78,597 | 136,588 |
| Utilities | Yes | No | Yes | Yes |
| R&D | Yes | Yes | No | Yes |
| International | Yes | Yes | Yes | No |
| Panel B: Australia vs. USA subsample tests | | | | |
| | *EBITDA to Assets* $*$ *AUS* | | | |
| Dependent Variable | (1) | (2) | (3) | (4) |
| *Initiate Dividend (0/1)* | 3.632*** | 3.667*** | 3.473*** | 3.606*** |
| *Pay Dividend (0/1)* | 5.457*** | 5.604*** | 4.803*** | 5.441*** |
| *Dividend Payout Ratio* | 0.111*** | 0.110*** | 0.0990*** | 0.112*** |
| Observations | 164,010 | 144,929 | 96,156 | 157,892 |
| Utilities | Yes | No | Yes | Yes |
| R&D | Yes | Yes | No | Yes |
| International | Yes | Yes | Yes | No |

Table 11: Robustness - Propensity score matching

This table summarizes propensity score estimation results. In Panel A, treated firms are New Zealand firms. In Panel B, treated firms are Australian firms. The outcomes of interest include either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)* or the *Dividend Payout Ratio*. Columns (1) and (2) report the unconditional sample means for the outcomes of interest. Column (3) reports the difference between the unconditional means. Columns (4) and (5) report the Average Treatment Effect of the Treated (ATET) for each outcome of interest. The treatment assignment variables are *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, *Earned to Common Equity*, *Industry*, and *Year*. Column (4) matches each New Zealand or Australia firm to the closest USA firm. Column (5) matches each New Zealand or Australia firm to the four closest nearest neighbor USA firms. Using robust standard errors, all ATET estimations are statistically significant at less than the 1% level as denoted by ***.

| Panel A: New Zealand vs. USA Propensity Score Matching | | | | | |
|---|---|---|---|---|---|
| | | | | ATET (NZ vs. USA) | |
| | Sample Means | | Difference | Closest | Four |
| | NZ | USA | NZ-USA | Match | Matches |
| Outcome of Interest | (1) | (2) | (3) | (4) | (5) |
| *Initiate Dividend (0/1)* | 5.96% | 3.25% | 2.71% | 2.66%*** | 2.46%*** |
| *Pay Dividend (0/1)* | 57.60% | 31.00% | 26.60% | 2.76%*** | 2.76%*** |
| *Dividend Payout Ratio* | 18.80% | 5.99% | 12.81% | 13.21%*** | 13.34%*** |

| Panel B: Australia vs. USA Propensity Score Matching | | | | | |
|---|---|---|---|---|---|
| | | | | ATET (AUS vs. USA) | |
| | Sample Means | | Difference | Closest | Four |
| | AUS | USA | AUS-USA | Match | Matches |
| Outcome of Interest | (1) | (2) | (3) | (4) | (5) |
| *Initiate Dividend (0/1)* | 3.97% | 3.25% | 0.72% | 0.85%*** | 0.76%*** |
| *Pay Dividend (0/1)* | 26.60% | 31.00% | -4.40% | 8.33%*** | 8.59%*** |
| *Dividend Payout Ratio* | 7.69% | 5.99% | 1.70% | 4.32%*** | 4.42%*** |

Table 12: Robustness - Hierarchical model

This table summarizes estimation of Equation (4) where each firm has a random intercept. The dependent variables are either *Initiate Dividend (0/1)*, *Pay Dividend (0/1)*, or *Dividend Payout Ratio*. Columns (1) and (2) report the coefficient associated with *EBITDA to Assets* $*$ *NZ*. Columns (3) and (4) report the coefficients associated with *EBITDA to Assets* $*$ *AUS*. Columns (1) and (3) report coefficients from Columns (4) and (5) from Tables 4, 5, and 6, respectively. Columns (2) and (4) report the coefficients from mixed effects estimation. All estimations include the controls *EBITDA to Assets*, *R&D to Assets*, *Asset Growth*, *Total Assets*, *LT Book Debt to Assets*, and *Earned to Common Equity* and include controls for Industry, Country, and Year. In the last line of the table, the "Yes" in Columns (2) and (4) denotes that the mixed effects estimator controls for time invariant firm heterogeneity. Using cluster standard errors, all estimates are statistically significant at less than the 1% level as denoted by ***.

| | *EBITDA to Assets* $*$ *NZ* | | *EBITDA to Assets* $*$ *AUS* | |
|---|---|---|---|---|
| Dependent Variable | (1) | (2) | (3) | (4) |
| *Initiate Dividend (0/1)* | 2.100*** | 2.164*** | 3.632*** | 3.632*** |
| *Pay Dividend (0/1)* | 4.544*** | 4.528*** | 5.457*** | 3.910*** |
| *Dividend Payout Ratio* | 0.254*** | 0.137*** | 0.111*** | 0.049*** |
| Controls | Yes | Yes | Yes | Yes |
| Industry | Yes | Yes | Yes | Yes |
| Country | Yes | Yes | Yes | Yes |
| Year | Yes | Yes | Yes | Yes |
| Firm | No | Yes | No | Yes |