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**IPOs and Corporate Taxes**

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## IPOs and Corporate Taxes

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**Abstract:** How does going public affect firms' tax obligations and tax planning? Using a panel of U.S. corporate tax return data from 1994 to 2018, we compare tax payments for firms that completed an IPO with those that filed for an IPO but later withdrew and remained private. We find that in the years immediately following IPO completion, firms have a higher probability of paying taxes and pay more U.S. tax. The effects occur regardless of tax status in the pre-IPO period and are not explained by statutory limitations imposed on the use of pre-IPO losses. Higher income reported for financial reporting purposes, as well as lower interest deductions attributable to debt repayment, contribute to the increased tax payments. These increases are partially offset by higher tax deductions for post-IPO investment and employment spending. Furthermore, the IPO is associated with increased tax planning through foreign tax haven use. The evidence adds to the nascent literature examining corporate tax implications of the IPO decision.

Keywords: Corporate tax, IPO, investment, tax haven

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## **1. Introduction**

An initial public offering (IPO) is a seminal event in the lifecycle of a firm, providing an influx of equity capital, expanding the ownership base, and subjecting the firm to public financial reporting requirements. Lowry, Michaely, and Volkova (2017) show that over 6,500 firms have gone public since 1990, raising approximately \$1 trillion in outside capital. A substantial academic literature examines IPOs, focusing on market underpricing, long-run underperformance, determinants of the going-public decision, and investment outcomes (reviewed by Ritter and Welch, 2002; Lowry, Michaely, and Volkova, 2017). However, there is little evidence on the extent to which the IPO affects firms' tax obligations, even though the IPO event is accompanied by operational, investment, and reporting shifts that can directly affect tax payments and provide opportunities to implement tax planning strategies (Edwards, Hutchens, and Rego, 2019). In this paper, we use a panel of U.S. corporate tax filings to first provide descriptive evidence of the extent to which domestic tax payments change following an IPO transaction. We then test the economic drivers of any such change, including (i) corporate investment and employment spending, (ii) capital structure re-adjustments, (iii) financial reporting incentives, and (iv) explicit tax planning strategies.

Edwards and Hutchens (2020) state that prior research is largely silent on the relation between corporate taxes and IPOs. The lack of prior evidence may be attributable to two factors. The first is an econometric challenge, as the decision to complete an IPO is endogenous. Indeed, a common critique of the IPO literature is that it is difficult to disentangle the effects of capital infusion from the managerial decision to go public, due to the lack of an appropriate control sample against which to measure effects. The second factor is a data challenge: there are few data sources on private

firms (Lisowsky and Minnis, 2020; Badertscher, Katz, and Rego, 2013), making it difficult to study tax obligations in the pre-IPO period.

To address the econometric challenge, we follow Bernstein (2015) and compare firms that complete IPOs to firms that filed for an IPO but ultimately withdrew and remained private. These two sets of firms are naturally comparable, as both faced similar incentives in the decision to file for an IPO. Furthermore, firms generally incorporate as a “C corporation” legal entity in advance of an IPO filing, ensuring that both IPO-completing and IPO-withdrawing firms face similar tax incentives and available tax planning strategies during our period of study. To mitigate the endogeneity concerns related to the IPO decision, we employ inverse probability weighting to ensure that the firms do not differ based on observable characteristics in the pre-IPO period. The inclusion of the withdrawn firms as a comparison group allows us to better isolate the effects of IPO capital infusion and expanded ownership on firms’ tax payments.

To overcome the data availability challenge, we use a panel of confidential U.S. corporate tax returns from both public and private firms. Our data span 1994 through 2018, with a focus on the seven years surrounding each firm’s IPO filing. Although these data only capture U.S. tax liabilities, they permit measurement of tax obligations for several years prior to the IPO, including years outside of the S-1 filing. Furthermore, they allow us to distinguish between the effects of tax planning and other investment and operational factors that may naturally drive changes in tax payments, all of which may explain why tax obligations change as companies transition to public markets.

First, we study how tax payments change after an IPO. We start with descriptive evidence of U.S. tax payments around an IPO filing for firms that complete versus withdraw the IPO, using several measures of cash taxes paid. Because the commonly-used effective tax rate (ETR) measure

cannot be calculated for the large proportion of IPO firms with tax losses, we use an indicator for paying domestic taxes as well as two continuous measures, including the natural logarithm of one plus tax payments and the ratio of domestic taxes paid to domestic income (for tax purposes). We employ a stacked cohort design in which we compare IPO-completing firms in each sample year to withdrawing firms in the same sample year, thus holding constant the applicable U.S. corporate income tax rates and accompanying tax incentives. Across the three tax measures, we consistently find increases in tax payments for firms that complete an IPO versus those that withdraw. For example, the probability of paying taxes rises by approximately 5.8 to 7.0 percentage points after IPO completion; given that only 31 percent of the sample pay tax, this is equivalent to an 18.7-22.6 percent increase. Additional tests demonstrate that the increase occurs regardless of whether firms were paying tax in the pre-IPO period and that a U.S. statutory limitation on post-IPO tax loss use is not the primary explanation for the observed tax increases. Robustness tests using alternative samples and research designs, such as a generalized difference-in-difference design and an instrumental variables approach following Bernstein (2015), generate a range of magnitudes for the documented tax payment effects.

We then focus on our primary research question related to the economic drivers of these increased payments. We focus on two “real” activities motivated by the prior literature – investment/employment spending and capital structure re-adjustments – as well as two “reporting” activities related to financial performance and explicit tax planning. We first study the role of corporate investment and employment given that firms cite the demand for investment capital as one reason to enter the public market (Ritter and Welch, 2002; Chemmanur, He, and Nandy, 2009). To the extent that firms increase investment in the three year post-IPO filing period we study, we would observe lower tax payments attributable to the corresponding increased depreciation

deductions and R&D tax benefits. However, if the capital infusion is not used for investment purposes (Pagano, Panetta, and Zingales, 1998; Bernstein, 2015), we would observe minimal change in tax obligations. Using detailed domestic investment data, we find that firms report both increased capital expenditures and R&D expense. We link the capital expenditure activity to tax payments by documenting a commensurate increase in depreciation deductions by IPO-completing firms relative to withdrawing firms. Additional tests show that firms also report greater employee compensation deductions in the post-IPO period, implying use of the IPO capital infusion for investment in both fixed and human capital. Overall, this real investment and employment activity is one channel through which firms' tax obligations change; this spending drives greater tax shields, thereby *lowering* taxable income and tax payments post-IPO.

Second, we study capital structure effects of the IPO. Capital structure re-adjustment is one of the top three reasons firms cite for going public (Lowry, Michaely, and Volkova, 2017), and thus we examine the extent to which changes in external debt financing affect post-IPO tax payments. We find that firms significantly reduce their external borrowing after the IPO, measured using total long-term debt, total debt, and total debt scaled by assets. Additional tests confirm a commensurate but modest decline in interest deductions, implying *increased* taxable income and tax payments in IPO firms.

We next study how the shift in firms' reporting incentives affects tax payments. Increased capital market pressure shifts firms' focus from minimizing tax obligations to meeting financial reporting targets (Teoh, Welch, and Wong, 2002). The disciplining role of public market scrutiny may motivate managers to implement operational improvements, thereby driving increased financial performance reported for both book and tax purposes. The focus on targets could also manifest in earnings management activities that cannot be unwound for tax purposes (Erickson,

Hanlon, and Maydew, 2004). We find that IPO-completing firms on average report higher financial reporting income per dollar of sales and assets, as compared to withdrawing firms in the post-IPO period. We link this improved financial performance to tax payments by comparing the distribution of income reported for tax purposes from the pre- to the post-IPO period. For both IPO-completing and withdrawing firms in the pre-IPO period, we observe a normal distribution with a clear peak centered just below zero taxable income, suggesting that on average a large proportion of firms report small tax losses. The IPO-withdrawing firms exhibit a virtually identical distribution after they file for the IPO. However, IPO-completing firms exhibit a flatter distribution after going public, reflecting that more firms report taxable profits post-IPO. Thus, improved financial performance is a third channel through which firms appear to report both *increased* taxable income and tax obligations post-IPO.

The fourth channel we study is explicit tax planning. Firms may use the IPO event as an opportunity to implement a number of tax planning strategies, such as “supercharging” tax benefits (Edwards, Hutchens, and Rego, 2019) and establishing tax structures to facilitate future tax avoidance and counteract the higher post-IPO income. We focus on foreign tax planning given the considerable focus in the academic literature on firms’ geographic presence and the ability of firms to lower their tax obligations through shifting both income and physical presence to lower-taxed jurisdictions. We find that the probability that a firm has a tax haven subsidiary, as well as the number of foreign tax haven subsidiaries, increases significantly within the three years following the IPO filing.<sup>1</sup> We also observe that IPO completion is associated with lower cash ETRs among the small subsample of firms with requisite data.

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<sup>1</sup> This paper considers legal strategies for firm tax planning, including a commonly studied strategy of locating some corporate activities in jurisdictions with low effective tax rates—so-called corporate “tax havens” (Hines and Rice 1994),

Having studied these four channels, we then examine cross-sectional variation based on post-IPO agency issues. While all IPO-completing firms experience greater separation of ownership and control after the IPO, we test whether the observed increase in tax payments varies based on post-IPO ownership. We proxy for agency issues using reported tax data on the number of shareholders in the post-IPO firm, under the premise that agency issues are increasing in the number of shareholders and the separation of principals and agents. We find some evidence that the increased level of taxes occurs in firms with smaller shareholder groups, suggesting that increased tax obligations do not reflect manager inattention or suboptimal levels of tax planning.

This paper contributes to the prior accounting literature studying companies' tax planning strategies. This literature focuses almost entirely on well-established public firms, despite the large number and aggregate activity of private firms in the U.S. economy (Lisowsky and Minnis, 2020). More recent work examines tax planning in private firms, documenting different tax planning strategies in these companies (Hoopes, Langetieg, Maydew, and Mullaney, 2020; Badertscher, Katz, and Rego, 2013; Badertscher, Katz, Rego, and Wilson, 2019; Olbert and Severin, 2020). The key innovation of our paper is to study tax planning trends in firms' transition periods from private to public status, which helps to bridge between the findings of these other papers and the multitude of studies examining public firms' tax avoidance. This evidence is particularly important as recent literature suggests that the nature of firms' tax planning activities changes during this transition (Badertscher Katz, Rego, and Wilson, 2019). In so doing, we add to work that has primarily focused on IPO-related investor taxes (Guenther and Willenborg, 1999; Li, Lin, and Robinson 2016), as well as recent work studying the TCJA (Edwards and Hutchens, 2020) and the "supercharged" IPO tax strategy on corporate behavior (Edwards, Hutchens, and Rego, 2019).



We also contribute to a large corporate finance literature studying how various firm outcomes are affected by private-to-public transitions (IPOs or public firm acquisitions of private firms) as well as public-to-private transitions (e.g., leveraged buy-outs or LBOs), including Chemmanur, He, and Nandy (2009), Pagano, Panetta, and Zingales (1998), Bernstein (2015), Babina, Oimet, and Zarutskie (2017), Ball and Shivakumar (2008), and Cohn, Mills, and Towery (2014). We add to this literature by linking investment, employment, and debt repaying to an important policy outcome—tax-paying behavior. We also demonstrate the role of financial reporting and explicit tax planning strategies in driving the observed tax changes. Collectively, these tests permit an assessment of the most prominent U.S. tax incentives within this sample of firms, including depreciation, R&D incentives, interest tax shields, and the taxation of foreign earnings (Joint Committee on Taxation, 2015).

Finally, this work contributes to understanding policy ramifications of the substantial decline in the number of U.S. IPOs in the past two decades, which has contributed to the diminishing number of public U.S. firms overall (Gao, Ritter, and Zhu, 2013; Doidge, Karolyi, Stulz, 2017; Chemmanur, He, Ren, and Shu, 2020). The IPO decline has been a concern for policymakers over the past decade, leading to passage of the Jumpstart our Business Startups (JOBS) Act in 2012 (Barth, Landsman, and Taylor, 2017). If tax remittances change when firms go public, these issues intersect with the ongoing policy debate on the appropriate level of U.S. corporate taxation and the structure of the U.S. corporate tax system (Yellen 2021). We offer relevant evidence about the tax position of firms prior, during, and after the going public decision, thereby shedding light on how the IPO decision affects U.S. corporate tax revenues. We document that the IPO event is associated with increased tax planning activity, most specifically the use of foreign

tax havens. Thus, our evidence highlights the inflection point at which firms begin to implement the extensive foreign tax structures at the heart of recent multilateral policy changes.

The remainder of the paper proceeds as follows. In Sections 2 and 3 we discuss the empirical methodology and data sources, respectively. We present the descriptive evidence on changes in tax payments in Section 4 and tests of the economic drivers in Section 5. We conclude in Section 6.

## 2. Research Design and Hypotheses

To study whether corporate tax payments change following the IPO transaction, we implement a stacked cohort differences-in-differences empirical design by estimating the following ordinary least squares (OLS) equation on a sample of IPO-completing and withdrawing firms:

$$(1) \quad Y_{ict} = \beta_1 IPO \text{ Completed} * Post_{ict} + \gamma_{ct} + \delta_i + \epsilon_{it},$$

where  $Y_{itc}$  includes three measures of tax payments for firm  $i$ , in IPO cohort year  $c$ , in tax year  $t$ , which are described below in additional detail. *IPO Completed* is an indicator variable equal to one for the firms in the sample that completed an IPO, and zero for the firms that filed for an IPO but ultimately withdrew the filing. *Post* is an indicator variable equal to one for the year of the IPO filing and any subsequent year. We construct one cohort for each sample year comprised of firms that either complete or withdraw the IPO in that year  $t$ . We include all observations for each cohort of firms in a  $t-3$  to  $t+3$  window, requiring firms to be observable at least in  $t-2$  through  $t+1$ .<sup>2</sup> We then stack the cohorts in event time to test the effect of the IPO on corporate tax payments. The main effects for both *IPO Completed* and *Post* are omitted due to the inclusion of firm and

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<sup>2</sup> Restricting the cohorts to include firm-year observations only within the seven year window surrounding the IPO filing permits us to more confidently attribute any observed effects to the IPO event. This approach follows the stacked cohort design described in Gormley and Matsa (2011) and Baker, Larcker, and Wang (2021). We also require a firm to be present in both the pre- and post-IPO period to ensure that the results are not biased by firms inconsistently appearing in the tax data. While this design provides for cleaner identification, we acknowledge that it results in substantial sample attrition. Section 5 reports results after relaxing these sample restrictions.

year-by-cohort fixed effects, respectively, which are described below in additional detail. The interaction term *IPO Completed \* Post* captures whether tax payments differ for IPO firms after the firm files and completes the IPO, relative to those firms that withdraw.

We construct three measures of U.S. corporate income tax payments. The first measure is *Positive Taxes Paid*, an indicator equal to one if a firm pays tax based on U.S. income tax reporting (if U.S. Corporate Income Tax Return Form 1120, Line 31 “Total Tax” is greater than zero). This measure captures whether the probability of making a U.S. tax payment changes after the IPO. The other two measures capture the level of tax payments.  $\ln(1+Tax)$  is equal to the natural logarithm of one plus total cash tax payments, where one is added to include the large proportion of sample firms reporting tax losses. *Tax/Pre-NOL Taxable Income* is equal to total cash tax payments, scaled by a firm’s taxable income before taking into account its net operating loss deduction (NOL) and other special deductions (Form 1120, Line 28). *Tax/Pre-NOL Taxable Income* is set equal to zero for firm-year observations with a current tax loss.<sup>3</sup>

We include firm fixed effects  $\delta_i$  in Eq. (1) to control for observable and unobservable time-invariant firm-level characteristics. Each firm is only included in the cohort associated with the year of the IPO filing, and therefore, the firm fixed effects control for differences across firms within each cohort.<sup>4</sup> We do not include time-varying firm controls in the regression because most of these potential variables are also potentially affected by the firm IPO, introducing a “bad controls” problem and potentially biasing estimates (Angrist and Pischke, 2009; Roberts and Whited, 2013). We also include year-by-cohort fixed effects  $\gamma_{ct}$ , which control for time series

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<sup>3</sup> We use amounts reported for tax purposes, as opposed to amounts from financial statements, for two reasons. The first is that the sample includes pre-IPO firm-year observations in years prior to the S-1 filing where financial income is unobservable. The second is that, within the years for which financial statement income is available, domestic segment reporting from financial statements that would be necessary to measure domestic income does not provide the same coverage or detail as that available from the tax return.

<sup>4</sup> Because we only include a firm in the cohort pertaining to the year of the IPO filing, firm fixed effects are analogous to firm-by-cohort fixed effects that are otherwise typically used in a stacked design.

trends and uniquely capture each tax year within each cohort. We cluster standard errors using the major industry classification codes provided by the Internal Revenue Service (IRS)—the codes with which the firms are asked to report their industry—which generally correspond to three-digit NAICS codes.<sup>5</sup> Clustering standard errors at the industry level corrects for unobserved error correlation within industries, which is particularly important given the documented evidence that IPO waves may be driven by industry-level productivity shocks (Chemmanur and He, 2011).

## *2.2 Tests of Economic Factors Related to the Change in Tax Payments*

The primary empirical tests examine the economic drivers of any observed change in tax payments. Prior literature motivates four non-mutually exclusive hypotheses for why tax payments may change. In each section below, we first state the predicted economic effect that we expect to observe based on prior literature. We then provide a corollary prediction to connect these economic effects to firm tax payments.

### *2.2.1 Investment and Employment Spending*

One reason firms cite for going public is to obtain necessary capital to pursue growth opportunities. For example, Ritter and Welch (2002) states that a primary reason for firms to go public is “the desire to raise equity capital for the firm,” and Chemmanur, He, and Nandy (2009) finds that capital expenditures and employment increase in the years before and after the IPO.

Thus, we predict the following:

*H1a: IPO completion is positively associated with corporate investment post-IPO.*

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<sup>5</sup> We use the firm’s industry reported in the year prior to the IPO. As the IRS transitioned from an SIC-based to NAICS-based industry classification system in 1998, we assign the first NAICS-based code available to a firm’s observations prior to 1998. Untabulated tests also show that results are robust to alternatively clustering standard errors at the firm level as in Bernstein (2015).

Assuming that capital and labor are complements, we also expect to observe increases in corporate employment. To examine employment spending and to directly connect our first hypothesis (H1a) to post-IPO tax obligations, we predict the following<sup>6</sup>:

*H1b: IPO completion is positively associated with tax depreciation deductions, R&D expenses, and compensation deductions post-IPO.*

However, we may not observe these effects for several reasons. While investment is one reason firms cite for going public, Lowry, Michaely, and Volkova (2017) discuss several other reasons, including market timing, readjusting capital structure, providing liquidity for owners, obtaining the benefits of an observable stock price, and the credibility that accompanies public firm scrutiny. To the extent that firms use the capital infusion for other purposes, we would observe little change in investment and employment-related tax deductions in the post-IPO period. Consistent with this, Pagano, Panetta, and Zingales (1998) find limited investment spending in a sample of Italian firms post-IPO, and Bernstein (2015) finds no change in the number of patents post-IPO.

To test H1a, we re-estimate Eq. (1), replacing the dependent variable with three investment measures constructed following Feldman, Kawano, Patel, Rao, Stevens, and Edgerton (2021).  $\ln(Investment+1)$  is equal to the natural logarithm of a firm's capital investment during the year, measured using capital expenditure details from IRS Form 4562 (Depreciation and Amortization). We add one to capture both the extensive and intensive margin investment effects of the IPO. We decompose this amount into  $\ln(Short-term Investment+1)$ , which includes assets depreciable over a 3 to 7 year period for tax purposes, and  $\ln(Long-Term Investment+1)$ , which includes all longer-lived tangible assets. To test H1b, we use  $\ln(Depreciation+1)$ , the natural logarithm of total

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<sup>6</sup> Ideally we would also measure the number of total employees, but such data are unavailable for the IPO-completing and withdrawing firms in the sample.

depreciation deductions, and  $\ln(R\&D\ Investment+1)$ , the natural logarithm of R&D expenses from IRS Form 6765 (R&D Tax Credit).<sup>7</sup>

We also test H1b using  $\ln(Employee\ Comp)$  and  $\ln(Officer's\ Comp)$ , which are equal to the natural logarithm of U.S. tax deductions for employees and officers, respectively.<sup>8</sup> As we assume all firms have employees and officers, we exclude observations with zero or missing values. If IPO-completing firms expand the domestic workforce and/or increase the pay of existing workers,  $\ln(Employee\ Comp)$  would increase. We separately test  $\ln(Officer's\ Comp)$  to assess whether deductible executive compensation varies around the IPO given specific restrictions around public firm's compensation levels (for example, Section 162(m)).

### 2.2.2 Capital Structure

As discussed above, realignment of a firm's capital structure is another cited reason that firms undertake an IPO (Lowry, Michaely, and Volkova, 2017). The IPO capital infusion provides the opportunity for a firm to repay its outstanding debt obligations, particularly if such debt had a relatively higher cost of capital due to information asymmetry in the private lending market. We predict:

*H2a: IPO completion is negatively associated with debt financing post-IPO.*

*H2b: IPO completion is negatively associated with interest tax deductions post-IPO.*

However, firms may not necessarily use the capital infusion to repay outstanding loans. First, such repayment would reduce a key benefit of corporate debt: interest tax shields. Furthermore,

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<sup>7</sup> Tangible investment is typically measured as capital expenditures scaled by beginning fixed assets, whereas R&D expenses are typically scaled by other financial characteristics. For consistency across these five measures, we use the logarithmic transformation. Section 4 discusses robustness of results to alternatively scaling by beginning fixed assets; see Section 4.

<sup>8</sup> The measure  $\ln(Employee\ Compensation)$  is constructed based on amounts reported as "Salaries and Wages" (Form 1120, page 1, line 13). While this measure captures most firm compensation, the firm may also incur additional salaries reported as part of Cost of Goods Sold (Form 1120, page 1, line 2). Untabulated results show a similar effect for employee compensation when including Cost of Labor on Form 1125-A, Line 3.

prior literature shows that some firms manage to a target debt ratio and Lemmon, Roberts, and Zender (2008) provide evidence suggesting that firms do not rebalance their capital structures around the IPO. If so, then these firms may instead increase borrowing commensurate with the increased IPO equity capital infusion.

We test H2a by re-estimating Eq. (1) after replacing the dependent variable with three measures of external debt financing:  $\ln(\text{Debt})$ , the natural logarithm of total outstanding debt reported on the U.S. corporate income tax return Balance Sheet (Schedule L),  $\ln(\text{LT Debt})$ , the natural logarithm of outstanding long-term debt, and  $\text{Debt}/\text{Assets}$ , equal to total outstanding debt scaled by lagged assets. To link any observed changes in debt with tax payments (H2b), we also use  $\ln(\text{Interest Deductions})$ ,  $\text{Interest Deduction}/\text{Sales}$ , and  $\text{Interest Deduction}/\text{Assets}$ , where each measure is constructed using the U.S. interest deductions (Form 1120, Line 18).

### *2.2.3 Shift in Financial Performance and Reporting Incentives*

The IPO transaction introduces a substantial shift in a firm's reporting incentives. Prior to the IPO, the firm primarily reported to tax authorities, the firm's relatively smaller set of owners, and debt holders. Because the primary external authority was the tax authority, firms likely minimized taxable income to lower their tax obligations.

After the IPO, the firm is subject to extensive public reporting requirements. The prior accounting literature demonstrates that these reporting requirements serve as a disciplining mechanism, motivating firms to improve financial performance through operational efficiencies. Firms may also report higher financial performance through earnings management strategies (see Dechow, Ge, and Schrand, 2010 for a review). Thus, we predict the following:

*H3a: IPO completion is positively associated with firm financial performance post-IPO.*

*H3b: IPO completion is associated with commensurate increases in firm taxable income post-IPO, as well as with changes in the distribution of taxable income.*

However, in the IPO setting, Jain and Kini (1994), Teoh, Wong, and Gao (1998), and Teoh, Welch, and Wong (2002) suggest that managers may “window dress” their accounting numbers prior to going public, leading pre-IPO performance to be overstated and post-IPO performance to be understated. Pagano, Panetta, and Zingales (1998) document such a decline in profitability post-IPO in a set of Italian firms, and Pastor et al. (2009)’s dynamic model demonstrates these effects more generally across a broader sample of firms. By studying tax payments around the IPO, we explicitly test these assertions and examine how firms transition between these differing reporting incentives.

To test our third hypothesis, we re-estimate Eq. (1), replacing the dependent variable with two measures of financial performance. *Pre-tax Financial Income/Sales* is equal to the amount of financial statement domestic pre-tax income from the tax return (Net income (loss) for the domestic firm as reported on Schedule M-3, plus U.S. current income tax expense, following Hoopes, Langetieg, Maydew, and Mullaney (2020), scaled by gross receipts for tax purposes. We also report results alternatively scaling by lagged assets (*Pre-tax Financial Income/Assets*). We expect to observe an increase in these measures due to improved performance and/or earnings management activity, post-IPO.<sup>9</sup>

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<sup>9</sup> When a firm reports attaching a Schedule M-3 to the Form 1120 (Box A4), financial statement income is measured as the net income (loss) per income statement of includible corporations (Form 1120: Schedule M-3, Part I, line 11) + U.S. current income tax expense (Form 1120: Schedule M-3, Part III, line 1) plus the U.S. deferred income tax expense (Form 1120: Schedule M-3, Part III, line 2). When a firm does not report filing a Schedule M-3 or in the years the Schedule M-3 was not utilized, financial statement income is defined as net income (loss) per books (Form 1120: Schedule M-1, line 1) + federal income tax per books (Form 1120: Schedule M-1, line 2). Ideally, we would also use sales reported on the financial statements, but we are not able to observe this information for years outside of the S-1 period and for firms without requisite domestic segment data. Use of this measure assumes that domestic sales reported on the tax return approximate those on the financial statements. The alternative measure that is scaled by assets does not suffer from book/tax differences because the asset amounts reported on Schedule L are intended to be the same as those reported under U.S. GAAP.



We conduct two analyses to connect any improved financial performance to the firm's tax reporting. First, we examine a specific tax reporting strategy: bunching in taxable income at the kink where the tax liability begins (\$0 of taxable income). A growing body of work argues that the tendency of firms and individuals to bunch around kink points in the income tax schedule is suggestive of manipulated tax reporting behavior (Saez, 2010; Coles, Patel, Seegert, and Smith 2020; Mortenson and Whitten, 2020). Mapping the distribution of pre-NOL taxable income in both the pre- and post-IP period permits examination of whether a firm's tax reporting behavior (e.g., the propensity to bunch at zero taxable income) changes as it transitions to a publicly traded company.

We also use two measures of taxable income to directly assess how much of any increase in financial reporting income was reported for tax purposes. These measures include *Pre-NOL Taxable Income/Sales* and *Pre-NOL Taxable Income/Assets*, where the numerator is equal to income reported on Form 1120, Line 28 and is either scaled by gross receipts (net of returns) or assets, respectively. A third measure,  $\ln(\text{Sales})$ , is the natural logarithm of domestic sales (for tax purposes) and permits an assessment of whether any increase is driven by higher sales post-IPO.

#### 2.2.4 Tax Planning

Finally, a firm's tax payments could change due to explicit tax planning strategies undertaken around the IPO. In preparation for comparison with their public industry peers, firms may put in place certain tax planning strategies to better manage post-IPO tax liabilities. Furthermore, the uncertain value of the firm and its intangible assets pre-IPO may motivate the firm to establish structures for future tax avoidance.<sup>10</sup> We predict the following:

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<sup>10</sup> For example, firms may transfer valuable assets, such as intellectual property rights, to foreign jurisdictions to facilitate tax planning. These transfers are generally accompanied by exit taxes assessed on the "gain" calculated as a function of the IP value at the time that the intellectual property leaves the U.S. To the extent that the value is uncertain in the pre-IPO period, the exit tax may be low.

*H4: IPO completion is positively associated with increased tax planning.*

We examine changes in firm tax planning strategies by studying the propensity of a firm to establish and increase the number of tax haven subsidiaries in its corporate structure. We re-estimate Eq. (1) after replacing the dependent variable with two variables, *Tax Haven (0/1)*, an indicator equal to one for whether a firm reports a foreign tax haven subsidiary, and *#Tax Havens*, which is the count of a firm's total tax haven subsidiaries, measured using IRS Form 5471. We identify the list of tax havens following Hoopes, Langetieg, Maydew, and Mullaney, 2020.<sup>11</sup> Additional tests replace the dependent variable with *Cash ETR* and re-estimate Eq. (1) for the small subsample with requisite data.

### **3. Data and Summary Statistics**

#### *3.1 Data*

The dataset consists of firm IPO data from Thompson Financial and the SEC's Edgar platform matched with administrative tax records derived from corporate tax returns. Table 1 shows the sample selection steps. We draw the dataset of firms that complete or withdraw an IPO from the Thomson Financials' SDC Platinum New Issues database (n=29,724 IPO events). We retain IPOs between 1996 and 2016, starting in 1996 because that was the first year in which firms were required to file with Edgar (n=22,484 events). Following standards in the literature, we exclude non-U.S. firms, financial firms (SIC codes 6000-6999), spin-offs, American depository receipts (ADRs), real estate investment trusts (REITs), closed-end funds, blank-check firms, unit funds, and IPOs for which the data of IPO filing is unavailable, resulting in a reduction of 16,618 IPO filings. As tax employer identification numbers (EINs) necessary for merging with the tax data are only available for a limited subset of firms in the SDC IPO sample, we scrape the EIN number

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<sup>11</sup> The IRS does not designate any country as a "tax haven."

from the filing on the Edgar platform when available (Lowry, Michaely, and Volkova, 2017). IPOs for which the EIN or the IPO filing date cannot be pulled from Edgar are excluded. The IPO sample includes 3,794 unique IPO events from SDC pertaining to 3,651 distinct firms. Figure 1 shows the number of completed and withdrawn IPOs by year of filing. The number of completed IPOs was the highest from 1997 to 2000, with the number of withdrawn IPOs also peaking in 2000, prior to the 2001 recession. Approximately 94 percent of firms have just one IPO event; we discard all but the earliest event for firms with multiple IPO filings.

We use the EIN to merge the IPO dataset with tax data. We include sample years from a wider window of 1994 to 2018 so as to construct lagged variables and measure effects post-IPO. The tax data are derived from two sources of IRS administrative records. We first use the annual sample of returns cleaned by the IRS Statistics of Income (SOI) division.<sup>12</sup> We also supplement the SOI sample with data from the Compliance Data Warehouse (CDW), which encompasses the universe of corporate returns. The CDW allows us to include additional years and firms in the sample.

In total, we match 3,267 IPO filing firms to the tax data. From the corresponding sample of 37,727 firm-years, we drop observations that do not have C-corporation filing status (593 observations), those with non-positive values for either gross receipts or total assets (6,834 observations), and observations for which a major industry classification code is unavailable or cannot be imputed (142 observations). Because the primary research question relates to how tax payments change around the IPO transaction, we require all firms to be present in the sample for at least years  $t-2$  through  $t+1$  relative to the IPO filing in year  $t$  (dropping 12,224 observations). Finally, we require each cohort to have at least one completing and one withdrawing firm, and we drop observations outside of the  $t-3$  to  $t+3$  window (8,299 firm-years) to isolate the tax payment

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<sup>12</sup> The annual SOI data comprise a stratified sample from the universe of corporate and partnership tax returns. Large firms, as measured by either total assets or proceeds, are sampled with 100 percent probability.

effects immediately surrounding the IPO. The final sample includes 8,642 observations for 1,352 firms, of which over 70% complete the IPO.

### 3.2 Summary Statistics

Table 2 displays summary statistics on the main sample. To eliminate the influence of outliers, we winsorize variables at the five percent level following prior work that uses corporate tax data (Cohn, Mills, and Towery, 2014; Zwick and Mahon, 2017; Yagan, 2015). Only 34.0 percent of the sample report having positive pre-NOL taxable income. Average *Pre-NOL Taxable Income* is (\$4.3) million. *Taxable Income*—which reflects income reported on the tax return after NOL deductions and is equal to zero for loss firms (Form 1120, line 30)—is skewed, with the mean (median) firm reporting \$5.8 million (\$0). Approximately 31 percent of firms pay U.S. corporate income taxes, with the average (median) firm paying \$1.7 million (\$0).<sup>13</sup>

Average (median) total assets are \$263.7 million (\$71.5 million). The average firm has 75 percent asset growth and 111 percent sales growth, reflecting the growth life cycle stage for these firms. Average equity issuance via the IPO was \$32.4 million, and equity financing (the ratio of equity issuance to the sum of equity and debt issuance) is equal to 21.0 percent. Figure 2 shows trends in the level of equity issuance (Panel A) and equity financing (Panel B), where the solid line shows amounts for IPO-completing firms, and the dashed line shows amounts for withdrawing firms. These figures graphically demonstrate the extent of equity issuance in our sample and also show that most IPOs are completed in the same year of filing, with some additional IPO-related equity issuance occurring in year  $t+1$ .

Given that loss firms represent a substantial fraction of firms in the sample, and because they are subject to certain statutory limitations and exhibit different corporate tax behaviors as

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<sup>13</sup> All percentile estimates (including medians) are calculated as the average of the ten observations around the percentile cutoff to preserve confidentiality of reported tax data.

compared to profitable firms (Henry and Sansing, 2018; Heitzman and Lester, 2020; Dobridge, forthcoming; Cohn, Mills, and Towery, 2014), we also provide descriptive statistics for two additional subsamples based on pre-IPO losses in Table 2. We show descriptive statistics for the sample firms that reported no taxable income in years  $t-2$  and  $t-1$  due to reporting or using tax losses in Columns (4) through (6). Columns (7) through (9) report results for the subsample of firms reporting positive taxable income in the two years preceding the IPO. For purposes of comparing these samples, and for later tests that examine the U.S. statutory limitation, we drop firms that bounce between positive and zero taxable income in the pre-IPO period.

Figure 3 presents graphs of the mean values for three measures across the full sample and these two subsamples. Panel A presents graphs for *Pre-NOL Taxable Income/Sales*; Panel B presents graphs for *Pre-NOL Taxable Income/Assets*; and Panel C presents graphs for *Pr(Positive Taxable Income)*. The solid line maps the average levels for completing firms; the dashed line shows the effects for the withdrawing firms. We generally observe parallel trends across these variables, implying similarities in completing and withdrawing firms in the pre-IPO period. Online Appendix Figure A1 presents additional graphs for *Asset Growth* and *Sales Growth*.

Table 3 presents summary statistics for key variables in year  $t-1$  for firms that complete the IPO as compared to firms that withdrew in the same cohort year. Columns (1) and (4) show the number of distinct completing firms (999) and withdrawing firms (353), respectively. Columns (2) and (5) (Columns (3) and (6)) report averages (standard deviations) of key variables for these two groups. Columns (7) and (8) report the difference in means and the industry-adjusted p-values for the differences. Firms that complete an IPO have a higher likelihood of reporting *Positive Pre-NOL Taxable Income* (39 percent as compared to 33 percent) and have smaller losses as a

proportion of sales and assets. IPO-completing firms have a 6.0 percentage point higher probability of *Positive Taxes Paid*, as well as higher levels of *Taxes/Pre-NOL Taxable Income* and  $\ln(1+Tax)$ .

Four factors mitigate concerns about these differences driving any observed results. First, while *Positive Pre-NOL Taxable Income*, *Pre-NOL Taxable Income/Sales*, and *Pre-NOL Taxable Income/Assets* differ, completing and withdrawing firms exhibit similar trends in these variables as seen in Figure 3. These parallel trends imply that, while the levels of these variables are statistically different, firms would likely have continued to exhibit similar trends but for the IPO event. Second, we also present trends for the tax paying variables in Figure 4. For the overall sample of completing and withdrawing firms, we observe trends that do not appear to be parallel in years  $t-3$  to  $t-2$ ; however, we observe more similar patterns from  $t-2$  to  $t$  for *Positive Taxes Paid* and  $\ln(1+Tax)$ . Furthermore, after isolating the subsamples of firms based on pre-IPO tax obligations (from Table 2), we observe extremely similar pre-period trends across the remaining six graphs. This improvement implies that the firms with more volatile pre-IPO tax obligations drive the pre-period differences observed in the full sample.

Third, to further mitigate concerns about differences in the samples, we perform inverse probability weighting (IPW), where we first predict the likelihood of IPO completion and then weight the completing and withdrawing firms according to the predicted values derived from the first stage estimation. The first stage predictors include  $\ln(Age)$ ,  $\ln(Assets)$ ,  $\ln(Sales)$ , *Pre-NOL Income/Sales*, *Interest Deduction/Sales*, and *Depreciation/Sales*. Descriptive statistics at the bottom of Table 3 show that after implementing IPW, all but four of the variables are statistically similar across the completing and withdrawing firms. Finally, we perform several additional empirical tests to address endogeneity concerns related to withdrawn firms; see Section 5.

#### **4. Results: Changes in Tax Payments around IPO**

#### 4.1 Tax Payments

We begin our analysis of changes in tax planning behavior by inspecting graphical trends. Figure 4 shows that *Positive Taxes Paid*,  $\ln(1+Tax)$ , and *Tax/Pre-NOL Taxable Income* increase for completing firms relative to withdrawing firms across all nine figures. By construction, the probability of paying tax for firms in the subsample with *Pre-IPO Taxable Income*  $> 0$  is 100% in years  $t-2$  and  $t-1$ ; in contrast, none of the firms with pre-IPO tax losses pay tax in those years. After the IPO, we observe a divergence in both the probability and amount of taxes across the groups.

Next, we confirm these inferences by estimating Eq. (1); results are presented in Table 4. Columns (1) and (2) present results using the indicator *Positive Taxes Paid* as the dependent variable, Columns (3) and (4) use *Taxes/Pre-NOL Taxable Income*, and Columns (5) and (6) present results where the dependent variable is  $\ln(Tax + 1)$ . The odd (even) columns present results before (after) inverse probability weighting.

Across the columns, we observe positive and statistically significant coefficients, confirming that IPO-completing firms exhibit a higher probability of paying U.S. taxes, and they pay higher taxes in total as a share of pre-NOL taxable income. The coefficient estimates in the even columns are slightly smaller and, in Columns (4) and (6), slightly weaker, but overall confirm that the inferences are unchanged after IPW. The coefficients in Columns (1) and (2) of 0.070 and 0.058 indicate that IPO completion leads to a 7.0 or 5.8 percentage point higher probability that a firm pays U.S. federal taxes, respectively. Given that 31% of firms on average pay taxes (Table 2), this is equivalent to an 18.7-22.6% increase in the probability that a firm pays taxes. The coefficients in Columns (3) through (6) also imply increases in the level of tax payments.

#### 4.2 Tax Payments for Firms Based on Pre-IPO Losses

One explanation for an increase in U.S. tax obligations relates to the large proportion of firms in the sample reporting pre-IPO tax losses. U.S. tax law imposes a statutory limitation on use of tax losses following a change in ownership control, such as one that occurs in an IPO. This limitation can reduce the amount of loss carryforwards that the firm can use to offset post-IPO income, resulting in increased tax obligations.<sup>14</sup> To assess whether this explains the increased tax payments observed in Table 4, we re-estimate Eq. (1) on the two subsamples formed from sorting on pre-IPO tax losses. We expect the latter group with pre-IPO losses to be most affected by the statutory limitation that occurs as a consequence of the IPO transaction.

Table 5, Panel A reports results for the subsample of observations with zero taxable income in the pre-IPO year. As in Table 4, the even (odd) columns present results before (after) IPW, where we retain the weights from the full sample for purposes of estimation.<sup>15</sup> In Panel A, we consistently observe positive coefficients, but the results are only statistically significant in Columns (1) and (3). While the t-statistics in Columns (2) and (5) of 1.40 and 1.63, respectively, approach statistical significance, the overall results provide weak evidence that *Positive Taxes Paid* and *Taxes/Pre-NOL Taxable Income* increases post-IPO. For example, the coefficient in Column (1) implies a 3.4 percentage point increase in the probability of paying taxes; given the average probability for

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<sup>14</sup> Specifically, Section 382 limits the ability of a firm to use its NOLs if the firm has had a greater than 50% ownership change over a three year rolling period. Given that the IPO transaction results in a substantial capital infusion by new owners, we expect that the IPO will trigger the Section 382 limitation in most, if not all, firms. Briefly, the amount of the limitation is equal to the firm's market value at the time of the ownership change, times the federal long-term tax-exempt rate. See Erickson and Heitzman (2010) and Sikes, Tian, and Wilson (2014) for more discussion of this limitation.

<sup>15</sup> Ideally, we would re-estimate the IPW weights separately for each subsample. We are unable to do so, however, because within these subsamples some matching variables perfectly predict IPO completion, thereby inhibiting convergence on the maximum-likelihood solution. Thus, for computability and ease of comparison with the full-sample results in Table 4, we retain the original weights generated from the first stage estimation on the sample of 8,642 observations. This approach is valid if the probability of IPO completion conditional on our matching variables does not vary across the subsamples.



these firms in the sample is 7 percent (Table 2), this is an increase of at least 50 percent. Observing limited statistical significance in this subsample mitigates concerns that the effects documented in Table 4 are mechanically driven by the U.S. statutory limitation.

Furthermore, we observe consistently positive and statistically significant effects in the subsample of firms with pre-IPO positive taxable income in Panel B. For example, the coefficient in Column (1) implies that an 11.6 percentage point increase in *Positive Taxes Paid*; given the average probability of 81 percent (Table 2, Column (8)), this is an increase of approximately 14 percent.<sup>16</sup> The remaining columns further confirm that *Taxes/Pre-NOL Taxable Income* and  $\ln(\text{Tax}+1)$  increase in the post-IPO period for this subsample.

Observing the positive and statistically significant effects in Table 5, Panel B means that the increased obligations cannot be explained by the U.S. statutory limitation. To further mitigate concerns, we conduct two additional analyses. First, we drop firms based on whether the statutory limitation appears to bind, where we identify these firms based on if the company does not use the maximum amount of NOL stock to reduce its taxable income to zero in the post-IPO period. Overall, we observe a very low number of firms for which the limitation is binding.<sup>17</sup> We then re-estimate Eq. (1) with *Positive Taxes Paid* as the dependent variables, showing OLS results after inverse probability weighting.<sup>18</sup> We find that a positive, but weaker coefficient in Table 6, Column

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<sup>16</sup> Because we only require firms in this sample to have positive taxable income in the two preceding years, some firms report losses in year  $t-3$  which accounts for why the descriptive statistic is lower than 100%. Requiring taxable income for the three year pre-IPO period would result in additional sample attrition due to missing observations in that year.

<sup>17</sup> Validation checks conducted on a broader sample of firms in the SOI data confirm a similarly low proportion of firms with a binding limitation. The non-binding limitation is due to the fact that the limitation is a function of i) the firm's valuation at the time of the IPO, ii) the amount of a firm's NOL stock, and iii) the amount of taxable income in the post-IPO period. If a firm has a relatively high valuation, a relatively low NOL stock, or low levels of taxable income, then the firm may still be able to fully offset its taxable income with losses in post-IPO years. Alternatively, if the firm continues to report tax losses, as many firms in our sample do, the limitation will have no effect until the firm begins to report taxable income.

<sup>18</sup> In all following tables in the paper, we show results for the OLS specification after inverse probability weighting (IPW) only, for conciseness of presentation. OLS results without IPW are qualitatively similar for most specifications.

(1) (t-statistic = 1.36). This implies that some of the effects observed in Table 5 are partly attributable to the statutory limitation. Second, we construct an indicator equal to one if a firm appears to report less than the allowable amount of NOL deduction in either the year of the IPO filing (most often, the year the IPO is completed), or the year immediately after the IPO filing. We then re-estimate Eq. (1) on firms with zero taxable income in year  $t-1$  after replacing the dependent variable with this indicator.<sup>19</sup> Results reported in Column (2) suggest that there is no significant increase in the likelihood that a firm claims less than the maximum allowable NOL.

In summary, the results in Tables 4 through 6 demonstrate that 1) on average, tax payments increase post-IPO, 2) this increase is most consistently significant in firms reporting pre-IPO taxable income, and 3) while the U.S. statutory limitation on loss utilization partially explains this effect in the subsample of firms reporting or using a tax loss, in practice there are a small number of firms for which this limitation binds. We next empirically test the four hypotheses on the economic factors associated with the increased tax obligations.

## **5. Results: Economic Drivers of Changes in Tax Payments**

### *5.1 Investment in Capital and Labor*

Table 7 reports results from studying whether firms' investment and employment activities change after the IPO transaction. Panel A reports results for three investment measures to test H1a:  $\ln(\text{Investment}+1)$  in Column (1) and a decomposition based on the depreciable lives of the assets ( $\ln(\text{Short-term Investment}+1)$  and  $\ln(\text{Long-term Investment}+1)$  in Columns (2) and (3), respectively). The sample size is slightly smaller because the necessary investment details are

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<sup>19</sup> As the NOL stock data are unavailable in the CDW dataset prior to 2004, the sample size for this regression is smaller than for the main analysis. We assume that the firm would otherwise use all available NOLs and does not forego loss utilization due to tax compliance or behavioral explanations (Zwick and Mahon, 2017). This assumption is plausible given the number of tax advisors and consultants involved during the IPO process.

unavailable in the CDW data. Panel A also reports results for the measures linking investment to tax payments (H1b),  $\ln(\text{Depreciation}+1)$  in Column (4) and  $\ln(\text{R\&D Expense}+1)$  in Column (5).

Across all five columns, we consistently observe positive and statistically significant increases in corporate investment. These coefficients imply large increases in investment among the sample firms, consistent with the companies using the capital infusion for investment activity. While adding 1 to these measures permits estimation on a larger sample of firms, the interpretation of such coefficients is not straightforward. Thus, we examine two alternative untabulated variables to estimate the economic magnitude of IPO completion on investment activity. Statistically significant coefficients on  $\ln(\text{Investment})$  and  $\text{Capital Expenditures/Lagged Fixed Assets}$  suggest a 30.3-65.8 percent increase in fixed asset investment. The coefficient in Column (4) confirms commensurate increases in depreciation deductions within the three year post-IPO window, thereby reducing corporate tax obligations. We also observe increased R&D activity post-IPO.

Columns (6) and (7) report results for testing corporate employment using  $\ln(\text{Employee Compensation})$  and  $\ln(\text{Officer's Compensation})$ . The sample size is slightly smaller given that we exclude firms reporting no compensation (which seems implausible). We again observe statistically significant increases in both expenses, confirming that the IPO capital infusion is used both for investment and employment purposes. The coefficients in Columns (1) and (2) suggest a 32.3-35.6 percent increase in employee and officer's compensation post-IPO. Figure A2 and Table 1 in the online appendix provide further analysis of these effects. In summary, completing the IPO is associated with increased investment and employment activity. Such activity drives larger corporate deductions, which *decrease* corporate tax payments.

## 5.2 Capital Structure

Table 8 presents results from examining shifts in capital structure. Panel A presents results testing whether debt levels changed as a test of H2a; Panel B reports results for interest deductions for H2b. As with the investment variables in Table 7, the sample size is slightly smaller given that the requisite data are only available for firms in the IRS Statistics of Income sample.

In Panel A, we observe that the level of debt declines significantly for IPO-completing firms. This decline occurs across all three measures of corporate borrowing, implying that firms use some capital infusion to pay down external borrowing. The coefficients suggest a 56.7-79.7 percent decrease in the level of outstanding debt; the coefficient of -0.149 in Column (3) implies a 3.2% decrease in the ratio of debt to assets given the average ratio of 22% (see Table 2). Online Appendix Table 2 presents these results for subsamples based on pre-IPO losses.

Panel B reports results after testing the effects of this decline in debt on corporate interest deductions. We observe indeed that total interest deductions decline across all three measures; Online Appendix Figure A3 shows these effects graphically. The coefficient in Panel B, Column (1) implies that IPO completion is associated with a 45.0% percent decrease in external debt over the three years following an IPO. While overall this is a large percent change, the relative effects on the ratio of interest to sales and assets are fairly small. Collectively, these results demonstrate that the decline in external borrowing and the associated interest deductions are one channel through which tax payments *increase*.

### *5.3 Changes in financial performance and financial reporting incentives*

We next examine whether and to what extent domestic financial statement income changes in the post-IPO period. Unlike taxable income that reflects specific policy goals and incentives, financial statement income is intended to capture a firm's true economic performance. Thus, examining whether and to what extent financial reporting income changed is an important step in

assessing if greater taxable income and tax payments are a function of the post-IPO firm's financial performance.

Table 9, Panel A reports results from directly testing whether firms report a change in financial statement income in the post-IPO period (H3a). Data from IRS Form M-3 are necessary for these tests, resulting in a smaller sample. In Columns (1) and (2), we observe that return on sales and return on assets, measured with *Pre-tax Financial Income/Sales* and *Pre-tax Financial Income/Assets*, both increases in the post-IPO period. Online Appendix Table 3 tests these effects in the two subsamples formed by sorting on pre-IPO losses; we observe increases in financial performance across both groups, but coefficients that appear much larger in the firms with pre-IPO losses.

We then evaluate the extent to which the increased financial reporting income affects firm's tax obligations (H3b). To do so, we map the distribution of pre-NOL income (Form 1120, Line 28) in both the pre- and post-IPO period to assess if the distribution of pre-NOL income changes. Figure 5, Panels A, C, and E show these figures for IPO-withdrawing firms, whereas Panels B, D, and F show these for IPO-completing firms. In each figure, we map the distribution during the pre-filing period (dashed line) against the distribution for the post-filing period (solid line). The panels present the kernel densities using a -\$10 million to \$10 million window.

In all figures, we observe that the peak of the distribution in the pre-filing period is immediately below the zero pre-NOL taxable income threshold, implying that a large proportion of sample firms report relatively small tax losses. For withdrawing firms, we observe little change in the distribution of income in the post-IPO period. In contrast, we observe substantial changes in the distribution for the firms completing IPOs in Panels B, D, and F. Although the peak in Panel

B remains below zero, the distribution is flatter – implying that firms’ reported income is more distributed across the sample.

We directly test changes in amounts reported for tax purposes in Table 9, Panel B. Columns (1) and (2) report results for  $\ln(\text{Sales})$  on both the full sample of firms as well as the same sample as that in Panel A, for which M-3 data are available. The coefficients mean that completing the IPO is associated with a 39.6-43.1% increase in the level of sales during the post-IPO period. These increased sales drive a substantial increase in tax payments, as we also observe that income reported for tax purposes increases. Specifically, Columns (3)-(6) show that the increased return on sales and return on assets reported for financial reporting purposes in Panel A also occurs for tax purposes; the coefficient of 0.712 in Column (4) is similar to that in Panel A, Column (1) and implies that the increased revenues result in higher income reported on firms’ tax returns. In summary, IPO completing firms report greater financial reporting income in the post-IPO period, and such income affects the amount and distribution of taxable income. Thus, financial performance and reporting incentives are another channel for *increased* tax payments.

#### 5.4 Tax Planning

Table 10 presents results after testing firms’ tax planning strategies in the post-IPO period (H4). Panel (A) reports results for re-estimating Eq. (1) using *Tax Haven (0/1)* as the dependent variable in Columns (1) through (3) and using *#Tax Havens* in Columns (4)-(5). The sample used for these tests is smaller due to necessary IRS foreign tax data.

Overall we find that, within the three year post-IPO period, firms report a higher probability of having a tax haven; the coefficient in Column (1) of 0.109 means that IPO completion is associated with a 10.9 percentage point increase in the likelihood of having a haven entity. Given the unconditional probability of having a haven entity is 27.7 percent (Table 2), this implies a

39.4% increase. We similarly observe increased effects based on whether the haven is a “Big 7” tax haven country based on higher GDP or a “dot” (i.e., “small as a dot”) country characterized by a small geographic footprint (Hines and Rice 1994). Furthermore, the coefficient in Column (6) means that firms increase the total number of tax havens in the “dot” countries post-IPO period, confirming that the haven use cannot be explained purely by firm growth or expansion. The Online Appendix depicts these effects graphically (Figure A4) and shows that the increased haven presence occurs predominantly in those firms with pre-IPO losses (OA Table 4).

In Table 10 Panel B, we present results for *Cash ETR*. IPO completion is associated with a decline in the domestic cash ETR. However, we caution that the sample used in this specification is much smaller due to the requirement of having positive income in the denominator. We further present results for the subsamples partitioned based on pre-IPO losses, finding that the negative coefficient appears to be driven by those firms that had historically been paying taxes.

Collectively, the evidence in Table 10 shows that the IPO is associated with a growth in tax haven use by firms with pre-IPO losses, and by reductions in cash ETRs by those firms already paying tax in the pre-IPO period.

### *5.5 Changes in corporate ownership and agency issues*

Finally, we study whether the increased separation of management and control (Badertscher, Katz, and Rego, 2013) affects tax payments. Prior literature implies that agency issues increase for all firms that complete an IPO. Greater separation between ownership and control may introduce or exacerbate agency problems such as short-termism (Stein 1989), sub-optimal risk-taking due to managerial career concerns (Holmstrom 1982; Fama and Jensen, 1983), empire building tendencies (Baumol 1959), or expropriation of firm resources (Jensen 1986), all of which could encourage suboptimal tax planning decisions after an IPO. Therefore, we examine

heterogeneity in the extent to which tax payments change based on the extent of post-IPO agency issues.

To test the role of agency concerns, we partition the sample based on a measure of the separation of ownership and control in the post-IPO firm and then re-estimate Eq. (1) using the three measures of tax payments. We use tax return detail on the number of reported shareholders in a firm following the IPO to construct these subsamples. Specifically, we partition the sample based on whether the firm reports having 100 or fewer shareholders after the IPO transaction on Form 1120, Schedule K. The implicit assumption is that agency issues should be most pronounced in the firms with a greater separation between a larger group of owners and management. Results are presented in Table 11.

We find evidence suggesting that the amount of tax payments differs based on post-IPO ownership. We observe statistically significant coefficients in Columns (1), (3) and (5), implying that the increased payments occur in those firms that continue to have relatively smaller shareholder groups and thus that the increased tax obligations are not reflective of increased agency issues at the firm. Additional analysis in Online Appendix Table 5 suggests that these results appear to be largely driven by the subset of firms with more volatile pre-IPO income.

### *5.6 Robustness*

Finally, we demonstrate the robustness of results to alternative samples and research designs in Table 12. While the stacked cohort approach mitigates recent concerns about staggered difference-in-difference (DiD) designs (Baker, Larcker, and Wang, 2021), the implementation of such approach limits the sample observations used in estimation. In Column (1), we extend the post-IPO window to five years after the IPO, adding an additional 1,600 to the sample. We observe a 7.0 percentage point effect, which is similar to that in Table 4.



Several tests partition the sample based on pre-IPO losses but drop firms that bounce between income and loss in the two pre-IPO years. Column (2) presents results for this group: we find a 19.0 percentage point increase in *Positive Taxes Paid* among this subsample.

Columns (3) through (7) present results from alternative regression specifications. Column (3) presents results replacing the cohort-by-year fixed effects with tax year effects.<sup>20</sup> Column (4) retains this fixed effects structure and includes sample observations outside of the  $t-3$  to  $t+3$  window. Column (6) also includes the main effect of *Post* to capture the main effect of withdrawing an IPO filing in the post-period. Across all three columns, we observe a similar coefficient as that in Table 4.

Finally, we estimate two instrumental variables specifications as an alternative strategy for addressing endogeneity concerns related to the decision to complete or withdraw the IPO following Bernstein (2015). We use three instrumental variables that reflect short-run market conditions around the IPO and interact these with *Post*; see the Online Appendix for a detailed description. Column (6) shows that we continue to find a statistically significant, although the estimate is slightly smaller (5.5 percentage points). When we further include *Post* in the first- and second-stage regressions, we observe a smaller and insignificant effect, likely attributable to the fact that *Post* is very highly correlated with the instrumented variable *Completed\*Post*. In summary, the evidence in Table 12 suggests that the results are largely robust to alternative samples and designs.

## 6. Conclusion

This paper studies the extent to which U.S. tax payments change around U.S. IPOs and the economic drivers of these changes. Using confidential corporate tax data for a large sample of firms that completed and withdrew IPOs between 1996 and 2016 (using data from 1994 through

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<sup>20</sup> This specification is similar to a generalized difference-in-difference specification with multiple time periods and multiple treatment groups (Bertrand, Duflo, and Mullainathan, 2004; Roberts and Whited, 2013).

2018), we find similar tax paying trends for firms that complete vs. withdraw an IPO prior to filing. However, after the IPO, we find a pronounced increase in both the probability that a firm pays taxes and the amount of tax payments.

We then test four economic reasons for the change in tax payments. The increase appears attributable to improved financial performance upon a firm's transition to the public markets. We observe that decreased interest deductions also provide a modest increase in corporate tax obligations. Despite notable investment and employment spending, the commensurate depreciation and compensation deductions do not sufficiently offset the increased income, such that tax payments still ultimately increase. Consequently, we also observe increased foreign tax haven use after the IPO as a possible strategy to counteract some of the the increased tax obligations.

There has been a striking decline in publicly listed firms in the United States in the past two decades, which has raised questions about the reasons for the decline and about the potential consequences of fewer public firms. Our results document the transition from private to public status and demonstrate how this transition is associated with changes in both real and reporting effects that in turn alter corporate tax obligations. We look forward to future work that continues to evaluate the tax implications of IPO transactions.

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## Appendix A: Variable Definitions

Note: All data are sourced from the IRS unless otherwise noted.

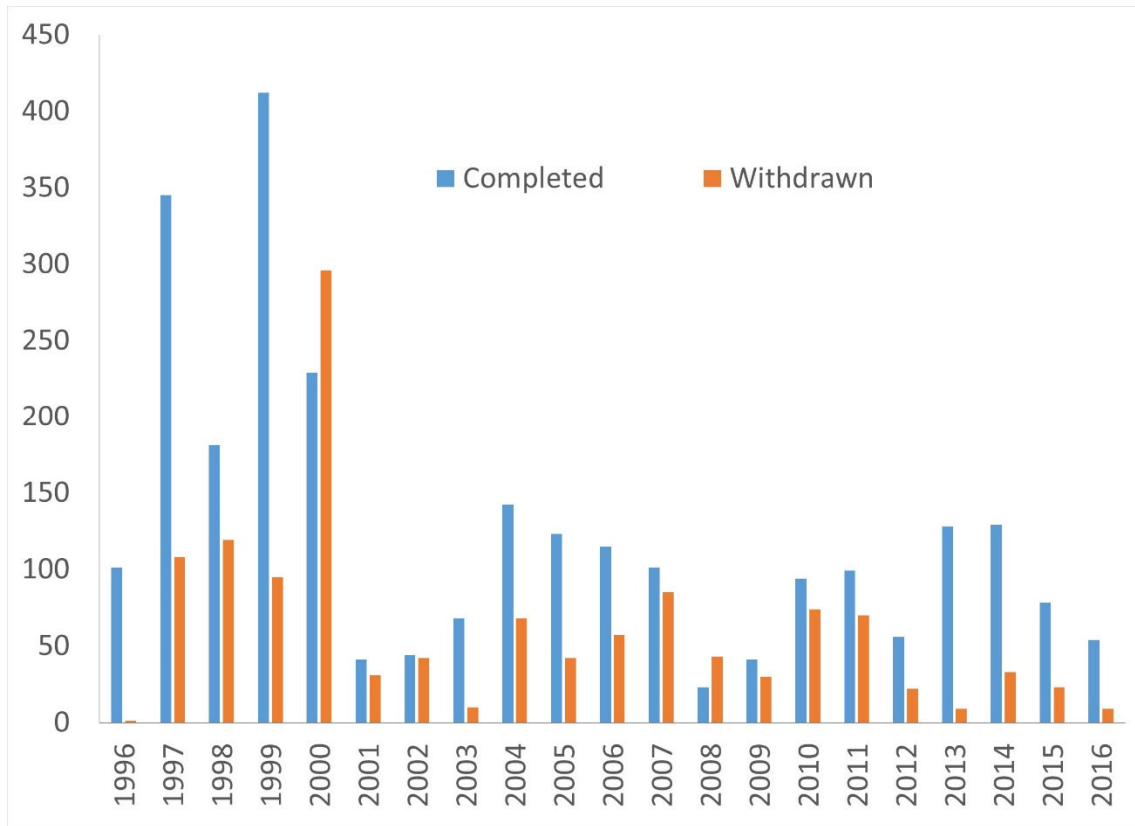
<i>Pre-NOL Taxable Income</i>	Form 1120: line 28
<i>Taxable Income</i>	Form 1120: line 30
<i>Taxes Paid</i>	Form 1120: line 31
<i>Sales</i>	Form 1120: line 1c
<i>Total Assets</i>	Form 1120: Schedule L, line 15 (column d)
<i>Positive Pre-NOL Taxable Income</i>	Indicator variable equal to 1 if <i>Pre-NOL Taxable Income</i> > 0
<i>Pre-NOL Taxable Income/Sales</i>	<i>Pre-NOL Taxable Income</i> / <i>Sales</i>
<i>Pre-NOL Taxable Income/Assets</i>	<i>Pre-NOL Taxable Income</i> / prior year <i>Total Assets</i> ; when missing prior year <i>Total Assets</i> , use current year <i>Total Assets</i>
<i>Positive taxes paid (0/1)</i>	Indicator variable equal to 1 if <i>Taxes Paid</i> > 0
<i>Ln(Tax+1)</i>	Natural log of <i>Taxes Paid</i> + \$1,000
<i>Tax/Pre-NOL Taxable Income</i>	<i>Taxes Paid</i> / <i>Pre-NOL Taxable Income</i>
<i>NOL deduction</i>	Form 1120, line 29a
<i>NOL stock</i>	Form 1120: Schedule K, line 12
<i>Special Deductions</i>	Form 1120: line 29b
<i>NOL deduction &lt; max allowable</i>	Indicator variable equal to 1 if and only if <i>NOL deduction</i> (Form 1120, line 29a) is less than $\min\{\text{NOL stock, Pre-NOL Taxable Income minus Special Deductions}\}$
<i>Short-Lived Investment</i>	Form 4562: line 19a + line 19b + line 19c
<i>Long-Lived Investment</i>	Form 4562: lines 19d + 19e + 19f + line 19g + line 19h + line 19i + line 20a + line 20b + line 20c
<i>Total Investment</i>	<i>Short-Lived Investment</i> + <i>Long-Lived Investment</i>
<i>Depreciation</i>	Form 1120: line 20
<i>R&amp;D Expense</i>	Maximum of Form 6765: line 9, Form 6765: line 53, and Form 6765: line 28
<i>Employee Compensation</i>	Form 1120: line 13 + line 23 + line 24
<i>Officer Compensation</i>	Form 1120: line 7
<i>Ln(Total Investment + 1)</i>	Natural log of <i>Capex</i> + \$1,000
<i>Ln(Short-Lived Investment + 1)</i>	Natural log of <i>Short-lived Capex</i> + \$1,000
<i>Ln(Long-Lived Investment + 1)</i>	Natural log of <i>Long-lived Capex</i> + \$1,000
<i>Ln(Depreciation + 1)</i>	Natural log of <i>Depreciation</i> + \$1,000
<i>Ln(R&amp;D Expense + 1)</i>	Natural log of <i>R&amp;D Expense</i> + \$1,000
<i>Depreciation/Sales</i>	<i>Depreciation</i> / <i>Sales</i>
<i>Debt</i>	Form 1120: Schedule L, line 16 (column d) + line 17 (column d) + line 18 (column d) + line 19 (column d) + line 20 (column d) + line 21 (column d)
<i>Long-Term (LT) Debt</i>	Form 1120: Schedule L, line 20(d)
<i>Ln(Debt + 1)</i>	Natural log of <i>Debt</i> + \$1,000



$\ln(LT\ Debt + 1)$	Natural log of $LT\ Debt + \$1,000$
$Debt/Assets$	$Debt / Total\ Assets$
$Interest\ Deduction$	Form 1120: line 18
$Interest\ Deduction/Sales$	$Interest\ Deduction/Sales$
$Interest\ Deduction/Assets$	$Interest\ Deduction / Total\ Assets$ in the prior year; when prior year assets are unavailable, replace with current year $Total\ Assets$
$Pre-tax\ Financial\ Income$	When a firm reports attaching a Schedule M-3 to the Form 1120 (Box A4): net income (loss) per income statement of includible corporations (Schedule M-3, Part I, line 11) + U.S. current income tax expense (Schedule M-3, Part III, line 1) + U.S. deferred income tax expense (Schedule M-3, Part III, line 2).  When a firm does not report attaching a Schedule M-3 or in the years the Schedule M-3 was not utilized: net income (loss) per books (Schedule M-1, line 1) + federal income tax per books (Schedule M-1, line 2)
$Pre-Tax\ Financial\ Income/Sales$	$Pre-tax\ Financial\ Income / Sales$
$Pre-Tax\ Financial\ Income/Assets$	$Pre-Tax\ Financial\ Income /$ prior year $Total\ Assets$ ; when prior year $Total\ Assets$ are missing, use current year $Total\ Assets$
$\ln(Sales)$	Natural log of $Sales$
$Asset\ Growth\ Rate$	Percentage change in $Total\ Assets$ from the prior year to the current year
$Sales\ Growth\ Rate$	Percentage change in $Sales$ from the prior year to the current year
$Age$	Year of tax filing minus year of incorporation from Form 1120: Box C
$Equity$	Form 1120: Schedule L, line 22b (column d) + line 23 (column d)
$Equity\ Issuance$	Non-negative change in $Equity$ between the prior year and the current year
$Equity\ Financing$	$Equity\ Issuance / (Debt + Equity)$
$Cash\ Effective\ Tax\ Rate\ (ETR)$	When a firm reports attaching a Schedule M-3 to the Form 1120 (Box A4): $Taxes\ Paid/[Net\ income\ (loss)$ per income statement of includible corporations (Schedule M-3, Part I, line 11) + U.S. current income tax expense (Schedule M-3, Part III, line 1) U.S. deferred income tax expense (Schedule M-3, Part III, line 2)].  When a firm does not report attaching a Schedule M-3 or in the years the Schedule M-3 was not utilized: $Taxes\ Paid/[Net\ income\ (loss)$ per books (Schedule

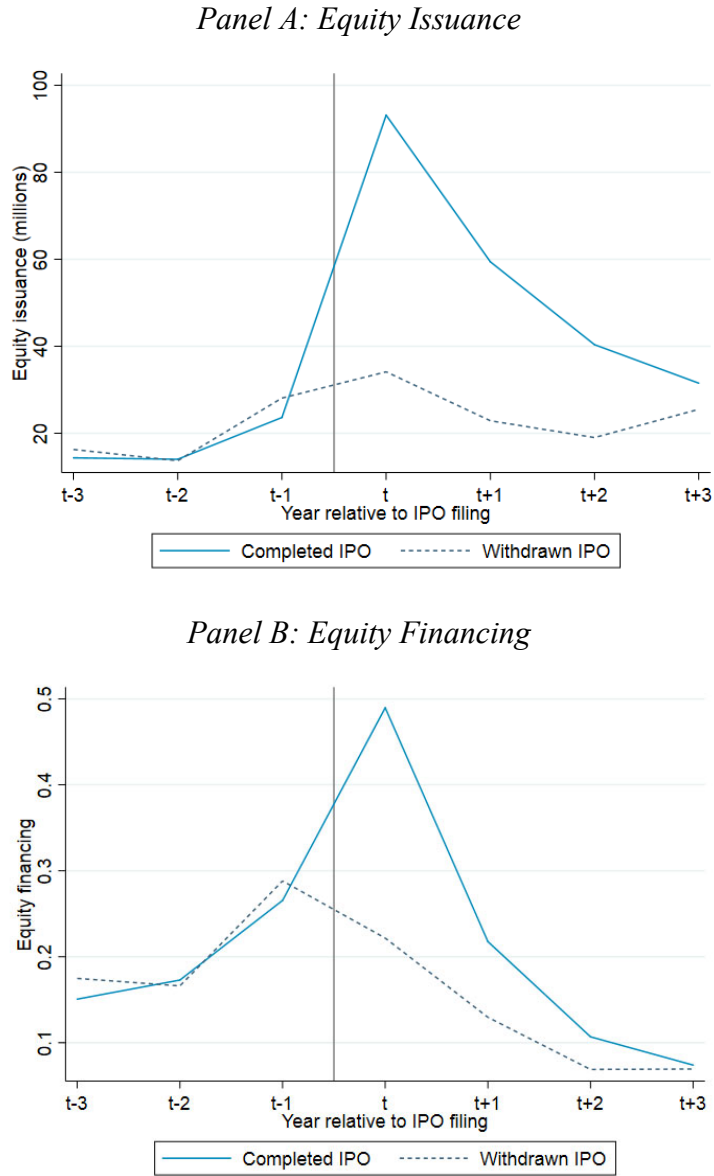
	M-1, line 1) + Federal income tax per books (Schedule M-1, line 2)]
<i>Tax Haven</i>	Indicator variable equal to 1 if a controlled foreign corporation (CFC) is reported on Form 5471 and is located in one of the following countries: Andorra*; Anguilla*, Antigua & Barbuda*; Aruba*; Bahamas*, Bahrain*; Barbados*; Belize*; Bermuda*; Botswana; British Virgin Islands; Brunei Darussalam; Cape Verde; Cayman Islands; Cook Islands; Costa Rica; Cyprus*; Dominica*; Gibraltar*; Grenada*; Guernsey and Alderney*; Hong Kong**; Ireland**; Isle of Man*; Latvia; Lebanon**; Liberia**; Liechtenstein*; Luxembourg*; Macau*; Maldives; Malta*; Marshall Islands; Mauritius*; Monaco; Monserrat; Nauru*; Netherlands Antilles*; Niue*; Palau; Panama**; San Marino; Samoa; Seychelles; Singapore**; St. Kitts & Nevis*; St. Lucia Island*; St. Vincent and the Grenadines*; Switzerland**; U.S. Virgin Islands; Uruguay; Vanuatu *
<i>Dot Haven</i>	Indicator variable equal to 1 if a CFC is located in one of the tax haven countries designated above with a *
<i>Big 7 Haven</i>	Indicator variable equal to 1 if a CFC is located in one of the tax haven countries designated above with a **
<i># Tax Havens</i>	Number of total CFCs in <i>Tax Haven</i> countries
<i># Dot Havens</i>	Number of total CFCs in <i>Dot Haven</i> countries
<i># Big 7 Havens</i>	Number of total CFCs in <i>Big 7 Haven</i> countries
<i>Number of Shareholders &lt; 100</i>	Indicator variable equal 1 if Form 1120: Schedule K, Line 10 is less than 100
<i>NASDAQ Return</i>	Two-month NASDAQ composite return after the date of IPO filing, sourced from the Wall Street Journal and Haver Analytics
<i>Dividend Premium</i>	Average of the equity dividend premium in the two months following IPO filing, sourced from Jeffrey Wurgler's website
<i>Closed-end Fund Discount</i>	Average of the closed-end fund discount in the two months following IPO filing, sourced from Jeffrey Wurgler's website
<i>IPO Completed</i>	Indicator variable equal to 1 for firms that complete an IPO, sourced from SDC Platinum and SEC filings
<i>Post</i>	Indicator variable equal to one for the year of the IPO filing and any subsequent year, sourced from SDC Platinum and SEC filings

**Figure 1: Completed and Withdrawn IPOs, by Year of Filing**



This figure shows the number of firms that completed and withdrew IPOs, by year of filing, for the sample of IPOs for which employer identification numbers of the IPO firms and IPO filing dates could be collected from the SEC's Edgar database, prior to the merge with the corporate tax return data. Data are sourced from Thomson Reuters SDC Platinum and the SEC.

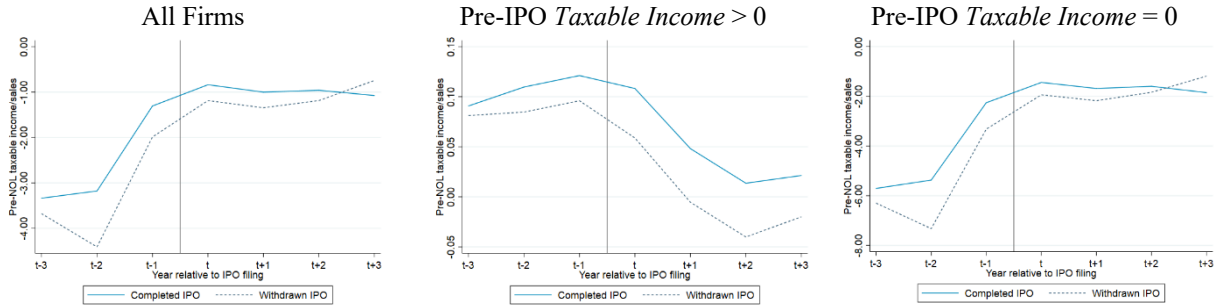
**Figure 2: Equity Issuance and Financing Trends around IPO Filing**



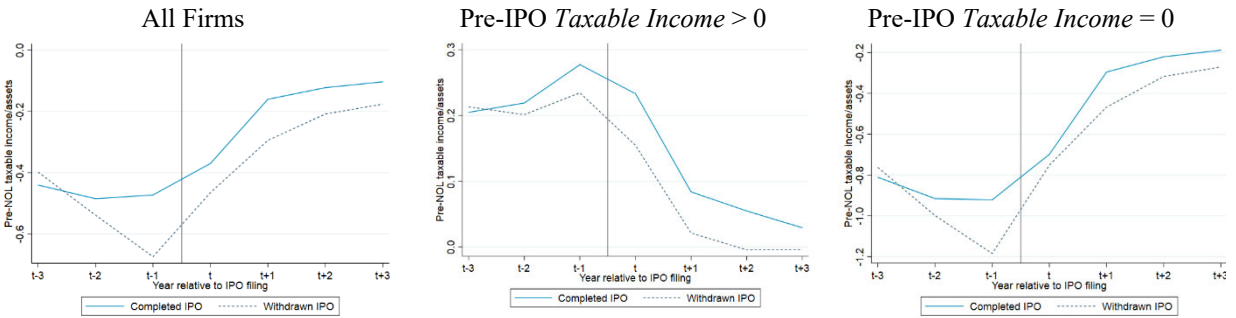
The figure presents averages of equity issuance (Panel A) and equity financing (Panel B) around the year of IPO filing (year  $t$ ). The charts present amounts for firms that either complete an IPO (solid line) or withdraw their IPO filing (dashed line), calculated for the subsample of companies with requisite U.S. tax data in the IRS Statistics of Income sample. Both measures are defined in Appendix A.

**Figure 3: Firm Characteristics of Completed and Withdrawn Firms**

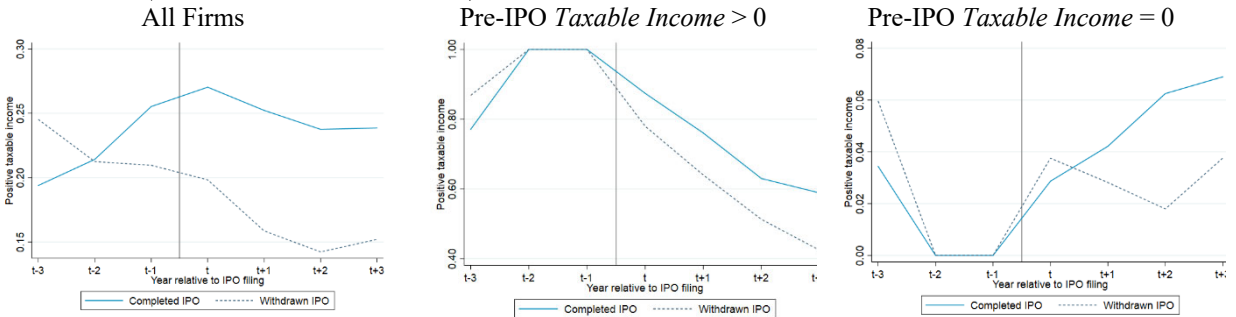
*Panel A: Pre-NOL Taxable Income/Sales*



*Panel B: Pre-NOL Taxable Income/Assets*



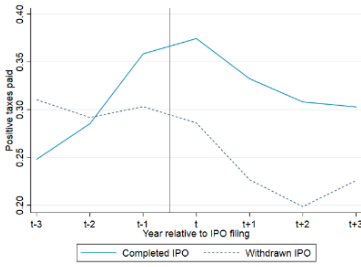
*Panel C: Pr(Positive Taxable Income)*



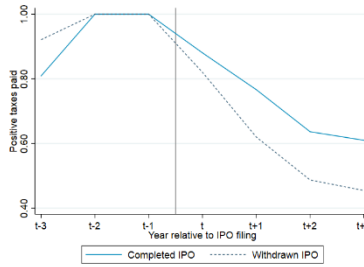
The figure presents sample averages for *Pre-NOL Taxable Income/Sales* (Panel A), *Pre-NOL Taxable Income/Assets* (Panel B), and the *Pr(Positive Taxable Income)* (Panel C) around the year of IPO filing (year  $t$ ). The charts present amounts for firms that either complete an IPO (solid line) or withdraw the IPO filing (dashed line). In each panel, graphs are presented for the full sample, the subsample of firms with positive *Taxable Income* in years  $t-2$  and  $t-1$  relative to the IPO, and the subsample of firms with \$0 *Taxable Income* in years  $t-2$  and  $t-1$  relative to the IPO due to reporting or using a tax loss. All variables are calculated using U.S. corporate income tax data and are defined in Appendix A.

**Figure 4: Taxpaying Trends around IPO Filing**

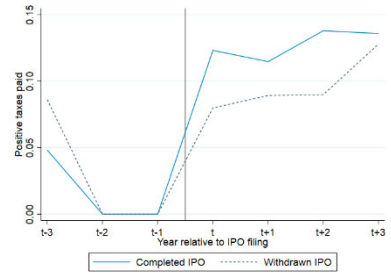
*Panel A: Positive Taxes Paid*  
All Firms



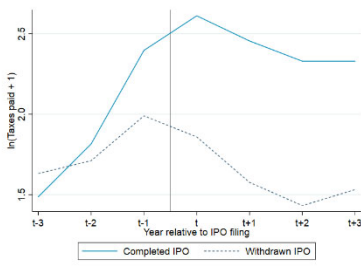
Pre-IPO Taxable Income > 0



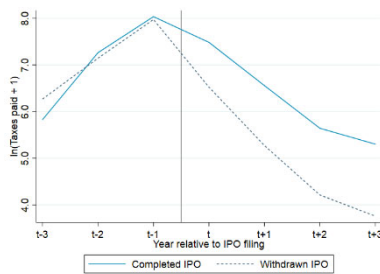
Pre-IPO Taxable Income = 0



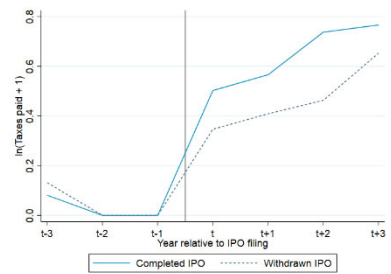
*Panel B: Ln(1+Tax)*  
All Firms



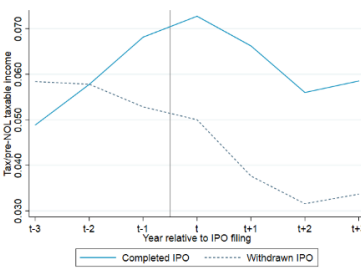
Pre-IPO Taxable Income > 0



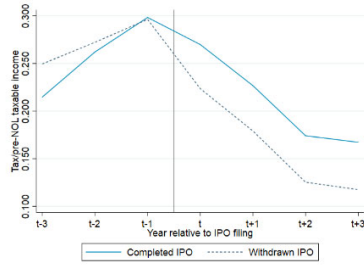
Pre-IPO Taxable Income = 0



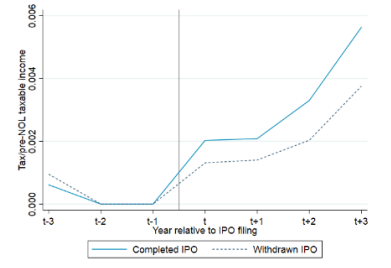
*Panel C: Tax/Pre-NOL Taxable Income*  
All Firms



Pre-IPO Taxable Income > 0



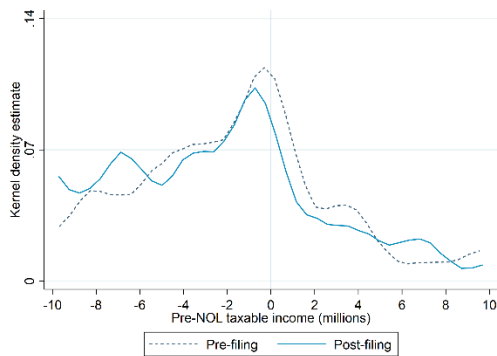
Pre-IPO Taxable Income = 0



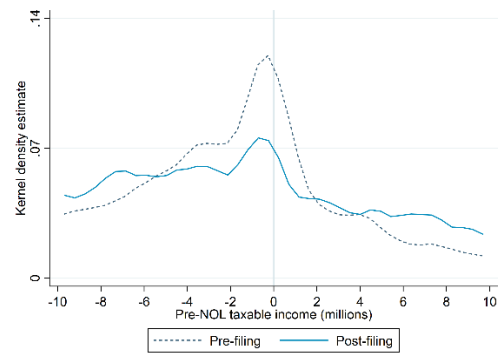
The figure presents averages for *Positive Taxes Paid* (Panel A), *Ln(1+Tax)* (Panel B), and *Tax/Pre-NOL Taxable Income* (Panel C) around the year of IPO filing (year  $t$ ). The charts present amounts for firms that either complete an IPO (solid line) or withdraw the IPO filing (dashed line). In each panel, graphs are presented for the full sample, the subsample of firms with positive *Taxable Income* in years  $t-2$  and  $t-1$  relative to the IPO, and the subsample of firms with \$0 *Taxable Income* in years  $t-2$  and  $t-1$  relative to the IPO due to reporting or using a tax loss. All variables are calculated using U.S. corporate income tax data and are defined in Appendix A.

**Figure 5: Bunching behavior around \$0 Pre-NOL Taxable Income Threshold**

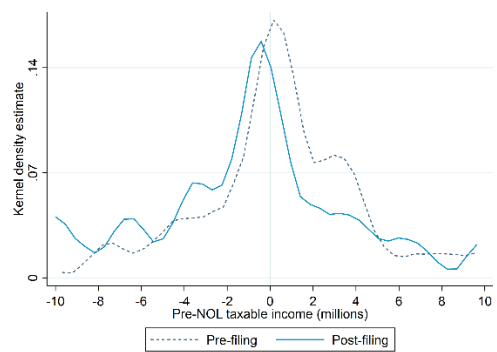
*Panel A: Withdrawn IPOs*



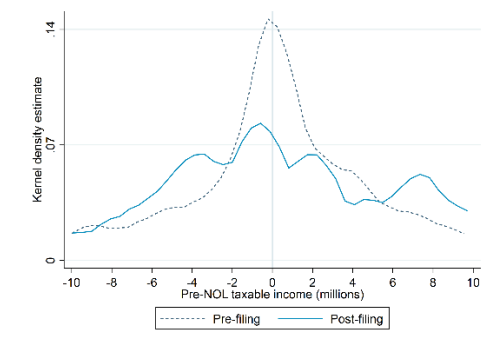
*Panel B: Completed IPOs*



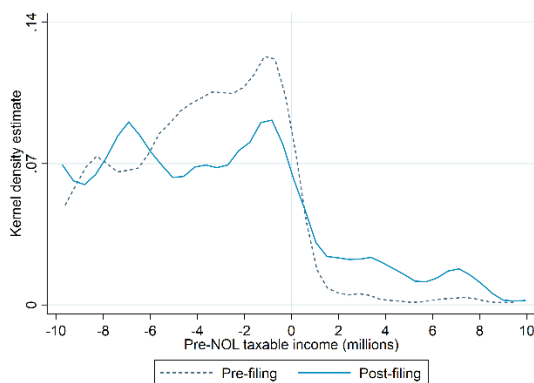
*Panel C: Withdrawn IPOs with Positive Pre-IPO Taxable Income*



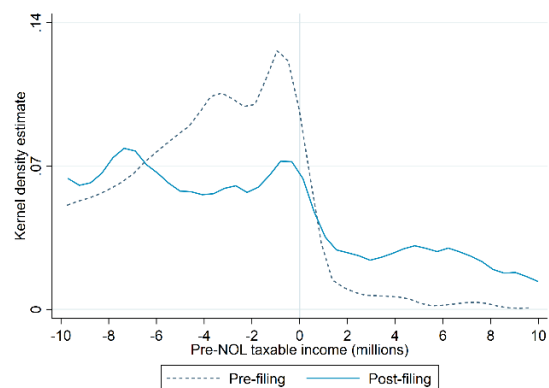
*Panel D: Completed IPOs with Positive Pre-IPO Taxable Income*



*Panel E: Withdrawn IPOs with Zero Pre-IPO Taxable Income*



*Panel F: Completed IPOs with Zero Pre-IPO Taxable Income*



This figure presents estimated kernel densities of firm pre-NOL taxable income with a range of +/- \$10 million, using an Epanechnikov kernel and a bandwidth of \$600,000. Panels A, C, and E show estimated densities for IPO-withdrawing firms; Panels B, D, and F show estimated densities for IPO-completing firms. Panels A and B show the kernel densities for the full sample; Panels C and D show the kernel densities for firms with positive taxable income in years t-2 and t-1 relative to the IPO year; Panels E and F show the kernel densities for firms with zero taxable income in years t-2 and t-1 due to reporting or using a tax loss. Observations are limited to the three years prior to and three years after IPO filing. The IPO filing year is omitted.

**Table 1: Sample Criteria***Panel A: IPO Selection*

	IPO events		
	Events dropped	Events remaining	completing IPO
U.S. IPOs from SDC Platinum		29,724	0.40
Limit to IPOs from 1996 to 2016	(7,240)	22,484	0.27
Exclude nonfinancials	(4,499)	17,985	0.26
Exclude unit offers, closed-end funds, REITS, ADRs, LPs, blank check companies, and spin offs	(12,010)	5,975	0.60
Exclude issuance of noncommon stock	(109)	5,866	0.60
Observe an EIN from SEC Edgar and observe an IPO filing date	(2,072)	3,794	0.68
Final sample of IPOs to merge with U.S. tax data		3,794	

*Panel B: Tax Data Merge*

	Firms			Firm-years	
	Firms dropped	Firms remaining	completing IPO	Obs. Dropping	Obs. Remaining
Firms representing the 3,794 IPOs above		3,651			
Match to tax data	(384)	3,267	0.70		37,727
Drop IPO-withdrawer observations after later IPO	(1)	3,266	0.70	(876)	36,851
Limit to C corporations	(41)	3,225	0.70	(593)	36,258
Require positive gross receipts	(193)	3,032	0.71	(5,963)	30,295
Require positive total assets	(26)	3,006	0.72	(871)	29,424
Require industry affiliation	(72)	2,934	0.72	(142)	29,282
Require firms present $t-2$ to $t+1$	(1,576)	1,358	0.74	(12,224)	17,058
Retain cohorts with completing and withdrawing firms	(6)	1,352	0.74	(117)	16,941
Retain observations in years $t-3$ to $t+3$	-	1,352	0.74	(8,299)	8,642
<b>Final sample</b>		<b>1,352</b>	<b>0.74</b>		<b>8,642</b>

This table presents the sample selection steps. Panel A presents the steps to identify 1996 through 2016 IPOs for non-financial firms from SDC Platinum following Lowry et al. (2017). Panel B shows the number of distinct IPOs that merge with the U.S. corporate income tax data and presents both the number of firms and firm-year observations after imposing requisite sample restrictions.



**Table 2: Summary Statistics**

	<i>All Firms</i>			<i>Firms with Pre-IPO TI &lt; \$0</i>			<i>Firms with Pre-IPO TI &gt; \$0</i>		
	No. Obs (1)	Mean (2)	Median (3)	No. Obs (4)	Mean (5)	Median (6)	No. Obs (7)	Mean (8)	Median (9)
<i>Income and Tax Reported for Tax Purposes</i>									
<i>Positive Pre-NOL Taxable Income (0/1)</i>	8,642	0.34	0.00	5,119	0.12	0.00	1,404	0.83	1.00
<i>Pre-NOL Taxable Income (\$Thousands)</i>	8,642	-4,290	-3,721	5,119	-15,827	-8,967	1,404	24,928	9,026
<i>Pre-NOL Taxable Income/Sales</i>	8,642	-1.76	-0.10	5,119	-2.96	-0.48	1,404	0.07	0.06
<i>Pre-NOL Taxable Income/Assets</i>	8,642	-0.34	-0.09	5,119	-0.60	-0.32	1,404	0.15	0.09
<i>Taxable Income (\$Thousands)</i>	8,642	5,827	0.00	5,119	25.04	0.00	1,404	25,472	8,220
<i>Taxes paid (\$Thousands)</i>	8,642	1,723	0.00	5,119	19.83	0.00	1,404	7,222	2,265
<i>Positive taxes paid (0/1)</i>	8,642	0.31	0.00	5,119	0.07	0.00	1,404	0.81	1.00
<i>ln(Tax +1)</i>	8,642	2.09	0.00	5,119	0.35	0.00	1,404	6.52	7.73
<i>Tax/Pre-NOL Taxable Income</i>	8,641	0.06	0.00	5,119	0.00	0.00	1,404	0.23	0.31
<i>NOL deduction &lt; max allowable</i>	8,037	0.04	0.00	4,719	0.01	0.00	1,329	0.13	0.00
<i>Other Firm Characteristics</i>									
<i>Total assets (\$Thousands)</i>	8,642	263,733	71,527	5,119	126,764	47,891	1,404	532,569	141,748
<i>Asset growth rate</i>	8,015	0.75	0.18	4,708	0.95	0.18	1,313	0.45	0.21
<i>Sales (\$Thousands)</i>	8,642	200,089	46,442	4,708	68,139	22,431	1,313	534,614	155,613
<i>Sales growth rate</i>	8,015	1.11	0.29	5,119	1.58	0.40	1,313	0.33	0.19
<i>Equity issuance (\$Thousands)</i>	7,504	38,094	9,686	4,356	37,729	13,445	1,270	34,130	3,666
<i>Equity financing</i>	7,502	0.21	0.08	4,354	0.24	0.12	1,270	0.17	0.04
<i>ln(Capex + 1)</i>	7,504	7.76	7.89	4,356	7.41	7.59	1,270	8.71	8.70
<i>ln(Short-lived Capex +1)</i>	7,503	7.40	7.64	4,356	7.08	7.35	1,270	7.91	8.21
<i>ln(Long-lived Capex +1)</i>	7,504	5.05	5.37	4,356	4.49	4.79	1,270	6.15	6.57
<i>ln(Depreciation +1)</i>	8,642	7.42	7.37	5,119	7.02	7.03	1,404	8.13	8.17
<i>ln(Employee Compensation)</i>	8,563	9.52	9.54	5,055	9.17	9.25	1,399	10.16	10.11
<i>ln(Officer's Compensation)</i>	7,806	7.34	7.27	4,611	7.14	7.13	1,306	7.65	7.54
<i>Pre-tax Financial Income</i>	7,504	-7,521	-6,192	4,356	-23,842	-14,151	1,270	30,776	10,414
<i>Pre-tax Financial Income/Sales</i>	7,504	-1.99	-0.11	4,356	-3.42	-0.57	1,270	0.06	0.06
<i>Pre-tax Financial Income/Assets</i>	7,504	-0.40	-0.09	4,356	-0.71	-0.38	1,270	0.13	0.09
<i>ln(Sales)</i>	8,642	10.55	10.75	5,119	9.75	10.02	1,404	11.99	11.96
<i>ln(Debt)</i>	6,080	9.15	9.09	3,477	8.52	8.45	1,088	10.10	10.32
<i>ln(LT Debt)</i>	5,038	7.34	7.45	2,896	6.96	7.13	899	8.01	8.07
<i>Debt/Assets</i>	7,504	0.22	0.08	4,356	0.20	0.06	1,270	0.23	0.15
<i>ln(Interest Deduction)</i>	7,834	6.24	6.18	4,583	5.76	5.76	1,317	6.99	7.16
<i>Interest Deduction/Sales</i>	8,642	0.05	0.01	5,119	0.07	0.01	1,404	0.02	0.01
<i>Interest Deduction/Assets</i>	8,642	0.02	0.01	5,119	0.02	0.01	1,404	0.02	0.01
<i>Tax Haven (0/1)</i>	4,062	0.28	0.00	2,298	0.25	0.00	690	0.29	0.00
<i># Tax Havens</i>	4,062	0.75	0.00	2,298	0.43	0.00	690	1.62	0.00
<i># Dot Havens</i>	4,062	0.19	0.00	2,298	0.07	0.00	690	0.57	0.00
<i># Big 7 Havens</i>	4,062	0.47	0.00	2,298	0.31	0.00	690	0.93	0.00
<i>Cash effective tax rate</i>	2,618	0.19	0.14	561	0.07	0.00	1,000	0.30	0.29

This table presents summary statistics for key variables used in the empirical tests. Variable descriptions are included in Appendix A. Data source is the Statistics of Income division of the Internal Revenue Service and authors' calculations. All percentile estimates are averages of the 10 observations around the percentile cutoff to preserve tax filing confidentiality.

**Table 3: Pre-IPO Filing Firm Characteristics**

	Completed IPO			Withdrawn IPO			Diff. in Means	
	No. Obs	Mean	Std. Dev	No. Obs	Mean	Std. Dev	Diff	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Difference in Means Across Samples</b>								
<i>Positive Pre-NOL Taxable Income (0/1)</i>	999	0.39	0.49	353	0.33	0.47	0.07	0.00
<i>Pre-NOL Taxable Income/Sales</i>	999	-1.31	3.59	353	-1.99	4.63	0.68	0.00
<i>Pre-NOL Taxable Income/Assets</i>	999	-0.47	1.13	353	-0.67	1.32	0.20	0.00
<i>Positive Taxes Paid (0/1)</i>	999	0.36	0.48	353	0.30	0.46	0.06	0.01
<i>Ln(1+Tax)</i>	999	2.40	3.49	353	1.99	3.26	0.41	0.01
<i>Taxes/Pre-NOL Taxable Income</i>	999	0.07	0.12	353	0.05	0.11	0.02	0.02
<i>ln(Assets)</i>	999	10.78	1.54	353	10.78	1.62	0.00	0.84
<i>Asset growth</i>	999	1.04	1.92	353	1.39	2.42	-0.35	0.14
<i>ln(Sales)</i>	999	10.39	1.88	353	10.18	2.08	0.22	0.40
<i>Sales growth</i>	999	2.27	5.28	353	2.70	5.89	-0.42	0.05
<i>Tangibility (Net PPE/Assets)</i>	999	0.16	0.15	353	0.16	0.15	0.00	0.87
<i>ln(Employee Compensation)</i>	992	9.28	1.39	349	9.08	1.34	0.20	0.22
<i>Leverage (Debt/Assets)</i>	865	0.26	0.30	307	0.29	0.32	-0.03	0.10
<i>Equity Financing</i>	865	0.27	0.30	307	0.29	0.31	-0.02	0.68
<i>Age</i>	999	6.06	5.48	353	6.10	5.44	-0.04	0.69
<b>Differences after Inverse Probability Weighting</b>								
<i>Positive Pre-NOL Taxable Income (0/1)</i>	999	0.40	0.49	353	0.35	0.48	0.05	0.01
<i>Pre-NOL Taxable Income/Sales</i>	999	-1.40	3.78	353	-1.25	3.38	-0.15	0.83
<i>Pre-NOL Taxable Income/Assets</i>	999	-0.45	1.10	353	-0.50	1.07	0.05	0.40
<i>Positive Taxes Paid (0/1)</i>	999	0.36	0.48	353	0.33	0.47	0.03	0.05
<i>Ln(1+Tax)</i>	999	2.41	3.48	353	2.20	3.41	0.21	0.09
<i>Taxes/Pre-NOL Taxable Income</i>	999	0.07	0.12	353	0.06	0.12	0.01	0.05
<i>ln(Assets)</i>	999	10.77	1.54	353	10.82	1.62	-0.04	0.81
<i>Asset growth</i>	999	1.04	1.90	353	1.09	1.98	-0.05	0.87
<i>ln(Sales)</i>	999	10.36	1.91	353	10.42	2.00	-0.07	0.80
<i>Sales growth</i>	999	2.22	5.13	353	2.50	5.35	-0.28	0.42
<i>Tangibility (Net PPE/Assets)</i>	999	0.16	0.15	353	0.16	0.14	0.01	0.96
<i>ln(Employee Compensation)</i>	992	9.26	1.39	349	9.09	1.35	0.17	0.30
<i>Leverage (Debt/Assets)</i>	865	0.26	0.30	307	0.28	0.29	-0.02	0.53
<i>Equity Financing</i>	865	0.27	0.30	307	0.29	0.33	-0.02	0.50
<i>Age</i>	999	6.08	5.51	353	6.10	5.32	-0.02	0.53

This table presents firm characteristics in the year prior to filing for an IPO for firms that complete an IPO and firms that withdraw the IPO. Columns (1) and (4) present the number of observations in the pre-filing year for firms that complete and withdraw, respectively. Columns (2) and (5) present the corresponding means, and Columns (3) and (6) present the corresponding standard deviations. Column (7) presents the difference in means, and Column (8) presents a within-cohort, industry-adjusted p-value for the difference between the two sample means. Variable descriptions are presented in Appendix A.

**Table 4: Post-IPO Tax Payments**

Dependent var:	<i>Positive Taxes Paid</i>		<i>Taxes/Pre-NOL Taxable Income</i>		<i>ln(Tax +1)</i>	
	OLS	IPW	OLS	IPW	OLS	IPW
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	0.070*** [2.746]	0.058** [2.115]	0.021*** [3.704]	0.015** [2.394]	0.609*** [3.768]	0.459** [2.473]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	8,642	8,642	8,641	8,641	8,642	8,642
R-squared	0.59	0.60	0.71	0.71	0.69	0.70

This table presents results for the effect of completing an IPO on measures of tax payments. The odd columns present OLS coefficients from estimating Equation (2) for the sample of completed and withdrawing firms, and the even columns present OLS results after inverse probability weighting (IPW). Equation (1) is estimated on stacked cohorts, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from  $t-3$  to  $t+3$ . Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Table 5: Post-IPO Tax Payments***Panel A: Firms with Zero Taxable Income in Two Years Pre-IPO Filing*

Dependent var:	<i>Positive Taxes Paid</i>		<i>Taxes/Pre-NOL Taxable Income</i>		<i>ln(Tax +1)</i>	
	OLS	IPW	OLS	IPW	OLS	IPW
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	0.034** [2.081]	0.026 [1.402]	0.001* [1.764]	0.001 [1.006]	0.148 [1.626]	0.079 [0.767]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	5,119	5,119	5,119	5,119	5,119	5,119
R-squared	0.40	0.40	0.40	0.42	0.43	0.43

*Panel B: Firms with Positive Taxable Income in Two Years Pre-IPO Filing*

Dependent var:	<i>Positive Taxes Paid</i>		<i>Taxes/Pre-NOL Taxable Income</i>		<i>ln(Tax +1)</i>	
	OLS	IPW	OLS	IPW	OLS	IPW
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	0.116** [2.326]	0.079 [1.590]	0.046** [2.606]	0.033* [1.707]	1.046** [2.411]	0.764* [1.734]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	1,404	1,404	1,404	1,404	1,404	1,404
R-squared	0.50	0.52	0.57	0.58	0.57	0.59

This table presents results for the effect of completing an IPO on three measures of tax payments. The odd columns present OLS coefficients from estimating Equation (1) for the sample of completed and withdrawing firms, and the even columns present OLS results after inverse probability weighting (IPW). Panel A shows results for the sample of firms with zero taxable income (Form 1120, line 30) in the two years prior to the IPO filing due to either reporting or using a tax loss carryforward; Panel B shows results for the sample of tax-paying firms with positive taxable income in the two years prior to the IPO filing. We drop firms that report a mix of pre-tax income and losses in the two years prior to IPO for this analysis. Equation (1) is estimated on stacked cohorts, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3 around the IPO filing date. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Table 6: Analysis of U.S. Statutory NOL Limitation**

<i>Dependent var:</i>	<b>Positive Taxes Paid</b>	<b>NOL Deduction Less Than Max Allowable</b>
	(1)	(2)
IPO Completed*Post	0.025 [1.362]	0.004 [0.442]
YearXCohort FEs	+	+
Firm FEs	+	+
Observations	4,999	4,717
R-squared	0.40	0.34

This table presents results from testing the role of the U.S. Internal Revenue Code Section 382 limitation in driving firm's tax payments in the post-IPO period. In Column (1), we re-estimate Eq. (1) with the dependent variable Positive Taxes Paid after dropping firms that could have used a larger amount of NOL than that reported on the tax return. In Column (2), the dependent variable is an indicator equal to one if a firm claims less than the total amount of NOL that can be taken based on its reported taxable income and its NOL stock. Both regressions are estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Table 7: Investment and Employment Spending***Panel A: Investment Spending around the IPO*

<i>Dependent Var:</i>	<b>Ln(Total Investment + 1)</b>	<b>Ln(Short-Lived Investment + 1)</b>	<b>Ln(Long-Lived Investment + 1)</b>	<b>Ln(Depr. + 1)</b>	<b>Ln(R&amp;D Expense + 1)</b>
	(1)	(2)	(3)	(4)	(5)
IPO Completed*Post	0.713*** [8.855]	0.714*** [8.806]	0.961*** [7.559]	0.349*** [3.373]	0.410** [0.179]
YearXCohort FEs	+	+	+		+
Firm FEs	+	+	+		+
Observations	7,493	7,492	7,493	8,642	7,493
R-squared	0.65	0.63	0.68	0.86	0.84

*Panel B: Employment Deductions around the IPO*

<i>Dependent Var:</i>	<b>Ln(Emp. Comp.)</b>	<b>Ln(Officer's Comp.)</b>
	(1)	(2)
IPO Completed*Post	0.323*** [4.869]	0.356*** [8.226]
YearXCohort FEs	+	+
Firm FEs	+	+
Observations	8,562	7,792
R-squared	0.88	0.78

This table presents estimates of the effect of completing an IPO on corporate investment (Panel A) and employment activity (Panel B). In Panel A, investment and employment activity is measured based on firm capital expenditures as reported on Form 4562, corporate tax deductions claimed on Form 1120, and research and development expenses from Form 6765. Column (1) reports results for firm total fixed asset investment, where total investment is the sum of all property investment as reported on Form 4562; Columns (2) and (3) report results after separating the assets into relatively shorter or longer depreciated lives. Columns (4) and (5) reports results using total tax depreciation deductions or total R&D expenses, respectively. In Panel B, Columns (1) and (2) report results for employee and officer's compensation, respectively, as reported on corporate tax deductions. All variables are reported after the logarithmic transformation; in Panel A, we add one to include firms reporting zero investment. We drop observations where there is no employee or officer's compensation reported. Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from  $t-3$  to  $t+3$ . Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Table 8: Post-IPO Capital Structure***Panel A: Changes in Debt Levels Post-IPO*

Dependent var:	Ln(Debt)	Ln(LT Debt)	Debt/Assets
	(1)	(2)	(3)
IPO Completed*Post	-0.567*** [-3.673]	-0.797*** [-4.663]	-0.149*** [-10.555]
YearXCohort FEs	+	+	+
Firm FEs	+	+	+
Observations	6,010	4,914	7,493
R-squared	0.81	0.68	0.69

*Panel B: Changes in Debt Levels Post-IPO*

Dependent var:	Ln(Interest Deductions)	Interest Deduction/Sales	Interest Deduction/Assets
	(1)	(2)	(3)
IPO Completed*Post	-0.450*** [-6.231]	-0.015** [-2.597]	-0.018*** [-10.288]
YearXCohort FEs	+	+	+
Firm FEs	+	+	+
Observations	7,823	8,642	8,642
R-squared	0.81	0.55	0.60

This table presents estimates of the effect of completing an IPO on corporate capital structure and external debt financing. In Panel A, debt is measured using amounts reported on the balance sheet of U.S. corporate income tax return (Form 1120), where amounts are required to be reported for U.S. GAAP. Column (1) reports results for firm total outstanding debt; Column (2) reports results for long-term debt, and Column (3) reports results after scaling total debt by assets. In Columns (1) and (2), the variables are reported after the logarithmic transformation. Panel B reports results using the total interest deductions reported on the U.S. corporate income tax return, where observations with zero interest deductions are not included in the Ln(Interest Deduction) specification in Column (1). Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Table 9: Financial Performance and Taxable Income**

*Panel A: Financial Reporting in Post-IPO Period*

Dependent var:	Pre-tax Financial	Pre-tax Financial
	Income/Sales	Income/Assets
	(1)	(2)
IPO Completed*Post	0.843*** [2.765]	0.151*** [2.794]
YearXCohort FEs	+	+
Firm FEs	+	+
Observations	7,493	7,493
R-squared	0.48	0.61

*Panel B: Taxable Income in Post-IPO Period*

Dependent var:	Ln(Sales)		Pre-NOL Taxable	Pre-NOL Taxable	Pre-NOL Taxable	Pre-NOL Taxable
	Full	M-3 Available	Income/Sales	Income/Sales	Income/Assets	Income/Assets
Sample:	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	0.396*** [8.468]	0.431*** [8.812]	0.333 [1.435]	0.712*** [2.846]	0.103* [1.932]	0.078* [1.852]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	8,642	7,493	8,642	7,493	8,642	7,493
R-squared	0.89	0.90	0.44	0.47	0.58	0.62

This table presents estimates of the effect of completing an IPO on firm financial performance. Panel A reports results using *Pre-tax Financial Income/Sales* (Column 1) and *Pre-tax Financial Income/Assets* (Column 2), where the numerator is the amount of domestic financial reporting income as provided from the U.S. corporate income tax return, Schedule M-3. Panel B reports results for *ln(Sales)* in Columns (1)-(2), *Pre-NOL Taxable Income/Sales* in Columns (3)-(4), and *Pre-NOL Taxable Income/Assets* in Columns (5)-(6), where the numerator is equal to pre-tax income for tax purposes (Form 1120, Line 28). In Panel B, Columns (1), (3) and (5) show results for the full sample of observations and Columns (2), (4), and (6) show results for the sample of observations for which Schedule M-3 data are also available, for consistency with the sample in Panel A. Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.



**Table 10: Tax Planning around IPO Filing***Panel A: Foreign Tax Haven Subsidiaries*

Dependent var:	Big 7		Dot	#Tax Havens	#Big 7	#Dot
	Tax Haven (0/1)	Tax Haven (0/1)	Tax Haven (0/1)		Tax Havens	Tax Havens
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	0.109*** [3.622]	0.073* [1.795]	0.045*** [3.775]	0.206 [1.468]	0.085 [0.776]	0.084*** [2.841]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	3,905	3,905	3,905	3,905	3,905	3,905
R-squared	0.77	0.74	0.76	0.87	0.81	0.92

*Panel B: Effective Tax Rates*

Dependent Var:	Cash Effective	Cash ETR	Cash ETR
	Tax Rate	(Pre-IPO TI > 0)	(Pre-IPO TI = 0)
	(1)	(2)	(3)
IPO Completed*Post	-0.089*** [-3.861]	-0.125*** [-3.956]	0.042 [0.665]
YearXCohort FEs	+	+	+
Firm FEs	+	+	+
Observations	2,453	989	415
R-squared	0.57	0.52	0.74

This table presents estimates of the effect of completing an IPO on corporate tax planning. Panel A reports results studying tax haven use; Panel B reports results using cash effective tax rates (ETRs) for the subsample of firms for which this measure can be calculated. In Panel A, the dependent variable in Columns (1)-(3) is an indicator equal to one if a firm reports a Tax Haven subsidiary; in Columns (4)-(6), the dependent variable is the #Tax Havens. In Panel B, results are presented for the full sample, as well as for the sample of firms with pre-IPO positive taxable income (Column 2) and pre-IPO zero taxable income (Column 3). Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from  $t-3$  to  $t+3$ . Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Table 11: Post-IPO Ownership**

<i>Dependent Var:</i>	Positive Taxes Paid		Taxes/Pre-NOL Taxable Income		ln(Tax +1)	
	< 100 SH	>100 SH	< 100 SH	>100 SH	< 100 SH	>100 SH
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	0.064** [2.305]	0.041 [1.146]	0.024*** [3.530]	0.005 [0.768]	0.628*** [2.786]	0.292 [1.425]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	3,053	5,417	3,053	5,416	3,053	5,417
R-squared	0.64	0.59	0.74	0.69	0.72	0.70

This table presents results from examining whether changes in corporate tax payments differ based on the size of post-IPO firm ownership as a proxy for agency issues. Eq. (1) is estimated for all three measures of tax payments after partitioning the sample based on whether the firm reports less than (even columns) or more than (odd columns) 100 shareholders in the post-IPO period. Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Table 12: Robustness to Alternative Samples and Regression Specifications**

	Dependent Variable: Positive Taxes Paid						
	OLS with Stacked Cohorts, $t-3$ to $t+5$	OLS with Stacked Cohorts, Pre- IPO TI > 0 and Pre-IPO TI < 0	OLS with Year and Firm FEs	OLS with Year and Firm FEs, All Years Pre- and Post-IPO	OLS with Year FEs, Firm FEs, and <i>Post</i>	IV with Year and Firm FEs	IV with Year FEs, Firm FEs, and <i>Post</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IPO Completed*Post	0.070**	0.187***	0.062***	0.064***	0.068***	0.055**	0.033
	[2.493]	[3.091]	[4.098]	[4.338]	[2.685]	[2.625]	[0.420]
Post					-0.011		0.014
					[-0.431]		[0.241]
YearXCohort FEs	+	+					
Year FEs			+	+	+	+	+
Firm FEs	+	+	+	+	+	+	+
Observations	10,270	1,909	8,642	21,565	8,642	8,642	8,642
R-squared	0.55	0.36	0.58	0.03	0.58	0.58	0.58

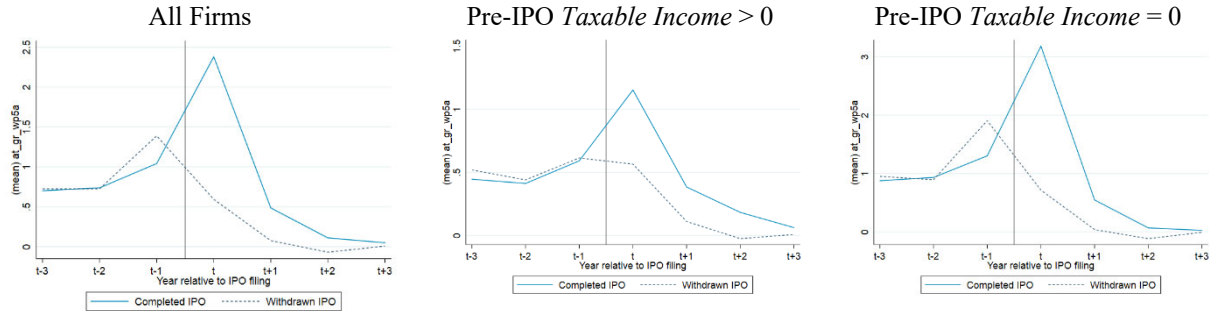
This table presents estimates for the effect of completing an IPO on the probability of paying taxes, using a variety of alternative samples and alternative regression specifications. Column (1) presents results for the stacked-cohort OLS specification as in Equation 1, but extends the window of observations to five years after the IPO. Column (2) presents results for the OLS stacked-cohorts specification and includes firms that had taxable income greater than zero and less than zero in the two years prior to IPO filing. Column (3) presents OLS results with year fixed effects and firm fixed effects, instead of the year-by-cohort fixed effects. Column (4) presents OLS results including year and firm fixed effects, for firms in the sample in years  $t-1$  to  $t+1$  around the IPO filing, and including all years of data available for each of the firms in the IRS data. Column (5) presents OLS results including year fixed effects, firm fixed effects and the variable *Post*, which is a dummy variable equal to 1 in the years after IPO filing for all firms in the sample. Column (6) presents results for an instrumental variable specification, using the 2-month NASDAQ return post-IPO filing, the 2-month average equity dividend premium post-IPO filing, and the 2-month average closed-end fund discount post-IPO filing—each interacted with *Post*—as instruments for the variable of interest *IPO Completed\*Post*, and year and firm fixed effects (Equation 3). Column (7) presents results for a similar instrumental variables specification as in Column (6), but also including the *Post* dummy variable in the first- and second-stage regressions. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

# Online Appendix

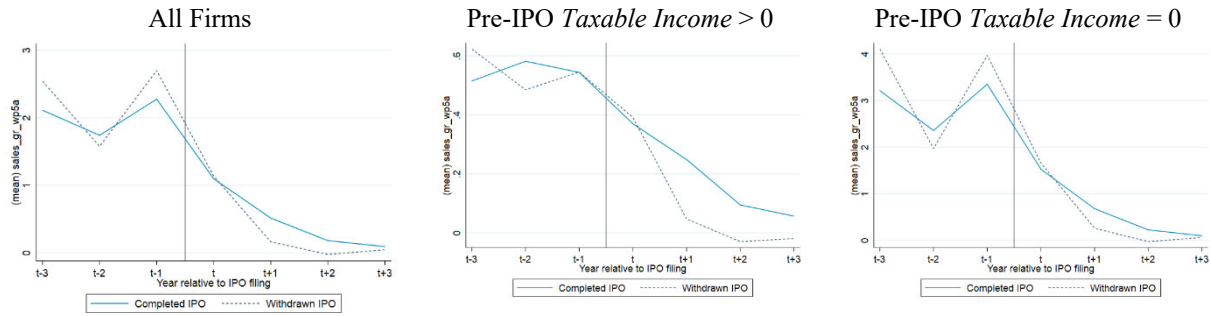
*Not intended for print publication*

**Figure A1: Asset Growth and Sales Growth Trends of Completed and Withdrawn Firms**

*Panel A: Asset Growth*



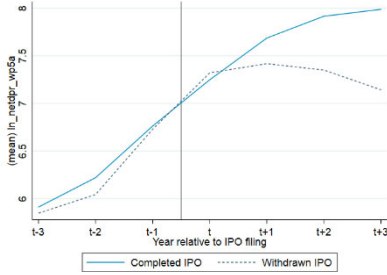
*Panel B: Sales Growth*



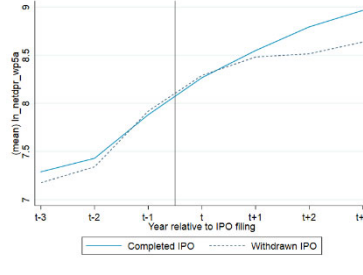
The figure presents sample averages for *Asset Growth* (Panel A) and *Sales Growth* (Panel B) around the year of IPO filing (year  $t$ ). The charts present amounts for firms that either complete an IPO (solid line) or withdraw the IPO filing (dashed line). In each panel, graphs are presented for the full sample, the subsample of firms with positive taxable income in years  $t-2$  and  $t-1$  relative to the IPO, and the subsample of firms with zero taxable income in years  $t-2$  and  $t-1$  relative to the IPO. All variables are calculated using U.S. corporate income tax data and are defined in Appendix A.

**Figure A2: Depreciation and Employee Compensation Trends of Completed and Withdrawn Firms**

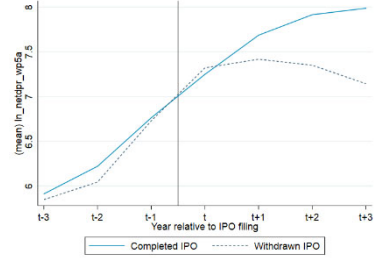
*Panel A:  $\ln(\text{Depreciation})$*   
All Firms



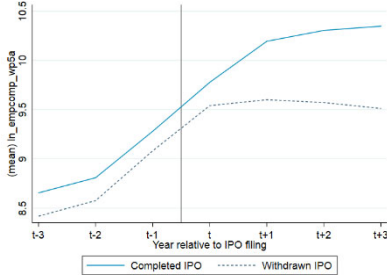
Pre-IPO Taxable Income > 0



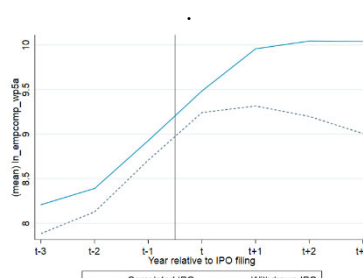
Pre-IPO Taxable Income = 0



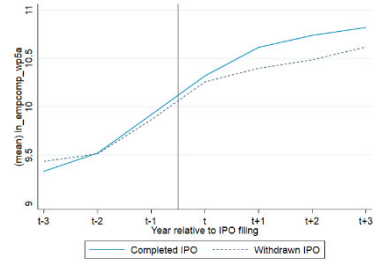
*Panel B:  $\ln(\text{Employee Compensation})$*   
All Firms



Pre-IPO Taxable Income > 0



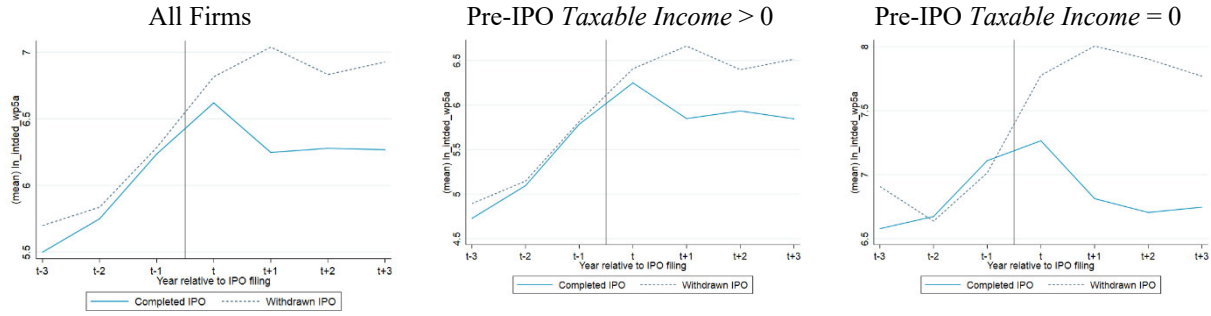
Pre-IPO Taxable Income = 0



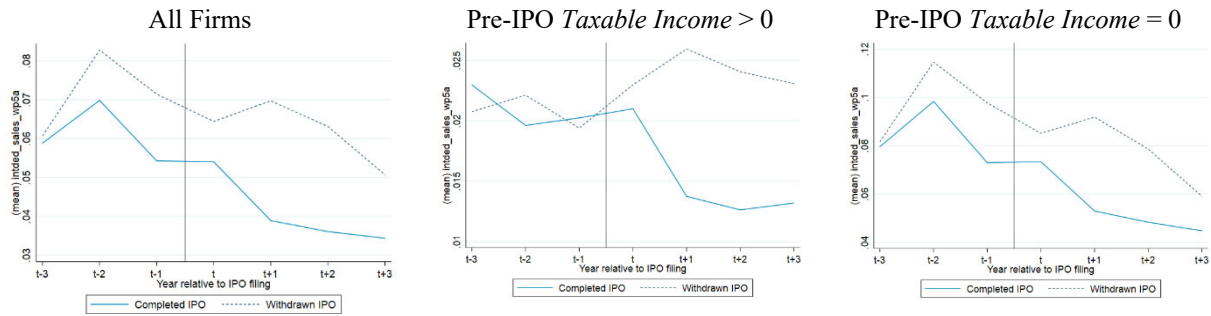
The figure presents sample averages for  $\ln(\text{Depreciation})$  (Panel A) and  $\ln(\text{Employee Compensation})$  (Panel B) around the year of IPO filing (year  $t$ ). The charts present amounts for firms that either complete an IPO (solid line) or withdraw the IPO filing (dashed line). In each panel, graphs are presented for the full sample, the subsample of firms with positive taxable income in years  $t-2$  and  $t-1$  relative to the IPO, and the subsample of firms with zero taxable income in years  $t-2$  and  $t-1$  relative to the IPO. All variables are calculated using U.S. corporate income tax data and are defined in Appendix A.

**Figure A3: Interest Deduction Trends around IPO Filing**

*Panel A: Ln(Interest Deductions)*

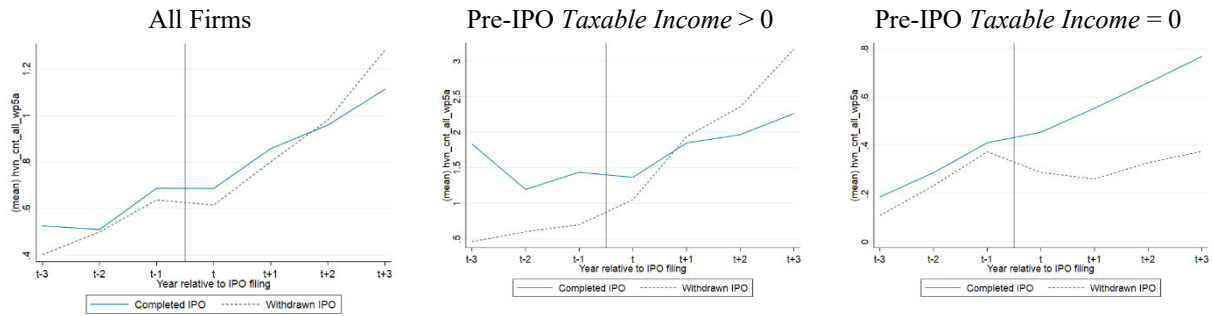


*Panel B: Interest Deductions/Sales*



The figure presents averages for  $\text{Ln}(\text{Interest Deductions})$  (Panel A) and  $\text{Interest Deductions/Sales}$  (Panel B) around the year of IPO filing (year  $t$ ). The charts present amounts for firms that either complete an IPO (solid line) or withdraw the IPO filing (dashed line). In each panel, graphs are presented for the full sample, the subsample of firms with positive taxable income in years  $t-2$  and  $t-1$  relative to the IPO, and the subsample of firms with zero taxable income in years  $t-2$  and  $t-1$  relative to the IPO. All variables are calculated using U.S. corporate income tax data and are defined in Appendix A.

**Figure A4: Number of Tax Havens owned by Completed and Withdrawn Firms**

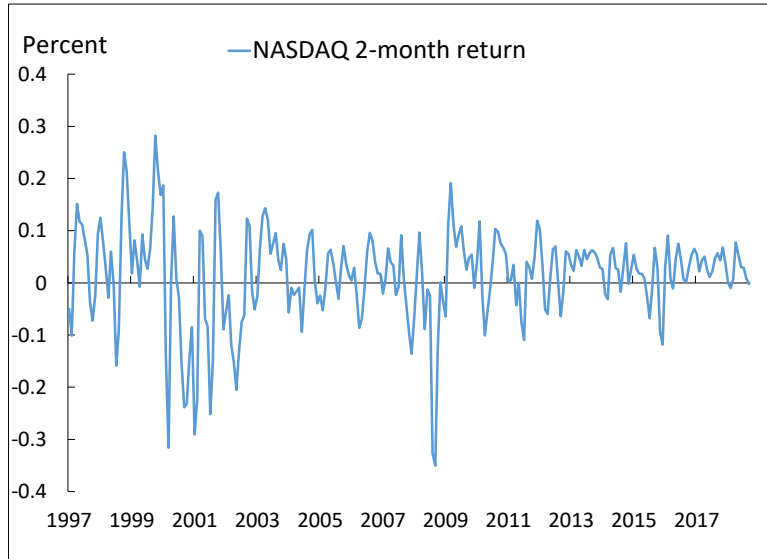


The figure presents sample averages for #Tax Havens around the year of IPO filing (year  $t$ ). The charts present amounts for firms that either complete an IPO (solid line) or withdraw the IPO filing (dashed line). In each panel, graphs are presented for the full sample, the subsample of firms with positive taxable income in years  $t-2$  and  $t-1$  relative to the IPO, and the subsample of firms with zero taxable income in years  $t-2$  and  $t-1$  relative to the IPO. All variables are calculated using U.S. corporate income tax data and are defined in Appendix A.

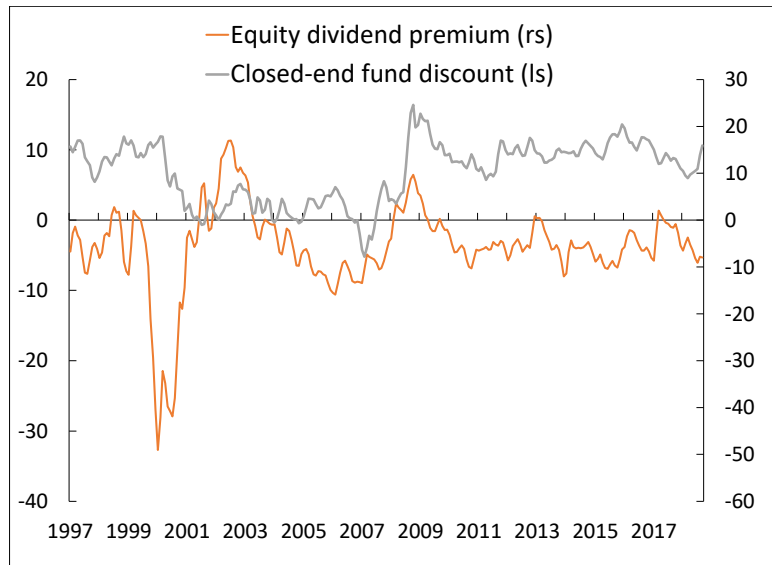


**Figure A5: NASDAQ Return, Dividend Premium and Closed-End Fund Discount**

*Panel A: NASDAQ Return*



*Panel B: Equity Dividend Premium and Closed-end Fund Discount*



This figure shows the history of the 2-month ahead NASDAQ return (Panel A) and the 2-month-ahead average dividend premium and closed-end fund discount (Panel B), by year. Data on the NASDAQ return are sourced from the Wall Street Journal and Haver Analytics. Data on the dividend premium and the closed-end fund discount are sourced from Jeffery Wurgler's website.

## Online Appendix 1: Investment and Employment Spending for Subsamples based on Pre-IPO Losses

*Panel A: Firms with Zero Taxable Income in Pre-IPO Filing Year*

<i>Dependent Var:</i>	<b>Ln(Total Investment + 1)</b>	<b>Ln(Short-Lived Investment + 1)</b>	<b>Ln(Long-Lived Investment + 1)</b>	<b>Ln(Depr. + 1)</b>	<b>Ln(R&amp;D Expense + 1)</b>	<b>Ln(Emp. Comp.)</b>	<b>Ln(Officer's Comp.)</b>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IPO Completed*Post	0.938*** [9.624]	0.890*** [7.806]	1.154*** [8.798]	0.395** [2.555]	0.372 [1.452]	0.352*** [4.239]	0.340*** [6.590]
YearXCohort FEs	+	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+	+
Observations	4,348	4,348	4,348	5,119	4,348	5,054	4,603
R-squared	0.61	0.60	0.61	0.82	0.84	0.85	0.76

*Panel B: Firms with Positive Taxable Income in Pre-IPO Filing Year*

<i>Dependent Var:</i>	<b>Ln(Total Investment + 1)</b>	<b>Ln(Short-Lived Investment + 1)</b>	<b>Ln(Long-Lived Investment + 1)</b>	<b>Ln(Depr. + 1)</b>	<b>Ln(R&amp;D Expense + 1)</b>	<b>Ln(Emp. Comp.)</b>	<b>Ln(Officer's Comp.)</b>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IPO Completed*Post	0.166 [0.660]	0.166 [0.602]	0.349 [1.156]	0.200*** [2.849]	0.133 [0.396]	0.205** [2.027]	0.255*** [2.956]
YearXCohort FEs	+	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+	+
Observations	1,270	1,270	1,270	1,404	1,270	1,399	1,304
R-squared	0.69	0.66	0.76	0.92	0.86	0.94	0.81

This table presents estimates of the effect of completing an IPO on corporate investment and employment activity. Panel A shows results for the sample of firms with zero taxable income (Form 1120, line 30) in the two years prior to the IPO filing, due to either a current year tax loss or use of NOL carryforward; Panel B shows results for the sample of firms with positive taxable income in the two years prior to IPO filing. Firms that report a mix of positive or zero taxable income in these years are omitted. Investment activity is measured based on firm capital expenditures as reported on Form 4562, corporate tax deductions claimed on Form 1120, and research and development expenses from Form 6765. Column (1) reports results for firm total fixed asset investment, where total investment is the sum of all property investment as reported on Form 4562; Columns (2) and (3) report results after separating the assets into relatively shorter or longer depreciated lives; Columns (4) and (5) reports results using total tax depreciation deductions or total R&D expenses, respectively; Columns (6) and (7) report results for employee and officer's compensation, respectively, as reported on corporate tax deductions. All variables are reported after the logarithmic transformation; we add one for the investment variables to include firms reporting zero investment. We drop observations where there is no employee or officer's compensation reported. Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Online Appendix 2: Corporate Capital Structure for Subsamples based on Pre-IPO Losses**

*Panel A: Firms with Zero Taxable Income in Pre-IPO Filing Year*

Dependent var:	Ln(Debt)	Ln(LT Debt)	Debt/Assets	Ln(Interest Deductions)	Interest Deduction/Sales	Interest Deduction/Assets
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	-0.481** [-2.100]	-0.909*** [-3.793]	-0.174*** [-7.675]	-0.451*** [-3.474]	-0.022** [-2.176]	-0.021*** [-9.720]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	3,433	2,816	4,348	4,575	5,119	5,119
R-squared	0.75	0.63	0.65	0.74	0.53	0.56

*Panel B: Firms with Positive Taxable Income in Pre-IPO Filing Year*

Dependent var:	Ln(Debt)	Ln(LT Debt)	Debt/Assets	Ln(Interest Deductions)	Interest Deduction/Sales	Interest Deduction/Assets
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	-1.160*** [-4.598]	-0.47 [-1.475]	-0.172*** [-9.379]	-0.769*** [-3.594]	-0.008*** [-5.271]	-0.012*** [-8.081]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	1,083	881	1,270	1,315	1,404	1,404
R-squared	0.87	0.78	0.80	0.88	0.80	0.78

This table presents estimates of the effect of completing an IPO on corporate capital structure and external borrowing. Panel A shows results for the sample of firms with zero taxable income (Form 1120, line 30) in the two years prior to the IPO filing, due to either a current year tax loss or use of NOL carryforward; Panel B shows results for the sample of firms with positive taxable income in the two years prior to IPO filing. Firms that report a mix of positive or zero taxable income in these years are omitted. In Columns (1)-(3), debt is measured using amounts reported on the balance sheet of U.S. corporate income tax return (Form 1120), where amounts are required to be reported for U.S. GAAP. Column (1) reports results for firm total outstanding debt; Column (2) reports results for long-term debt, and Column (3) reports results after scaling total debt by assets. In Columns (1) and (2), the variables are reported after the logarithmic transformation. Columns (4)-(6) report results using the total interest deductions reported on the U.S. corporate income tax return, where missing values are set equal to zero in Columns (5) and (6) when scaling by sales or assets, respectively. Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

### Online Appendix 3: Financial and Taxable Income for Subsamples based on Pre-IPO Losses

*Panel A: Firms with Zero Taxable Income in Pre-IPO Filing Years*

Dependent var:	Pre-tax Financial	Pre-tax Financial	Ln(Sales)	Pre-NOL Taxable	Pre-NOL Taxable
	Income/Sales	Income/Assets		Income/Sales	Income/Assets
	(1)	(2)	(3)	(4)	(5)
IPO Completed*Post	1.643*** [3.777]	0.260*** [3.503]	0.554*** [7.298]	1.399*** [3.725]	0.137** [2.303]
YearXCohort FEs	+	+	+	+	+
Firm FEs	+	+	+	+	+
Observations	4,348	4,348	4,348	4,348	4,145
R-squared	0.49	0.58	0.85	0.48	0.60

*Panel B: Firms with Positive Taxable Income in Pre-IPO Filing Years*

Dependent var:	Pre-tax Financial	Pre-tax Financial	Ln(Sales)	Pre-NOL Taxable	Pre-NOL Taxable
	Income/Sales	Income/Assets		Income/Sales	Income/Assets
	(1)	(2)	(3)	(4)	(5)
IPO Completed*Post	0.043* [1.795]	0.048* [1.715]	0.158** [2.287]	0.011 [0.575]	-0.009 [-0.248]
YearXCohort FEs	+	+	+	+	+
Firm FEs	+	+	+	+	+
Observations	1,270	1,270	1,270	1,270	1,210
R-squared	0.61	0.62	0.95	0.61	0.62

This table presents estimates of the effect of completing an IPO on financial reporting income and taxable income. Panel A shows results for the sample of firms with zero taxable income (Form 1120, line 30) in the two years prior to the IPO filing, due to either a current year tax loss or use of NOL carryforward; Panel B shows results for the sample of firms with positive taxable income in the two years prior to IPO filing. Firms that report a mix of positive or zero taxable income in these years are omitted. Columns (1) and (2) report results using Pre-tax Financial Income/Sales and Pre-tax Financial Income/Assets, respectively, where the numerator is the amount of domestic financial reporting income as provided from the U.S. corporate income tax return, Schedule M-3. Column (3) reports results for Ln(Sales); Column (4) uses Pre-NOL Taxable Income/Sales, and Column (5) uses Pre-NOL Taxable Income/Assets, where the numerator is equal to pre-tax income for tax purposes (Form 1120, Line 28). Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Online Appendix Table 4: Tax Planning for Subsamples based on Pre-IPO Losses**

*Panel A: Firms with Zero Taxable Income in Pre-IPO Filing Years*

Dependent var:	Big 7		Dot	#Tax Havens	#Big 7	#Dot
	Tax Haven (0/1)	Tax Haven (0/1)	Tax Haven (0/1)		Tax Havens	Tax Havens
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	0.168*** [6.266]	0.146*** [4.985]	0.057*** [3.603]	0.421*** [2.794]	0.248*** [3.754]	0.087** [2.400]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	2,202	2,202	2,202	2,202	2,202	2,202
R-squared	0.75	0.74	0.74	0.76	0.79	0.68

*Panel B: Firms with Positive Taxable Income in Pre-IPO Filing Years*

Dependent var:	Big 7		Dot	#Tax Havens	#Big 7	#Dot
	Tax Haven (0/1)	Tax Haven (0/1)	Tax Haven (0/1)		Tax Havens	Tax Havens
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	-0.05 [-0.744]	-0.104 [-1.443]	-0.03 [-0.985]	-0.182 [-0.396]	-0.092 [-0.248]	0.016 [0.143]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	667	667	667	667	667	667
R-squared	0.868	0.799	0.843	0.907	0.871	0.941

This table presents estimates of the effect of completing an IPO on corporate tax planning. Panel A shows results for the sample of firms with zero taxable income (Form 1120, line 30) in the two years prior to the IPO filing, due to either a current year tax loss or use of NOL carryforward; Panel B shows results for the sample of firms with positive taxable income in the two years prior to IPO filing. Firms that report a mix of positive or zero taxable income in these years are omitted. The dependent variable in Columns (1)-(3) is an indicator equal to one if a firm reports a Tax Haven subsidiary; in Columns (4)-(6), the dependent variable is the #Tax Havens. Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

**Online Appendix Table 5: Tax Payments Based on Agency Partitions**

*Panel A: Firms with Zero Taxable Income in Pre-IPO Filing Year*

<i>Dependent Var:</i>	<b>Taxes/Pre-NOL Taxable</b>					
	<b>Positive Taxes Paid</b>		<b>Income</b>		<b>ln(Tax +1)</b>	
	< 100 SH	>100 SH	< 100 SH	>100 SH	< 100 SH	>100 SH
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	-0.02 [-0.686]	0.050** [2.023]	0.000 [-0.333]	0.001 [1.436]	-0.161 [-0.880]	0.215* [1.721]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	1,762	3,241	1,762	3,241	1,762	3,241
R-squared	0.42	0.44	0.45	0.46	0.43	0.48

*Panel B: Firms with Positive Taxable Income in Pre-IPO Filing Year*

<i>Dependent Var:</i>	<b>Taxes/Pre-NOL Taxable</b>					
	<b>Positive Taxes Paid</b>		<b>Income</b>		<b>ln(Tax +1)</b>	
	< 100 SH	>100 SH	< 100 SH	>100 SH	< 100 SH	>100 SH
	(1)	(2)	(3)	(4)	(5)	(6)
IPO Completed*Post	-0.008 [-0.120]	0.066 [0.619]	0.014 [0.510]	0.018 [0.534]	0.471 [0.858]	0.467 [0.605]
YearXCohort FEs	+	+	+	+	+	+
Firm FEs	+	+	+	+	+	+
Observations	560	806	560	806	560	806
R-squared	0.56	0.55	0.61	0.61	0.61	0.63

This table presents results from examining whether changes in corporate tax payments differ based on the size of post-IPO firm ownership as a proxy for agency issues. Panel A shows results for the sample of firms with zero taxable income (Form 1120, line 30) in the two years preceding the IPO filing, due to either a current year tax loss or use of NOL carryforward; Panel B shows results for the sample of firms with positive taxable income in the two years preceding the IPO filing. The sample is partitioned based on whether the firm reports less than (even columns) or more than (odd columns) 100 shareholders in the post-IPO period. Each specification is estimated on stacked cohorts after inverse probability weighting, where each cohort corresponds to a calendar year in which there is at least one completing and one withdrawing firm. Firms are only included in one cohort, and each cohort includes observations from t-3 to t+3. Regressions include firm and year-by-cohort fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.

### *Instrumental Variables Description*

In this Online Appendix, we describe the three instrumental variables (IVs) used in the IV regression specifications tabulated in Section 5.6.<sup>21</sup> The three variables we use are the NASDAQ composite index return in the two months following an IPO filing (reflecting market performance), the average dividend premium in the two months after IPO filing (reflecting investor sentiment), and the average closed-end mutual fund discount in the two months after filing (reflecting either investor sentiment or market liquidity conditions).

The first measure used is the NASDAQ composite two-month return following an IPO filing (Bernstein, 2015). This measure reflects the sensitivity of managers to stock market changes during the book building process when deciding to complete the IPO (Busaba, Benveniste, and Guo, 2001; Dunbar and Foerster, 2008). As Bernstein notes, firms may decide to withdraw instead of waiting for more favorable market conditions because of automatically expiring filing registrations and the costs of waiting, including prohibitions on disclosing new information to investors or banks and the inability to issue private placements. The NASDAQ return is expected to have a positive relationship with IPO completion—when market returns are higher, firms are expected to be more likely to complete the IPO.

The second measure is intended to capture investor sentiment and is the average dividend premium two months after filing for the IPO, calculated as the log of the average market-to-book ratios of dividend-paying firms, minus the ratio for non-dividend-paying firms (Baker and

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<sup>21</sup> Bernstein's (2015) empirical design differs somewhat from this instrumental variable design in that his primary outcome of interest is the average scaled number of patents per year in the five years after IPO filing. He regresses this outcome on a dummy variable for IPO completion, which is 1 for firms that complete an IPO and 0 for firms that withdrawal the IPO. He instruments for IPO completion with the NASDAQ two-month stock return post filing. This is a cross-sectional instrumental variables regression. In contrast, we run a panel instrumental variables regression in order to study the trends in the years prior to the IPO as well as after the IPO and to utilize more variation in the outcome variables by year. If we did not interact the instruments with the *Post* dummy variable, the instruments would be constant across firms and thus colinear with the firm fixed effects.

Wurgler, 2006). Lowry (2003) finds that market sentiment is an important and distinct determinant of IPO volumes, and Baker and Wurgler (2004) suggest that the dividend premium reflects this sentiment by capturing excess demand for stocks of dividend-payers. In particular, the dividend premium is predicted to be negatively related to investor sentiment, as dividend-paying firms likely have poorer investment opportunities than non-dividend payers, and thus should correlate negatively with IPO completion.

The third measure used as an instrument is the average closed-end mutual fund discount (CEFD) in the two-months after filing for the IPO. A closed-end mutual fund is a publicly traded investment firm that invests in securities, and the CEFD is the average difference between the net asset values of closed-end stock fund (CEF) shares (i.e., the prices of underlying securities in which the closed-end fund has invested) and the market price of the CEF. The predicted relationship between the CEFD and IPO completion is theoretically ambiguous. On one hand, the CEFD has been used as a measure of investor sentiment (Lee, Shleifer, and Thaler, 1991; Baker and Wurgler, 2006), with the interpretation that a lower CEFD reflects higher investor sentiment and thus a higher probability of IPO completion. On the other hand, theoretical work by Cherkes, Sagi, and Stanton (2009) suggests that the CEFD instead reflects the tradeoff between liquidity benefits of trading in the liquid closed-end fund as opposed to the more illiquid underlying securities.<sup>22</sup> Market liquidity conditions may be important for a manager's decisions to complete an IPO because greater market liquidity or lower liquidity risk has been shown to have a number of trading and pricing benefits for IPO firms (Aggarwal, Krigman, and Womack, 2002; Ellul and Pagano,

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<sup>22</sup> In their model, the CEFD is inversely related to the liquidity benefits of trading in the CEF instead of the underlying stocks and is positively related to CEF manager's fees paid. When liquidity conditions are favorable—i.e., when the liquidity benefits of trading in the CEF are low—the CEFD is expected to be high. Intuitively, with favorable market liquidity, there will be less market demand for the closed-end fund for liquidity purposes and the fund will trade at a higher discount due to the manager's fees.



2006). Under the predictions of this model, the CEFD is expected to have a positive relationship with market liquidity conditions, and by extension, the probability of IPO completion. Online Appendix Figure A5 graphs the three instruments over time.

We then estimate the following first- and second-stage regression specifications:

First stage:

$$(2) \quad IPO\ Completed * Post_{it} = \alpha_1 NASDAQ\ return_d * Post_{it} + \alpha_2 Dividend\ premium_m * Post_{it} + \alpha_3 Closed\text{-}end\ fund\ discount_m * Post_{it} + \delta_i + \gamma_t + \epsilon_{it}$$

Second Stage:

$$(3) \quad Y_{it} = \beta_1 \widehat{IPO\ Completed} * Post_{it} + \gamma_t + \delta_i + \epsilon_{it},$$

The NASDAQ two-month return is calculated from the day  $d$  of IPO filing and the average dividend premium and closed-end fund discount are calculated for the two months  $m$  after IPO filing. This second-stage regression specification, which includes tax-year and firm fixed effects, is similar to a multiple treatment difference-in-difference strategy, as discussed above, but now instruments for IPO completion.

We present first-stage regression results in Online Appendix Table 6 for the two instrumental variables specifications discussed in Section 5.6, with the specification including year and firm fixed effects in column (1) and the specification including year and firm fixed effects as well as the *Post* dummy variable in column (2). In Column (1), we observe that the NASDAQ return and the closed-end fund discount are statistically significant predictors of the IPO completion. The sign on the NASDAQ premium is positive, as predicted, and the sign on the closed-end fund discount is also positive, which is consistent with the theory suggesting this variable is indicative of market

liquidity conditions. The dividend premium has little effect in this specification. In Column (2), we observe that the NASDAQ return and the dividend premium are statistically significant predictors of IPO completion, but the sign on the dividend premium is positive, which is not in line with the theoretically predicted sign of the dividend premium. In this specification, the *Post* variable is the most predictive of IPO completion—this variable is perfectly correlated with the independent variable *IPO Completed \* Post* for firms that complete an IPO (about 75 percent of the sample). It is highly significant with a t-statistic of 24.6.

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**Online Appendix Table 6: First-stage Results for IV Estimation**

Dependent var:	IPO Completed*Post (1)	IPO Completed*Post (2)
NASDAQ return*Post	0.698*** [6.092]	0.767*** [7.471]
Dividend premium*Post	0.00 [0.281]	0.003** [2.495]
Closed-end fund discount*Post	0.060*** [22.453]	0.005 [1.304]
Post		0.725*** [24.632]
Year FEs	+	+
Firm FEs	+	+
Observations	8,642	8,642
R-squared	0.77	0.83

This table presents results from a first-stage specification for IPO completion (Equation 2). The instruments included in the first-stage regression are the 2-month NASDAQ composite return post-IPO filing, the 2-month average equity dividend premium post-filing, and the 2-month average closed-end fund discount post-filing, each interacted with *Post*, which is a dummy variable equal to 1 in the years after IPO filing for all firms in the sample. Column (1) presents results including the three instrumental variables and year and firm fixed effects. Column (2) presents results including the three instrumental variables, the *Post* variable, and year and firm fixed effects. Standard errors are clustered at the IRS major industry level. T-statistics are reported in brackets. Variable descriptions are presented in Appendix A. \*\*\*, \*\* and \* indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.