The Impact of Tax Reform on Corporate Capital Investment: Evidence from Australian Panel Data

Abstract

We examine the impact of tax reform on corporate capital investment in Australia spanning the Ralph Review of Business Taxation reform. Based on panel data, our results indicate that corporate capital investment reduced because of the tax reform. The negative effects of the removal of accelerated depreciation exceeded the positive effects of the decrease in the corporate tax rate, hence corporate capital investment declined. Moreover, the decline was broad-based as it occurred across all major industry sectors. These findings remain robust to an alternate measure of corporate capital investment.

Keywords: Ralph Review; Tax reform; Corporate capital investment.

JEL Classification: H25; H32; K34.

1. Introduction

Prior U.S. research has examined the impact of tax reform on corporate capital investment. Kern (1994) studied the redistribution of corporate plant and equipment under the *Economic Recovery Tax Act of 1981*. This Act contained several provisions that aimed to stimulate corporate capital investment.[1] The results showed that corporations which received the largest tax benefits due to the tax reform increased their capital investment spending the most. Cummins and Hassett (1992) examined the impact of the *Tax Reform Act of 1986* on corporate capital investment,[2] and found a significant negative association between the cost of capital and plant and equipment investment. Finally, Cummins et al. (1994) analyzed corporate capital investment behavior in terms of all major U.S. tax reforms between 1962 to 1986. The results indicated that corporations that faced the greatest change in tax incentives related to corporate capital investment reacted the most.

There is a lack of research on corporate capital investment in other countries. However, major corporate tax reform proposals by the Ralph Review of Business Taxation were presented to the Australian Government on 30 July 1999. This provides a unique opportunity to treat this tax policy event as a natural experiment to study the likely impact of major tax reform on corporate capital investment in Australia. Several of the Ralph Review's key proposals could potentially affect corporate capital investment. Accelerated depreciation was proposed for removal. Moreover, a phased-in reduction of the corporate tax rate was also suggested. The Australian Government accepted both proposals, and they were codified in the *Income Tax Assessment Act (1997)*, with application from the 1999–2000 tax year.

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[1] The *Economic Recovery Tax Act of 1981* approved accelerated depreciation provisions, modified the investment tax credit regime and extended the net operating loss carryover time period and included safe harbor leasing provisions.

[2] The *Tax Reform Act of 1986* extended depreciation lifetimes, repealed the investment tax credit and lowered corporate tax rates.

Based on panel data spanning the Ralph Review tax reform, we find evidence of a significant negative association between the tax reform and corporate capital investment after controlling for corporation-specific and industry sector variables in our regression model. This association indicates that corporate capital investment decreased as a result of the tax reform. The negative effects of the removal of accelerated depreciation surpassed the positive effects of the decrease in the corporate tax rate, so corporate capital investment decreased. Our findings also show that the reduction in corporate capital investment was widespread as it occurred across all major industry sectors. Finally, these results remain robust to an alternate measure of corporate capital investment.

An important contribution of our study is that it is the first to confirm an association between the Ralph Review tax reform and corporate capital investment, and extends our understanding of the impact of tax reform on corporate capital investment. By examining the impact of tax reform on corporate capital investment, government policymakers can make more informed decisions about tax policy as it relates to corporate capital investment. Moreover, unlike prior studies that use a balance sheet measure of corporate capital investment, this study employs a cash flow statement measure, so our results should be more reliable. Finally, our study differs from previous studies by using panel data estimation models which adjust for corporation-specific and time-specific effects, so we are able to account for the impact of other variables on corporate capital investment not explicitly included in our study.

The remainder of the paper is organized as follows. Section two evaluates the Ralph Review tax reform on corporate capital investment and leads to the development of hypotheses. Section three describes the research design. Section four reports the empirical results. Finally, Section five presents the conclusion.

2. The Ralph review, corporate capital investment and hypotheses development

The Ralph Review's primary objective was to advocate basic design changes to the corporate tax system (Ralph, 1999, p. 10). Several of its key proposals could potentially affect a corporation's capital investment decisions.

The most important corporate capital investment tax reform was the replacement of accelerated depreciation with an "effective life" regime based on the economic life of an asset (Ralph, 1999, pp. 305-308). The removal of accelerated depreciation has the potential to significantly alter a corporation's incentive to invest in fixed assets. Because plant and equipment lives are extended for tax write-off purposes, this increases the tax burden for corporate purchases of plant and equipment (Cummins and Hassett, 1992, p. 244).

Another significant tax reform was the reduction in the corporate tax rate from 36% to 34% in the 2000–2001 tax year, and from 34% to 30% in the 2001–2002 tax year and thereafter. The Ralph Review considered the phased-in reduction of the corporate tax rate as a major trade-off to corporations to compensate for the removal of accelerated depreciation (Ralph, 1999, p. 425). A reduction in the corporate tax rate increases the net after-tax cash flows from investment, and makes investment in fixed assets more appealing to corporations (Black et al, 2000, p. 44).

The affect of the Ralph Review on corporate capital investment in Australia is tested with the following hypothesis:

H1: The removal of accelerated depreciation and the reduction in the corporate tax rate significantly impacted corporate capital investment in Australia.

Because of the potentially offsetting effects of the removal of accelerated depreciation on the one hand, and a reduction in the corporate tax rate on the other, we cannot predict with certainty the directional impact on corporate capital investment, so we formally test the following hypotheses:

H2a: If the negative effects of the removal of accelerated depreciation exceeded the positive effects of the reduction in the corporate tax rate, corporate capital investment in Australia decreased due to the tax reform.

H2b: If the positive effects of the reduction in the corporate tax rate exceeded the negative effects of the removal of accelerated depreciation, corporate capital investment in Australia increased due to the tax reform.

3. Research design

3.1. Sample selection and data

Our sample consists of a single panel of publicly listed Australian corporations collected from the Aspect Financial Database over the period 1997–2003. The year 2000 was excluded because it is a transitional tax year in terms of the Ralph Review proposals. It has been shown in prior research (e.g., Dhaliwal and Wang, 1992; Scholes et al., 1992; Guenther, 1994) that corporations generally respond to tax legislation changes one year after tax legislation becomes operative. The final sample consists of 222 corporations (1,332 corporation years) after excluding:

(a) Financial corporations as government regulation faced by these corporations is likely to systematically affect their capital investment decisions differently from other corporations.

(b) Foreign corporations because these corporations' investment decisions might be influenced by home country tax laws which are different from Australian tax laws.

(c) Corporations with missing data, outliers and/or no activity corporations.

A summary of the sample reconciliation for the data panel is reported in Table 1.

[Insert Table 1 Here]

3.2. Dependent variable

The dependent variable for our empirical tests is represented by corporate capital investment (CINV). Two measures of CINV are documented in the literature (e.g., Cummins and Hassett, 1992; Kern, 1994; Black et al., 2000). The first is the change in

gross property, plant and equipment collected from a corporation's balance sheet. The second is the amount of cash spent on capital expenditures taken from a corporation's cash flow statement. Data obtained from the cash flow statement is acknowledged to be superior because it is the most accurate (Kern, 1994, p. 234; Black et al., 2000, p. 43). This measure of CINV is available in the Aspect Financial Database, and is used in our study. To be consistent with Kern (1994) and Black et al. (2000), we scale CINV by total sales to obtain a measure of corporate capital investment that controls for inflation and growth. Hence, we measure corporate capital investment as the amount of cash spent on capital expenditures divided by total sales.[3]

3.3. Independent variables

The independent variables are classified as tax variables, corporation-specific variables and industry sector variables. The tax variables included are designed to capture the impact of the Ralph Review tax reform on corporate capital investment in Australia. Moreover, there are several corporation-specific variables that could affect the capital investment behavior of corporations, hence we also control for these variables in our study. Finally, there could be a change in investment patterns across industry sectors because of the removal of accelerated depreciation, so it is also necessary to control for industry sector effects.

3.3.1. Tax variables

The tax variable of primary interest in this study is represented by the Ralph Review tax reform (TREF). Consequently, TREF is denoted by a period dummy variable coded as 1 in the years in which the tax reforms took effect and 0 otherwise.

[3] Previous research by Kinney and Trezevant (1993) and Kern (1994) finds that various deflators have no impact on the empirical results.

No sign prediction is made for TREF owing to the potentially offsetting effects of the removal of accelerated depreciation and the reduction in the corporate tax rate.

The corporate tax rate (CRATE) can also influence a corporation's investment decisions, so CRATE is included in our study to account for this effect. The predicted sign for this variable is ambiguous. The Ralph Review reduced the corporate tax rate, thus as the value of an additional tax shield is a function of a corporation's marginal tax rate, a decreased corporate tax rate should cause less investment in fixed assets. Alternatively, reducing the corporate tax rate can also increase the net after-tax cash flows from an investment, and makes investment in fixed assets more attractive.[4]

As a corporation's taxable income decreases, the risk of incurring a net operating loss (NOL) for tax purposes increases, which results in a lower projected marginal tax rate. Corporations with low taxable incomes may respond differently to tax reforms that reduce depreciation rates and lower corporate tax rates. Likewise, the incentives provided by tax shields or lower corporate tax rates diminish as a corporation's marginal tax rate decreases. To capture the effects of low marginal corporate tax rates, a dummy variable coded as 1 for a NOL corporation and 0 otherwise is included. We classify a corporation is as a NOL corporation in this study if it reported a net operating loss during the previous year, the current year or the following year. The predicted sign for this variable is negative since a NOL corporation's capital investment opportunities may be affected adversely by its loss-making status.

An interaction term denoted by NOL multiplied by CRATE (NOL*CRATE) is included to more effectively account for the effects of tax rate changes on corporate capital investment. The effects of tax rate changes on corporate capital investment are

[4] It is also possible that individual tax rates can indirectly affect the corporate cost of capital due to their impact on required pre-tax rates of return (Black et al., 2000, p. 44). However, there has been no change in Australia's top marginal individual tax rate of 47% over the 1997–2003 sample period, so this variable was not included in our study.

likely to be a function of a corporation's marginal tax rate (Black et al., 2000, p. 44). There is no sign prediction for this variable.

Another interaction term for the tax variables is represented by NOL multiplied by TREF (NOL*TREF). In particular, NOL corporations may be affected in a different way to profitable corporations due to the Ralph Review tax reform, so an interaction term is included for NOL and TREF. There is no sign prediction for this variable.

3.3.2. Corporation-specific variables

The market to book (MKTBK) ratio is an important estimate of a corporation's investment opportunity set (Smith and Watts, 1992, p. 44). It is measured as the market value of equity divided by the book value of equity. The predicted sign for the MKTBK ratio is negative as it captures the difference between a corporation's return on both existing and future assets and its required rate of return on equity, so a lower MKTBK ratio suggests greater investment opportunities that are expected to yield returns in excess of the required rate of return (Collins and Kothari, 1989, p. 166).

In an efficient market, capital is provided to corporations that have superior investment opportunities (Smith and Watts, 1992, p. 264). However, while the MKTBK ratio is a direct proxy measure of investment opportunity, it is sensitive to a corporation's capital structure (Black et al., 2000, p. 45). Hence, the debt to equity (DE) ratio is included here to control for the effects of financial leverage and capital structure (Gupta and Newberry, 1997, p. 13). It is measured as long-term debt divided by total equity (both at book values). There is no predicted sign for this variable.

A capital intensive corporation is more likely to adjust its investment decision based on tax reform than a non-capital intensive corporation (Courtenay et al., 1989, pp. 289-291), so capital intensity (CINT) is included as a control variable. It is

measured as property, plant and equipment divided by total assets (both at book values). CINT is predicted to have a positive sign. Given the tax benefits normally associated with capital investment, capital-intensive corporations should invest more in fixed assets (Black et al., 2000, p. 45).

Corporation size (SIZE) can affect a corporation's ability to finance additional investment (Smith and Watts, 1992, p. 267) and therefore should also be included as a control variable. Corporation size is measured as the natural logarithm of total assets (at book value). There is no predicted sign for this variable.

Return on assets (ROA) represents an important measure of a corporation's performance and is used to control for corporate profitability (Gupta and Newberry, 1997, p. 15). It is measured as net profit before tax divided by total assets. The predicted sign for this variable is positive since an increase in return on assets should indicate an increase in corporate capital investment due to higher pre-tax income.

Cash Flow (CF) is a key measure of a corporation's ability to internally finance its capital investments. Gilchrist and Himmelberg (1995, pp. 566-567) show that cash flow impacts on a corporation's capital investment. Specifically, a corporation with a large cash flow ratio is more likely to be able to increase capital investment than a corporation with a small cash flow ratio. Hence, CF is included here as a control variable, and is measured as operating cash flow divided by total sales. The predicted sign for this variable is positive.

Lagged corporate capital investment (LCINV) in any given year should be correlated with corporate capital investment in the following year due to, for example, different industry characteristics and the various life stages of different corporations (Black et al., 2000, p. 45). Thus, a measure of corporate capital investment for the previous year is included. It is denoted by the amount of cash spent on capital

expenditures for the prior year divided by total sales to be consistent with our dependent variable. There is no sign prediction for this variable because it is possible that corporate capital investment may be cyclical, with large investments followed by periods of lower investment (Black et al., 2000, p. 45).

3.3.3. Industry sector variables

Prior research shows that corporate capital investment fluctuates across different industry sectors (e.g., Auerbach and Hassett, 1991; Cummins and Hassett, 1992; Cummins et al., 1994). Industry sector (INSEC) dummy variables defined at the two-digit Global Industry Classification Standard (GICS) code level are included.[5] An analysis with more discrete GICS classifications was not possible due to the steep decline in sample size by industry sector. The predicted sign for the INSEC dummy variables can be either negative (service industry sectors) or positive (non-service industries). However, we make no sign predictions because the INSEC dummy variables are only defined at the two-digit GICS code level, so many of the industry sector categories comprise a mix of service and non-service corporations. A summary of the industry reconciliation is provided in Table 2.

[Insert Table 2 Here]

Finally, Auerbach and Hassett (1991, p. 202) find that industry sectors may be impacted differently because of tax reform that amends fixed asset depreciation write-offs. This could occur as a direct result of the Ralph Review tax reform which removed accelerated depreciation. Interaction terms are included in our regression model by multiplying each INSEC dummy variable by TREF (INSEC*TREF). No sign predictions are made for these interaction terms.

[5] The INSEC dummy variables are represented by the energy, materials, industrials, consumer discretionary, consumer staples, heath care, information technology, telecommunication and utilities industry sectors, with utilities being the omitted sector in the regression model.

3.4. Regression model

Our empirical analysis involves estimating the following regression model:

$$CINV_{it} = \alpha_0 + \beta_1 TREF_{it} + \beta_{2it} CRATE + \beta_3 NOL_{it} + \beta_4 NOL*TREF_{it} + \beta_5 NOL*CRATE_{it} + \beta_6 MKTBK_{it} + \beta_7 DE_{it} + \beta_8 CINT_{it} + \beta_9 SIZE_{it} + \beta_{10} ROA_{it} + \beta_{11} CF_{it} + \beta_{12} LCINV_{it} + \beta_{13\text{-}20} INSEC_{it} + \beta_{21\text{-}28} INSEC*TREF_{it} + \varepsilon_{it} \quad (1)$$

where the dependent variable, $CINV_{it}$ is the level of corporate capital investment for corporation *i* in year *t* and the independent variables represent proxies for tax effects (TREF, CRATE, NOL, NOL*TREF and NOL*CRATE), corporation-specific effects (MKTBK, DE, CINT, SIZE, ROA, CF and LCINV) and industry sector effects (INSEC and INSEC*TREF). Lastly, financial statement data collected from the Aspect Financial Database are used to compute all variables.

3.5. Panel data estimation techniques

Our regression model is estimated using panel data. While it is possible to use a simple-pooled ordinary least squares model (OLSM) on panel data, this technique may not be optimal (e.g., Hsiao, 2003; Baltagi, 2005). The OLSM cannot adjust for corporation-specific and time-specific effects which might result in an omitted variables bias and an incorrectly specified model. Thus, we also estimate the fixed effects model (FEM) and random effects model (REM), and choose the most appropriate model based on statistical tests.

4. Empirical results

4.1. Descriptive statistics

Table 3 reports the descriptive statistics for the dependent and independent variables.

[Insert Table 3 Here]

Our dependent variable CINV has a mean of .074 and a range of 0 to 1.490, so the variation is reasonable. The independent variables are denoted by tax variables and corporation-specific variables. For the tax variables, TREF has a mean of .500 and a range of 0 to 1, CRATE has a mean of .337 and a range of .300 to .360, and NOL has a mean of .269 and a range of 0 to 1. Hence, there is adequate variation in the tax variables. For the corporation-specific variables, they have a reasonable amount of variation. MKTBK has a mean of 1.963 and a range of -19.610 to 42.190, ROA has a mean of .100 and a range of 0 to 1.573, and CINT has a mean of .354 and a range of 0 to .957. An acceptable range of variation is observed for all variables as well as consistency between the means and medians.

4.2. Correlation matrix

The Pearson correlation matrix for the dependent and independent variables is presented in Table 4.

[Insert Table 4 Here]

The Pearson correlation matrix shows that there are a number of significant associations between the independent variables and CINV. For the tax variables, significant correlations are found between TREF and CINV ($p < .01$), CRATE and CINV ($p < .01$) and NOL and CINV ($p < .10$). In addition, for the corporation-specific variables, significant correlations are observed between MKTBK and CINV ($p < .01$), CINT and CINV ($p < .01$), SIZE and CINV ($p < .01$), ROA and CINV ($p < .01$), CF and CINV ($p < .01$) and LCINV and CINV ($p < .01$).

Table 4 also indicates that moderate levels of collinearity exist between the independent variables. However, one high correlation is found between TREF and CRATE ($r = -.868$; $p < .01$). This high correlation was expected since a major part of

the Ralph Review tax reform was a reduction in the corporate tax rate. This high correlation makes it more difficult to find results on our major tax variable: TREF. Still, if we did not include CRATE in our study, we could not distinguish between the effects of the removal of accelerated depreciation and corporate tax rate changes. Variance inflation factors (VIFs) are computed when estimating the regression model. No VIFs exceed ten which is acceptable (Hair et al., 1998, p. 220).

4.3. Regression results

We obtain regression model estimates for OLSM, FEM and REM. Still, three statistical tests are computed to ascertain the most appropriate model to use: the Likelihood Ratio (LR) test, the Lagrange Multiplier (LM) test and the Hausman test (see e.g., Gupta and Newberry, 1997; Breusch and Pagan, 1980; Hausman, 1978). The results of the LR and LM tests are significant ($p < .01$), suggesting that both FEM and REM outperform OLSM. Based on the Hausman test, REM is also found to be superior to FEM ($p > .05$). Given the better model specification of REM, we only report these results in our paper. Table 5 summarizes the REM regression results which consider the impact of the Ralph Review tax reform on corporate capital investment after controlling for corporation-specific and industry sector effects. Significance of the estimates is based on White (1980) corrected standard errors.

[Insert Table 5 Here]

Table 5 reports that the regression model is significant at the $p < .01$ level (Wald $Chi^2 = 1{,}259.64$), while the adj. R^2 is .27. Regarding the significance of the regression coefficients for the tax variables, TREF has a significant negative association with CINV ($p < .01$), and indicates that the Ralph Review tax reform significantly reduced corporate capital investment in Australia. These results provide support for H1 and

more specifically, for H2a. The negative effects of the removal of accelerated depreciation exceeded the positive effects of the reduction in the corporate tax rate, so corporate capital investment declined. Finally, Table 5 shows that the coefficients for CRATE, NOL, NOL*TREF and NOL*CRATE are insignificant.

As to the significance of the regression coefficients for the corporation-specific variables, Table 5 shows that several of them are significant. CINT is included in our study to control for corporate investment decisions. As expected, it has a significant positive association with CINV ($p < .01$). Capital-intensive corporations invest more in fixed assets than non-capital-intensive corporations. SIZE is included in our study to control for the ability of corporations to finance additional investment. SIZE has a significant positive association with CINV ($p < .01$). Large corporations are better able to finance capital investment than small corporations. ROA is included in our study as a control for corporate profitability. As expected, the results show that it has a significant positive association with CINV ($p < .05$), suggesting that profitable corporations undertake more capital investment than less profitable corporations. CF represents another control variable in our study, and is a measure of the ability of corporations to finance their capital investments from internal sources. As expected, CF has a significant positive association with CINV ($p < .01$). Corporations with large cash flows are able to increase their capital investment more than corporations with small cash flows. Our final corporation-specific variable is denoted by LCINV. It is included in our study as a control since lagged capital investment for corporations in any given year should be correlated with corporate capital investment in the next year. LCINV has a significant positive association with CINV ($p < .10$). Lagged capital investment for corporations is followed by more corporate capital investment in the following year. Finally, the coefficients for MKTBK and DE are insignificant.

Our regression model also includes INSEC dummy variables because corporate capital investment can fluctuate across different industry sectors. In terms of the significance of the regression coefficients for the INSEC dummy variables: energy, materials, industrials, consumer discretionary, consumer staples, heath care, information technology and telecommunication, Table 5 reports that each of them has a significant positive association with CINV ($p < .01$). These results show that the industry sectors are generally related to corporate capital investment. Moreover, for the coefficients of the interaction terms between the INSEC dummy variables and TREF, Table 5 reports that they all have a significant negative association with CINV ($p < .01$). These results suggest that the association between the INSEC dummy variables and CINV underwent a fundamental change due to the tax reform. There was a broad-based decline in corporate capital investment across all industry sectors because of the Ralph Review.

4.4. Robustness check

Our dependent variable, CINV is measured as the amount of cash spent on capital expenditures because this is recognized in the literature as the superior measure (e.g., Kern, 1994; Black et al., 2000). As a robustness check of our regression results, we re-estimated our regression model using the alternate measure of CINV: change in gross property, plant and equipment, as our dependent variable. We also scaled this particular measure of CINV by total sales to control for inflation and growth.

The REM regression results, not reported, indicate that the coefficient estimates have identical signs and generally the same level of statistical significance. However, several of the coefficients for the industry sectors (i.e., energy, materials, industrials, consumer discretionary and information technology) were found to be insignificant.

In addition, the explanatory power of the regression model (Wald Chi^2 = 90.77, significant at the $p < .01$ level; adj. R^2 = .10) is considerably less when using the alternate measure of CINV. These results show the benefit of using a cash flow based measure of corporate capital investment in this line of research.

5. Conclusion

We examine the impact of the Ralph Review of Business Taxation reform on corporate capital investment in Australia. Based on panel data spanning the tax reform, we find evidence of a significant negative association between the tax reform and corporate capital investment. This result suggests that corporate capital investment decreased as a result of the tax reform. The negative effects of the removal of accelerated depreciation exceeded the positive effects of the decrease in the corporate tax rate, so corporate capital investment declined. The regression results also show that the decline in corporate capital investment was broad-based as it occurred across all major industry sectors. These findings remain robust to an alternate measure of corporate capital investment.

Our study is the first to validate an association between the Ralph Review tax reform and corporate capital investment in Australia, and extends our knowledge of the impact of tax reform on corporate capital investment. By examining the impact of tax reform on corporate capital investment, government policymakers are able to make more informed decisions about tax policy as it affects corporate capital investment. Our results also lend support to the value of using a cash flow based measure of corporate capital investment. Finally, this study shows the merit of employing panel data estimation models which adjust for corporation-specific and time-specific effects to analyze corporate capital investment.

This study is subject to several limitations. First, a common problem in this area of research is that major tax reforms seldom represent discrete events. Rather, they typically include changes with potentially off-setting effects. Moreover, time lags caused by political debates and actual implementation of enacted tax law changes produce many timing and measurement issues. Still, we have considered acceptable alternatives on how and when several of our variables are measured. Second, the sample is drawn from publicly listed corporations. Due to data unavailability, it was not possible to include non-listed corporations in our sample. Finally, our corporate capital investment model may be incomplete. While every effort was made to control for major non-tax variables in our model, there may be other variables that could affect corporate capital investment. However, an advantage of the panel data estimation techniques used in our study is that they possibly account for these other variables. Future research could investigate these issues in further detail.

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Table 1
Sample reconciliation

	1997–2003†
All corporations in the Aspect Financial Database	1,743
Less:	
Financial institutions and foreign corporations	(24)
Corporations with missing data, outliers and/or no activity	(1,497)
Final sample (number of corporations)	222
Final sample (corporation years)	1,332

†The year 2000 was excluded from the sample.

Table 2
Industry reconciliation

Industry Sector	Number of Corporations	Corporation Years	Relative Frequency (%)
Energy	7	42	3
Materials	54	324	24
Industrials	53	318	23
Consumer Discretionary	54	324	24
Consumer Staples	28	168	13
Heath Care	14	84	7
Information Technology	3	18	2
Telecommunication Services	2	12	1
Utilities†	7	42	3
Totals	222	1,332	100%

†Omitted sector in the regression analysis.

Table 3
Descriptive statistics (n = 1,332 corporation years)

Variable	Mean	Median	Std. Dev.	Min	Max
CINV	.074	.073	.123	0	1.490
TREF	.500	.500	.501	0	1
CRATE	.337	.350	.027	.300	.360
NOL	.269	.243	.443	0	1
MKTBK	1.963	1.340	2.812	-19.610	42.190
DE	.436	.289	1.585	-11.079	39.692
CINT	.354	.327	.207	0	.957
SIZE	18.832	18.524	1.970	13.700	24.735
ROA	.100	.073	.126	0	1.573
CF	.023	.022	1.031	-32.987	1.457
LCINV	.099	.041	.363	0	9.590

Definition of variables: CINV is cash spent on capital expenditures divided by total sales; TREF is a dummy variable coded as 1 in the years in which the tax reforms took effect and 0 otherwise; CRATE is the statutory corporate tax rate; NOL is a dummy variable coded as 1 if a corporation reported a net operating loss during the previous year, the current year or the following year and 0 otherwise; MKTBK is the market value of equity divided by the book value of equity; DE is long-term debt divided by total equity; CINT is property, plant and equipment divided by total assets; SIZE is the natural logarithm of total assets; ROA is net profit before tax divided by total assets; CF is operating cash flow divided by total sales; and LCINV is the amount of cash spent on capital expenditures for the prior year divided by total sales.

Table 4
Pearson correlation matrix (n = 1,332 corporation years)

	CINV	TREF	CRATE	NOL	MKTBK	DE	CINT	SIZE	ROA	CF	LCINV
CINV	1										
TREF	-.070***	1									
CRATE	.080***	-.868***	1								
NOL	-.047*	.088***	-.072***	1							
MKTBK	.071***	.029	-.021	-.007	1						
DE	.007	-.004	.009	-.035	.137***	1					
CINT	.235***	-.075***	.067**	-.089***	-.101***	.022	1				
SIZE	.079***	.077***	-.068**	-.369***	.003	.140***	.134***	1			
ROA	.168***	.009	-.030	-.149***	.436***	-.044	-.079***	-.243***	1		
CF	.142***	.018	-.018	-.155***	-.024	.002	.085***	.139***	-.176***	1	
LCINV	.345***	-.036	.055**	.102***	.086***	-.001	.038	-.032	.184***	-.136***	1

Definition of variables: CINV is cash spent on capital expenditures divided by total sales; TREF is a dummy variable coded as 1 in the years in which the tax reforms took effect and 0 otherwise; CRATE is the statutory corporate tax rate; NOL is a dummy variable coded as 1 if a corporation reported a net operating loss during the previous year, the current year or the following year and 0 otherwise; MKTBK is the market value of equity divided by the book value of equity; DE is long-term debt divided by total equity; CINT is property, plant and equipment divided by total assets; SIZE is the natural logarithm of total assets; ROA is net profit before tax divided by total assets; CF is operating cash flow divided by total sales; and LCINV is the amount of cash spent on capital expenditures for the prior year divided by total sales.
*, **, *** Significant at .10, .05 and .01 levels. Two-tailed (one-tailed) tests are used for non-directional (directional) predictions.

Table 5
Regression results (n = 1,332 corporation years)

$CINV_{it} = \alpha_0 + \beta_1 TREF_{it} + \beta_{2it} CRATE + \beta_3 NOL_{it} + \beta_4 NOL*TREF_{it} + \beta_5 NOL*CRATE_{it} + \beta_6 MKTBK_{it} + \beta_7 DE_{it} + \beta_8 CINT_{it} + \beta_9 SIZE_{it} + \beta_{10} ROA_{it} + \beta_{11} CF_{it} + \beta_{12} LCINV_{it} + \beta_{13\text{-}20} INSEC_{it} + \beta_{21\text{-}28} INSEC*TREF_{it} + \varepsilon_{it}$

Independent Variables	Predicted Sign	Coefficient	Standard Error[a]	*t* statistic
Intercept		.210	.158	1.33
TREF	?	-.411	.143	-2.87***
CRATE	?	.218	.145	1.50
NOL	-	-.067	.235	-.29
NOL*TREF	?	.023	.037	.62
NOL*CRATE	?	.194	.651	.30
MKTBK	-	.001	.002	.50
DE	?	-.001	.002	-.50
CINT	+	.131	.016	8.19***
SIZE	?	.007	.002	3.50***
ROA	+	.125	.071	1.76**
CF	+	.014	.004	3.50***
LCINV	?	.092	.055	1.67*
INSEC				
Energy	?	.359	.144	2.49***
Materials	?	.391	.143	2.73***
Industrials	?	.418	.143	2.92***
Consumer Discretionary	?	.399	.144	2.77***
Consumer Staples	?	.412	.143	2.88***
Heath Care	?	.415	.143	2.90***
Information Technology	?	.395	.145	2.72***
Telecommunication Services	?	.403	.146	2.76***
INSEC*TREF				
Energy*TREF	?	-.408	.147	-2.78***
Materials*TREF	?	-.404	.144	-2.81***
Industrials*TREF	?	-.416	.143	-2.91***
Consumer Discretionary*TREF	?	-.402	.144	-2.79***
Consumer Staples*TREF	?	-.402	.143	-2.81***
Heath Care*TREF	?	-.412	.143	-2.88***
Information Technology*TREF	?	-.396	.145	-2.73***
Telecommunication Services*TREF	?	-.475	.166	-2.86***
Adj. R^2	.27			
Wald Chi^2	1,259.64			
(two-tailed *p* value)	.01			

Definition of variables: CINV is cash spent on capital expenditures divided by total sales; TREF is a dummy variable coded as 1 in the years in which the tax reforms took effect and 0 otherwise; CRATE is the statutory corporate tax rate; NOL is a dummy variable coded as 1 if a corporation reported a net operating loss during the previous year, the current year or the following year and 0 otherwise; NOL*TREF is an interaction term; NOL*CRATE is an interaction term; MKTBK is the market value of equity divided by the book value of equity; DE is long-term debt divided by total equity; CINT is property, plant and equipment divided by total assets; SIZE is the natural logarithm of total assets; ROA is net profit before tax divided by total assets; CF is operating cash flow divided by total sales; and LCINV is the amount of cash spent on capital expenditures for the prior year divided by total sales; INSEC is a series of industry sector dummy variables; and INSEC*TREF is an interaction term.
*, **, *** Significant at .10, .05 and .01 levels. Two-tailed (one-tailed) tests are used for non-directional (directional) predictions.
[a]White (1980) corrected standard errors.