



Investment incentives and corporate tax asymmetries

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ABSTRACT

Recent facts on the importance of corporate losses motivate more careful study of the impact of tax incentives for investment on firms that lose money. I model firm investment decisions in a setting featuring financing constraints and carrybacks and carryforwards of operating losses. I estimate investment responses to tax incentives allowing effects to vary with cash flows and taxable status. Results suggest that asymmetries in the corporate tax code could have made recent bonus depreciation tax incentives at most 4% less effective than they would have been if all firms were fully taxable. Cash flows have more important effects on the impact of tax incentives. Recent declines in cash flows would predict a 24% decrease in the effectiveness of bonus depreciation. Results thus suggest that tax incentives have the smallest impact on investment exactly when they are most likely to be put in place – during downturns in economic activity when cash flows are low.

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1. Introduction

In 2002, U.S. corporations that lost money reported \$418 billion in losses on their tax returns. This amount is more than 60% of the \$676 billion in profits reported by profitable corporations. Also in 2002, President Bush signed the Job Creation and Worker Assistance Act, which included “bonus depreciation” provisions that allowed firms to deduct a larger portion of their spending on new capital equipment from their taxable income. Similar incentives were enacted in response to recession in 2008 and remained in place through the end of 2009. Bonus depreciation was intended to encourage firms to increase their investment, but several observers have found that it had little effect.² In this paper, I model and estimate how corporate losses may mitigate the impact of tax incentives like bonus depreciation.

I adapt the tax-adjusted Q model of Hayashi (1982) and Summers (1981) to a setting featuring financing constraints and carrybacks and carryforwards of operating losses. I consider the effects of investment incentives on two groups of firms. The first, taxable firms, pay the statutory tax rate on a marginal increase in income, either in the form of an increased tax liability or a decreased carryback refund. The second, nontaxable firms, face a tax rate of zero on a marginal increase in income. I show how investment choices depend on a familiar tax-adjusted Q expression, modified by the shadow values to the firm of carrybacks and carryforwards and by the presence of a binding financing constraint. Investment responses to tax incentives may differ between taxable and nontaxable firms, and they may be dampened by a binding financing constraint.

I present empirical estimates of the asymmetry in investment responses between taxable and nontaxable firms, using carefully constructed measures of taxable status for firms in the Compustat panel. Results suggest that nontaxable firms respond about 55% as strongly to tax incentives as do taxable firms. However, this observed asymmetry depends importantly on the cash flows earned by both groups of firms. Firms are considerably more responsive to investment incentives when their ratio of cash flows to assets is high. Including controls for cash flows considerably dampens the estimated effects of taxable status on the impact of tax incentives. With these controls, estimates suggest that bonus depreciation was at most 4% less effective than it would have been if all firms had been fully taxable.

I am not the first to infer measures of taxable status from financial statement data, and one might worry that the variables constructed in

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¹ The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Board of Governors or its staff.

² Cohen and Cummins (2006) find no effect of the incentives on investment quantities by comparing aggregate investment in assets most and least affected by the incentives. Edgerton (2009) finds no evidence for any effect of the incentives on the relative prices of new and used construction machinery, where used machinery did not qualify for the incentives. Knittel (2007) documents that firms making a substantial fraction of investments that qualified for bonus depreciation did not even claim the benefits to which they were entitled. See House and Shapiro (2008) for a dissenting view.

this paper measure taxable status poorly relative to those constructed by others. I conduct similar tests of the effects of taxable status using measures developed by Plesko (2003) and Graham (1996), and they perform no better than the ones I develop. It is still possible that errors in measuring taxable status attenuate its importance in these results. Proponents of prior measures claim, however, that these variables do quite well in measuring taxable status when compared with actual tax returns (Plesko (2003), Graham and Mills (2008)). Measurement error therefore appears unlikely to drive results. I conclude that there is little evidence that asymmetries in the corporate tax code played an important role in mitigating investment responses to bonus depreciation.

Cash flows, however, are much more successful in predicting firm responses to investment incentives. The aggregate ratio of cash flows to assets across all Compustat firms fell to 0.06 around the 2001 recession from an average near 0.11 before 1985. Applying coefficient estimates to this change in cash flows suggests that firms were 24% less responsive to bonus depreciation around the 2001 recession than they would have been if cash flows remained near historical averages.

Results thus suggest that tax incentives have the smallest impact on investment exactly when they are most likely to be put in place – during downturns in economic activity when cash flows are low. These results do not, however, prove a causal relationship between cash flows and responsiveness to tax incentives. In fact, these results could be generated by models that do not involve a financing constraint or a direct effect of cash flows on investment.

I discuss three models of investment that could explain this positive association between cash flows and the effectiveness of tax incentives. The model developed in this paper shows that these results could arise when firms face binding financing constraints. Caballero and Engel (1999) show that they could arise in a model where firms face a fixed cost of adjusting their capital stock. Bloom et al. (2009) show how time-varying uncertainty could further reduce the sensitivity of investment to tax incentives during downturns. I then present simple empirical tests intended as a horse race among these models. Results provide some evidence that financing constraints do matter for the effectiveness of incentives, but, in fact, the Caballero and Engel (1999) mechanism receives the most support from the data used here. More research into the causes and consequences of business cycle variation in the impact of tax incentives would be welcome.

The following section further motivates the paper by documenting the prevalence of losses among U.S. corporations in recent years, reviewing their treatment under the tax code, and reviewing related literature. Section 3 presents a model of firm investment decisions incorporating financing constraints and the tax treatment of losses. Section 4 describes the Compustat sample of financial statements and details the calculation of proxies for tax-related variables. Section 5 presents regression results, and Section 6 concludes.

2. Motivation

2.1. Facts on corporate losses

I discuss two stylized facts on corporate losses in the United States. First, I document that corporate losses have been quite large relative to positive profits during recent recessions.³ Second, most losses are not used quickly to offset profits through carrybacks or carryforwards, but tend to be carried forward for several years or expire unused.

³ Altshuler et al. (2008) have also recently documented this fact and explored in more detail the behavior of losses among subsets of firms. Interestingly, available Compustat data from 2008 also suggest that the peak of the loss-to-profit ratio will be lower during the “Great Recession” than it was during the far milder 2001 recession. There were no 2008 tax return data yet available at the time of this writing.

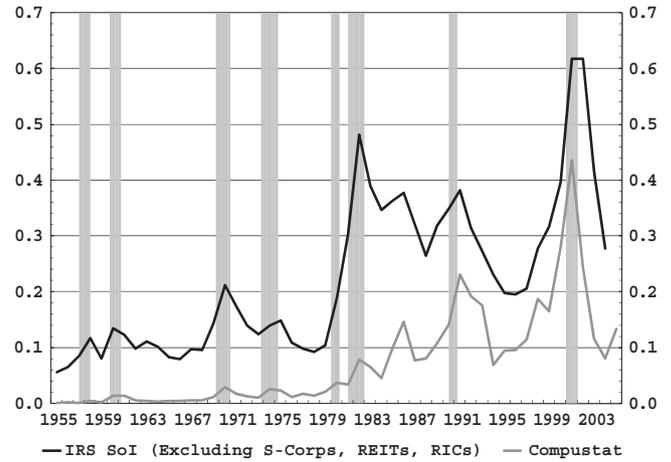


Fig. 1. Ratio of U.S. corporate losses to net income.

Together, these facts suggest that the asymmetric treatment of losses could have important effects on investment decisions.

Fig. 1 plots two historical measures of the ratio of corporate losses to corporate income in the United States. The numerator in this ratio is the sum of losses across all corporations that report a loss. The denominator is the sum of positive profits across all corporations that report a positive profit. The black line shows this loss ratio calculated from the Internal Revenue Service's Statistics of Income data for all firms that file corporate income tax returns. The grey line shows the loss ratio calculated for all nonfinancial, U.S. incorporated firms in Standard and Poor's Compustat dataset. Details on this calculation appear in Appendix B.

The underlying IRS and Compustat data differ in several ways. The IRS data include tax income for all firms that file corporate income tax returns. In 2003, there were over 2 million such firms, even after excluding subchapter S corporations, Real Estate Investment Trusts, and Regulated Investment Companies. The Compustat data include book income for large, publicly traded firms. The number of U.S. firms included in the Compustat sample has grown from less than 1000 in 1955 to more than 5000 today. The IRS ratio in Fig. 1 persistently exceeds the Compustat ratio for two reasons. First, the Compustat sample is composed primarily of large firms, which realize losses less frequently than smaller firms. Second, book income as reported in Compustat typically exceeds tax income as reported to the IRS.⁴

Despite these differences, the two series share important features. The levels of both series increase dramatically between the first half of the sample and today. The loss ratio in the IRS data averaged 0.12 from 1973 to 1977, while it averaged 0.47 from 1999 to 2003, an increase of 280 percent.⁵ Both five-year periods include a single recession. A second notable feature of both the IRS and Compustat loss ratio series is the height of their peaks near the relatively mild 1990 and 2001 recessions. Both series peaked at over 0.2 in the early 1990s and over 0.4 in the early 2000s. Fig. 2 plots similar ratios for the subsets of the firms in Compustat sorted by the book value of their assets. Even among the 100 largest industrial firms in the United States, the ratio of losses to profits peaked at more than 0.25 in 2001, much higher than in previous recessions.

2.2. Tax treatment of corporate losses

A firm earning positive profits typically must pay a percentage of its profits in tax, while a firm running a loss need not receive an

⁴ See Hanlon (2003) for more on the differences between tax and book income.

⁵ The average loss ratio in the Compustat data rose from 0.02 to 0.25 between these periods, although this 1300 percent increase can be attributed largely to the expansion of the Compustat sample to include more smaller firms.

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