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Leming Lin, Mark J. Flannery*

Warrington College of Business Administration, University of Florida, United States

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ABSTRACT

Because the personal tax treatments of interest and dividend income likely affect the relative cost of debt and equity financing, a sharp change in tax treatment could affect firms' optimal leverage. This paper examines the effect of the 2003 equity income tax cut on firms' debt usage. Because this tax cut affected only individual investors, we can use a difference-in-differences method to identify the effect of personal tax on firms' leverage. Previous research has found that the 2003 tax cut encouraged dividend payouts and reduced the cost of equity, but it provides no link to equilibrium leverage ratios. We estimate that the tax cut causes the affected firms' leverage to decrease by about 5 percentage points. Furthermore, we show that the effects of the tax cut are stronger for firms with lower marginal corporate tax rates and for firms that are not financially constrained, consistent with our theoretical predictions. Overall, we find strong evidence that personal tax is an important determinant of firms' optimal leverage.

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1. Introduction

In the theory of corporate finance, tax-deductible interest payments encourage firms to finance themselves with debt. But Miller (1977) shows how personal taxes also affect the value of interest versus equity payments to firm claimants. The net tax advantage of \$1 of debt payout, instead of \$1 of equity payout, is

$$(1 - \tau_p) - (1 - \tau_c)(1 - \tau_e) \quad (1)$$

where τ_p is the personal tax rate on interest income, τ_c is the corporate tax rate, and τ_e is the personal tax rate on equity income. The tax benefit of debt increases with the corporate tax rate and the personal tax rate on equity

income, but it decreases with the personal tax rate on interest income. In the extreme, the personal tax rate on interest income (relative to that on equity income) could be large enough to completely offset the corporate tax advantage of debt.

Although important in theory, the empirical evidence that personal taxes affect a firm's leverage ratio is limited. The major difficulty for the empirical tests appears to be identifying variation in personal tax rates that is exogenous and also allows for separating the effects of contemporaneous events. In this paper, we study firms' leverage adjustments following the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA). The JGTRRA reduced US federal dividend tax rates from a maximum of 38.6% to 15% and long-term capital gains tax rates from a maximum of 20% to 15% for individual investors. The JGTRRA was passed by the US Congress on May 23, 2003 and signed into law by President George W. Bush on May 28, 2003. The 2003 tax cut provides an ideal setting for testing the impact of personal tax rates on firms' leverage for several reasons. First, the 2003 tax cut introduced a relatively

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* Corresponding author. Tel.: +1 352 392 3184.

E-mail address: flannery@ufl.edu (M.J. Flannery).

large increase in the after-tax value of equity distributions. Second, the tax cut came largely as a surprise to the market, so that we can treat it as an exogenous event. Third, the tax cut affected the value of dividends or capital gains only to tax-paying individuals but did not change tax rates for corporations or nonprofit investors. We can, therefore, use the likelihood that each firm's marginal investor is an individual investor to design a difference-in-differences (DID) method of estimating the effect of the 2003 tax cut on firms' leverage.

To motivate our empirical tests, we present a simple model of leverage choice and then conduct a comparative statics analysis of how personal equity income tax affects firms' optimal debt ratios. The model requires knowledge of the benefits and costs of debt. For the benefits, we simply use a modified version of Eq. (1). For the costs, we adopt the reduced form cost function presented in van Binsbergen, Graham, and Yang (2010). The model we present implies that the impact of the 2003 tax cut should be larger for firms with lower marginal corporate tax rates and firms with smaller slopes of the marginal cost function of debt.

To estimate the effect of the tax cut on firms' debt ratio, we examine leverage changes between the ends of fiscal years 2002 and 2004. To eliminate the influence of any confounding factors and to identify the causal effect of the 2003 tax cut, we use percentage of shares owned by individual investors as our main identification variable. We find that a firm whose marginal owner was an individual reduced its book leverage by a considerable amount in response to the tax cut—about 5 percentage points compared with a sample average of 19.9% debt ratio in 2002. This result is consistent with findings that the JGTRRA reduced firms' cost of equity (Dhaliwal, Krull, and Li, 2007) and led them to pay out more in equity income (Chetty and Saez, 2005). Furthermore, the net reduction in affected firms' leverage means that they undertook leverage-decreasing transactions more than sufficient to offset the JGTRRA-induced increase in dividend payments, which would have raised leverage, *ceteris paribus*.¹ Finally, consistent with theoretical predictions, firms with lower marginal corporate tax rates and firms that are less financially constrained reduce leverage ratios more in response to the tax cut.

This paper is related to the literature that deals with the effect of personal taxes on capital structure. Graham (1999) is the first to directly test the effect of personal taxes using firm-level data. He uses dividend payout to proxy for personal tax rates and concludes that adjusting for personal taxes in estimating tax benefits helps to explain debt usage. He also finds that personal taxes are negatively related to debt usage. However, if firms simultaneously select their payout and leverage policies, payout rates could be correlated with leverage, invalidating Graham's interpretation of the payout ratio proxy. Campello (2001) also uses the dividend payout ratio to identify firms that are likely to change their capital structure following the Tax Reform Act of 1986 (TRA). He

finds that zero-dividend firms increased leverage ratios and high dividend payout firms reduced leverage ratios. By examining a period containing an exogenous tax code change, Campello's study could mitigate somewhat, but does not eliminate, the bias from relying on dividend policy for identification. Moreover, since the 1986 act included numerous changes in the relative tax treatment of corporate and individual income, isolating the effect of personal taxes on capital structure is difficult. Dhaliwal, Erickson, and Krull (2007) show that firms are more likely to issue debt (relative to equity) following the tax cuts in 1997 and 2003. However, their analysis of new issues provides only a qualitative assessment of how personal taxes affect equilibrium leverage ratios, and they study only the subset of firms with substantial debt or equity issues. Their methodology thus excludes other mechanisms by which firms could adjust leverage, such as earnings retention. In a contemporaneous study, Faccio and Xu (2011) examine the impact of corporate and personal taxes on capital structure by exploiting the shifts in statutory tax rates across OECD (Organisation for Economic Co-operation and Development) countries from 1981 to 2009. They find that corporate as well as personal taxes are important determinants of capital structure. Although their primary focus is the cross-country differences in the response to tax rate changes, their paper contains a table showing that firms' leverage decreases following the US 2003 tax cut. However, our focus on the US permits more detailed specifications and a fuller assessment of the tax cut, and our estimate is about twice as large as theirs.

Our paper differs from the above studies in several important ways. First, we focus on the relatively simple US 2003 tax cut to test whether personal taxes affect leverage. Second, we adopt a difference-in-differences methodology well suited to quantifying the impact of personal taxes on firms' leverage ratios. Third, we derive our empirical model from a simple theoretical framework, which clearly illustrates how personal equity income taxes impact optimal leverage ratios. Finally, we find evidence consistent with the model's implications, that the personal tax cut reduces firm leverage and this effect decreases with the marginal corporate tax rate and with the slope of the marginal cost function of debt.

The remainder of the article is organized as follows. In Section 2, we review the theory of the tax benefit of debt when personal taxes are considered. After introducing a reduced form cost function of debt, we conduct the comparative static analysis of how personal equity income taxes affect the optimal debt ratio. In Section 3, we discuss the identification strategy and establish our empirical specification. Section 4 describes the data procedure and presents summary statistics. In Section 5, we report our main results about the response of firms' book leverage to the 2003 tax cut. Section 6 provides some robustness checks of the main results, including the use of an alternative variable to measure firms' treatment status. Section 7 concludes the discussion.

2. Theoretical background

In this section, we derive the formula for the marginal effect of the personal equity income tax rate on a firm's

¹ We thank the referee for suggesting this expositional point.

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