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How does access to the unsecured debt market affect investment?

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Abstract

This paper examines the relation between debt structure and investment, by exploiting differences in secured and unsecured debt holdings. In order to address endogeneity concerns, I exploit two sources of exogenous variation for identification. From the firms' side, the Jobs and Growth Tax Relief Reconciliation Act of 2003 represents a negative shock to firms' creditworthiness. From the credit market's perspective, the asset-backed commercial paper market collapse of 2007 caused a temporary shortage of unsecured commercial paper. Each of these shocks to debt structure is analyzed combining a difference-in-differences approach with an instrumental variable estimation (Waldinger (2010)), which allows studying i) substitution patterns among debt types and ii) the impact on investment. Results show that greater access to unsecured debt leads to larger investment. When firms face more restricted access to the unsecured debt market, they substitute toward secured debt, and reduce investment. The reason behind this result is that unsecured debt is more cost-effective in terms of spreads and covenants. These findings suggest that collateral is not key to finance investment, as instead has often been claimed in the literature. Creditworthiness rather than collateral is key to access unsecured debt. Additionally, I shed light on how access to the unsecured debt market relates to the balance sheet and credit channels of monetary policy.

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1 Introduction

Under perfect capital markets, debt and capital structure decisions of firms are irrelevant (Modigliani and Miller (1958)). However, in practice firms use different debt instruments that serve different purposes, and access and usage of this pool of instruments may significantly affect firms' corporate policy in the presence of financial constraints. More precisely, investment and debt structure are closely linked and understanding how access to debt markets affects investment is an empirical challenge due to endogeneity concerns.

Financial constraints limit the availability of external funds for firms with profitable investment opportunities. They may take the form of asymmetric information or limited contract enforceability. Either way, collateral is typically used to alleviate these frictions. Collateral availability increases firms' debt capacity and reduces the likelihood that a firm may be rendered financially constrained.[1] Additionally, it reduces risk from a lender's perspective as it provides enforcement and because it offers protection against claims from other creditors upon default (priority).

In most cases, the literature on financial constraints assumes that debt is homogeneous and can be secured by the collateral that the firm posts. However, in practice unsecured debt is quantitatively more relevant than secured debt and does not require the pledge of collateral because creditworthiness of borrowers suffices as a guarantee of repayment.[2] Although counter-intuitive because secured debt offers higher protection to lenders, unsecured debt financing is associated with less risky borrowers and it includes contractual devices that may accomplish the same ends as the pledge of collateral.[3] On one hand, negative pledge covenants avoid firms encumbering assets to borrow secured debt beyond some threshold. Consequently, they artificially guarantee that the pool of assets to liquidate in case of default is sufficiently large to satisfy debt repayment. On the other hand, net worth covenants maintain the creditworthiness "cushion" at desired levels. As a result, unsecured bank debt, private placements and public debt tend to have lower interest rates

[1] Chaney et al. (2012) show that for each additional dollar of real estate collateral, the average U.S. corporation invests \$0.06. Gan (2007) undertakes a similar empirical approach and estimates that the land market collapse of the early 1990's in Japan caused a reduction in investment of 0.8% as a result from a decrease of 10% in the valuation of collateral.

[2] Rauh and Sufi (2010) show that senior unsecured debt holdings in debt structure are positively related to credit quality for rated firms and to the accumulation of internal funds in the capital structure. Giambona et al. (2015) prove causality from firms' investment opportunities to higher unsecured debt holdings in debt structure by means of the passage of a new law affecting growth prospects of the pharmaceutical sector. Similarly, Vig (2013) analyzes the effect of a securitization reform strengthening creditor rights and shows that secured debt dependence decreased as a result from the policy change.

[3] Only recourse secured debt has priority upon default over unsecured debt. When secured debt is non-recourse and collateral attached has been depleted, the residual secured claims are pooled together with unsecured claims of the highest seniority. See LoPucki et al. (2012) and LoPucki (2003) for further information.

attached and the combination of lower spreads and looser covenants helps to minimize total costs of financing as in Graham and Leary (2011).[4]

A natural question arises as a result: Can a firm invest more if it has access to the unsecured debt market? In this paper, I address this question by investigating how shocks to unsecured debt influence investment decisions in the presence of financial constraints. The key challenge for this type of cross-sectional analysis is that financial decisions tend to be made jointly along with payout and investment decisions. An ideal experiment would control for the endogeneity in the relation between debt structure and investment, but also for the endogeneity in retention/payout policy and investment. To overcome these concerns, I use two different identification strategies.

First, I examine the effects of the decrease in the tax rate on dividends in the U.S. associated with the *Jobs and Growth Tax Relief Reconciliation Act* of 2003 (JGTRRA). More precisely, I exploit the heterogeneity in firm ownership structure and the fact that individual investors suffer a tax disadvantage on dividend payouts. The clientele effects literature states that firms attract specific investors by setting their dividend policies. While institutional investors and corporations prefer companies paying high dividends, this is not the case for individual investors that face a tax disadvantage on dividend payouts. Therefore, the tax environment prior to the tax cut promoted share repurchases in detriment of dividend payouts. However, evidence in Chetty and Saez (2005) and Brown et al. (2007) suggests that the main action in the JGTRRA was driven by dividend initiations of firms with large presence of executive stock holdings and independent shareholders and, moderate earnings growth prospects. Therefore, individual investors are better off with the policy change as the cost of dividend payouts decreases significantly.

I analyze whether firms with a high percentage of individual investors (treatment group) react to a lower tax rate on dividends by increasing dividends relatively more than similar firms with a low percentage of individual investors (control group). From an accounting perspective, an increase in dividends reduces retained earnings in stockholders' equity by the same amount. This means that the reduction in dividend taxes represents a shock to a firm's creditworthiness, which itself is a shock to the ability of a firm to raise unsecured debt.

The JGTRRA is a quasi-natural experiment that helps examine two related questions. First, one can examine how unsecured debt holdings change as a result of lower retained earnings, whereby

[4]Berger and Udell (1990) find that secured borrowers are riskier for bank debt, while Carey et al. (1993) and John et al. (2003) do the analogous for private placements and public debt respectively.

the latter is instrumented by the shock to dividends (instrumental variable estimation, IV). Second, one can analyze if a decrease in creditworthiness leads firms to substitute away from unsecured debt toward secured debt. One can then evaluate the effect that an exogenous variation in debt structure generates on investment for firms in the treatment group. I also estimate a causal effect in reduced-form to rule out that retained earnings could be directly affecting investment, as suggested by Kaplan and Zingales (1997).

The second identification strategy that I consider is a direct shock to the availability and cost of unsecured debt that occurred during the *collapse of the asset-backed commercial paper market* (ABCP) in 2007. The collapse in the ABCP market led to a temporary shortage of short-term unsecured non-financial corporate commercial paper (Acharya and Schnabl (2010)). Non-financial firms do not have access to this type of securitization instrument but commercial banks exposed to the collapse of ABCP market were suppliers to the corporate commercial paper market. Thus, they were indirectly affected by the unwillingness of banks to roll-over commercial paper (Ivashina and Scharfstein (2010)). Firms with a commercial paper program tend to be the least financially constrained firms and tend to use unsecured debt financing only (Rauh and Sufi (2010), Colla et al. (2013)). I sort firms according to their usage of commercial paper before the shock. I conjecture that firms with a large percentage of commercial paper financing (treatment group) face refinancing problems when the ABCP market comes to a halt. Moreover, refinancing problems are more severe for firms facing some degree of restricted access to the unsecured bond market. I expect the firms in the treatment group to reduce the share of unsecured debt in total debt more severely than firms without commercial paper.

The above strategy based on double identification allows me to distinguish between the effects that come from the firm side (balance sheet channel) from those that come from capital markets (credit channel). My focus is on the substitution effect that arises from shocks that affect both channels. When firms face restricted access to the unsecured debt market, they are forced to substitute toward secured debt issues and inefficiencies may arise in the investment decision.

The main findings are as follows. The JGTRRA quasi-natural experiment shows that a one standard deviation decrease in creditworthiness as measured by retained earnings over total assets causes the share of unsecured debt over total debt to decrease by 0.2 standard deviations. This means that a deterioration in the financial condition of the firm leads to lower usage of unsecured debt. As a result from JGTRRA, firms in the treatment group react to a lower tax rate on

dividends by initiating dividends more pronouncedly, consistent with life-cycle theories of dividend initiations in DeAngelo et al. (2006) and the free cashflow hypothesis in Jensen (1986). The tax reform generates a trade-off between payout policy and short-term financing and longer term investment decisions. As firms try to issue debt in order to finance both dividend payouts and investment projects, lower creditworthiness reduces repayment capacity in the eyes of unsecured (bank) creditors and puts upward pressure on spreads. This in turn may restrict access to the unsecured debt market and force substitution toward secured debt issues for firms in the treatment group. When there is substitution, different financial constraints become more relevant. In the context of JGTRRA, limited contract enforceability becomes more relevant. Creditors require the pledge of collateral to enforce repayment. Senior secured bank debt issues increase by 1.2%, while senior secured bonds increase by 0.6% more than the control group.

The ABCP test shows that firms in the treatment group experience an average reduction of 7% in unsecured debt over total debt. The temporary shortage in unsecured commercial paper forces firms in the treatment group to substitute toward other unsecured debt sources of financing as senior unsecured bonds. Firms with a commercial paper program increased senior unsecured bond holdings as a result from the supply shock by 3.7% more than the control group. However, some firms may face restricted access to the bond market and thus, they are forced to substitute toward bank debt instead. Creditors require the pledge of collateral to enforce repayment. More precisely, firms reduced senior unsecured bond holdings by 2.2% and increased senior secured bank debt by 0.9% more than the control group. These results are consistent with evidence in Ivashina and Scharfstein (2010) and Berrospide and Meisenzahl (2015) that credit line drawdowns increased during the financial crisis. Moreover, it also explains the shift in the composition of credit between loans and bonds evidenced in Adrian et al. (2012).

Then, I focus on the consequences for the inefficiency of investment decisions or post-treatment real outcomes of changes in the composition of debt structure. By means of the ABCP test and combining differences-in-differences (DID) with IV estimation as in Waldinger (2010), I show that a one standard deviation decrease in unsecured debt in debt structure causes investment to reduce by 0.06 standard deviations. To strengthen the external validity of results, I analyze the effect of financial constraints on investment when arising from firms' side, through the JGTRRA. A policy change deteriorating firms' creditworthiness forces them to substitute toward secured debt issues. This in turn causes investment to decrease by 0.8% more compared to the control group. For robustness, I address the endogeneity concerns in debt structure choice, payout policy and

investment decisions altogether. I quantify the reduced-form causal effect on investment when both retained earnings and unsecured debt in debt structure are "instrumented" with exogenous variation from JGTRRA and ABCP, respectively. I find that a reduction in unsecured debt in debt structure causes a significant decrease in investment as compared to the counterfactual, by 1.4%. Moreover, results remain unchanged when considering an estimation of collateral actually pledged by firms built through a text-search algorithm.[5]

According to the evidence reported in both identification strategies, JGTRAA and ABCP, when a negative shock impacts unsecured debt holdings in debt structure and firms find themselves unable to substitute toward other unsecured debt sources of financing, they substitute toward secured debt. When substitution occurs, different types of financial constraints become more relevant as the substitution is not solely limited to debt types (secured vs. unsecured), but also to instrument types (bank debt vs. bonds and private placements). The reduction in investment when substitution occurs depends on the extent to which contract terms are adjusted to reflect the presence of the specific financial constraints that become more relevant.[6] The fact that restricted access to unsecured debt markets can operate both from a demand and a supply side of credit provides cross-sectional evidence for a balance sheet and a credit channel and thus, debt structure choice can have aggregate implications.

Moreover, the results in this paper suggest that facing restricted access to the unsecured debt market offers a valid benchmark to proxy financial constraints faced by firms. The traditional ex-ante definitions for being financially constrained tend to yield inconsistent conclusions across definitions as evidenced in Farre-Mensa and Ljungqvist (2015). The innovation in this paper relies on the fact that firms that are unconstrained according to traditional definitions, or have access to a credit line as in Sufi (2009), can still be constrained if their access to the most cost-effective source of financing is limited. Therefore, there is a pecking-order in terms of debt types and instruments and restricted access to the unsecured debt market has a theoretical justification and is statistically significant enough to understand whether a firm is exposed to financial frictions.

This paper relates to the finance literature on the relevance of debt structure heterogeneity and to the macroeconomics literature on the collateral channel. I contribute to this literature

[5]Using collateral actually pledged as opposed to collateral availability proxied by tangibility reduces the specification's exposure to measurement error. I conduct the text-search on the EDGAR Security Exchange Commission's 10-K filings by looking for the sources of collateral pledged in secured debt contracts.

[6]Including amount outstanding, collateral requirements, maturity, spreads and covenants.

by shedding light on an alternative definition for financial constraints: restricted access to the unsecured debt market. Focusing on the corporate finance literature, Rauh and Sufi (2010) demonstrate that abstracting from debt structure heterogeneity considerations may lead to missing substantial variation in capital structure. On the other hand, Colla et al. (2013) show that most firms tend to specialize in one type of debt, and then relate usage to demand- and supply-driven factors.[7] Additionally, Giambona et al. (2015) conclude that firms actively manage their debt structure and that unsecured debt tends to have looser covenants attached and shorter maturities.[8] I contribute to this strand of the finance literature by being the first to show that debt structure heterogeneity defined as secured vs. unsecured debt has real effects on investment.

On the other hand, it relates to the extensive macro-finance literature on how collateral helps to solve market imperfections caused by asymmetric information (Holmstrom and Tirole (1997) or Stiglitz and Weiss (1981)) or limited contract enforceability (Kiyotaki and Moore (1997), Bernanke and Gertler (1989), Hennessy and Whited (2005) or Livdan et al. (2009)). Moreover, this literature concludes that collateral plays a role in the transmission, propagation and amplification of exogenous shocks to the real economy, as in the seminal papers by Kiyotaki and Moore (1997) and Bernanke and Gertler (1989). I contribute to this literature by providing the micro-foundations to recognize a balance sheet channel and a credit channel through which the composition of debt structure could generate real effects on investment. Although the role of collateral is relevant in generating cyclical fluctuations, the channel through unsecured debt should be further explored to shed light on the specific mechanisms and to quantify the effect in business cycle dynamics.

2 Identification Strategy

In this section, I explain each identification strategy in detail, justify how the treatment and control groups are defined, provide the empirical specification to be implemented and finally identify the possible threats to the exclusion restriction for IV estimation.

2.1 The Jobs and Growth Tax Relief Reconciliation Act of 2003

President Bush first proposed the JGTRRA on January 7, 2003. The tax reform was passed by Congress on May 23 and signed into law on May 28, 2003. The new law reduced the tax rate on capital gains (τ^{cap}) from 20% to 15%. The tax rate on qualified dividends (τ^{div}) also decreased for all taxpayers from the ordinary income tax rate of 39% to the long-term capital gains rate of 15%.

[7] Rauh and Sufi (2010) look at secured debt, senior unsecured debt, and subordinated debt. Colla et al. (2013) use the different debt structure components available in S&P's Capital IQ, including commercial paper, drawn credit lines, term loans, senior bonds and notes, subordinated bonds and notes, capital leases, and other debt.

[8] This is consistent with evidence in Brunnermeier and Oehmke (2013), who argue that creditors shorten maturities to artificially achieve priority.

The special tax treatment applied retroactively to any payment done after January 1, 2003.[9] The direct implication of this tax reform was making dividend payouts, share repurchases and earnings retention cheaper from a shareholders perspective.

The fiscal environment prior to the tax-cut discouraged dividend payouts in favor of share repurchases (Grullon and Michaely (2002), DeAngelo et al. (2000)).[10] Taxing dividend income at an individual level causes firms to retain instead of paying out. As a result, agency problems in inefficient investment of retained earnings arise (Jensen (1986), Scharfstein and Stein (2000), La Porta et al. (2000)). However, the JGTRRA lead to a large surge in dividend initiations, where firms with large executive stock holdings, independent shareholders, taxable institutional owners and firms with moderate earnings growth responded to the policy change more pronouncedly (Brown et al. (2007), Chetty and Saez (2005)).[11] This is consistent with the life-cycle theory of dividend payouts in DeAngelo et al. (2006). Non-payers tend to be in the capital infusion stage (Fama and French (2001), Jaganathan et al. (2000)) and only initiate dividend payouts when the costs of paying out are lower than the costs of retaining. Moreover, initiations carry a positive stock price reaction because they convey relevant information to the market by signaling the firm will remain profitable (Bhattacharya (1979)) and reduce exposure to agency conflicts.[12] As Jensen (1986), Rozeff (1982) and Easterbrook (1984) conclude, dividends imply managers will be subject to monitoring by capital markets as the firm may be forced to issue new debt to finance both, investment and the payout.

However, dividend payouts are a permanent cashflow commitment.[13] Shareholders' preference for dividend smoothing and dividend downward stickiness (Lintner (1956), Leary and Michaely (2011)), causes firms to cut dividends only as a last resort.[14] Therefore, from a capital structure

[9] Qualified dividends require two conditions to be satisfied: i) they must be paid by a U.S. corporation or a foreign company whose stock trades on the U.S. stock market (e.g., an American Depositary Receipt), and ii) they must have held the stock for more than 60 days during the 121-day period that begins 60 days before the ex-dividend date.

[10] In 1982, *Rule 10b-18* was adopted. This SEC rule provided a safe harbor for companies and their affiliated purchasers when the company repurchased shares of common stock. Firms would not be deemed to have violated the anti-fraud provisions of the Security Exchange Act of 1934. Moreover, in 1986, the *Tax Reform Law* was enacted. Although it reduced the tax rate on dividends (from 50 to 39%) and increased the tax rate on capital gains (from 20 to 28%), the effective dividend tax rate still discouraged dividend payouts (Allen and Michaely (2002)). As a result, the average share repurchase-dividend ratio was 57.7% in the 1980's, reaching a maximum of 113.1% in 2000.

[11] The authors show that while payers accounted for 17% in 2000, they increased up to 25% in 2004. Similarly, Brav et al. (2005) performed a survey on payout policy prior to the policy change. 13% of non-payer respondents said that a tax cut would lead to an initiation if tax rates on dividends were lower. The authors introduced a new survey after JGTRRA, and 6% of the 13% that were non-payers had already increased dividends at the beginning of 2004.

[12] Asquith and Mullins (1983) and Michaely, Thaler and Womack (1995) find that the abnormal returns associated with dividend initiations are around 3.7%.

[13] I rule out special dividends for the purpose of the present work. Special dividends are one-time or temporary dividend payouts occurring as a result of a temporary increase in cashflows (Jaganathan et al. (2000)). I do so, as they are unlikely to generate capital re-allocations.

[14] A dividend cut causes an average stock price decline of about 6% on the three days surrounding the announcement (Lintner (1956)).

channel perspective, for the same level of net income generated every fiscal year, a lower amount will be effectively devoted to retained earnings when dividend payouts increase. As a result, firms' repayment capacity in connection with unsecured debt financing is temporarily reduced, which may restrict access to the unsecured debt market. Thus, firms closer to a binding constraint may become financially constrained in terms of unsecured debt as a result of the new law.[15]

Another way to think about it is that there are adjustment costs to reach back the optimal capital structure (Myers (1984), Shyam-Sunder and Myers (1999), Leary and Roberts (2005)). Firms experience a lag between the increase in dividends and the time when optimal capital structure is restored. No matter what the new long-term equilibrium is or how long it takes for the firm to revert back to that equilibrium, in the short-run, the policy change generates a trade-off between short-term payout and financing and longer term investment decisions (as in Hennessy and Whited (2005)). Furthermore, the speed at which the new equilibrium is reached will depend on the degree of financial constraints faced. The more severely restricted access is to the unsecured debt market, the more likely firms will need to adjust the composition of their debt structure toward more secured debt issues. As a result, the probability of decreasing the size of their investment projects is heightened.

In my analysis, I face two main identification challenges. First, the tax reform affected all U.S. corporations. Therefore, even if exogenous or unpredicted, the decision on how much to alter payout/retention policy will still be endogenously determined. Second, there might be confounding effects from a lower τ^{div} and τ^{cap} if firms substitute dividend payouts for share repurchases.[16]

I address the first concern by looking at the ownership structure of firms to measure the degree of exposure to the policy change. The clientele effects literature indicates that a firms' dividend policy reflects the tax preference of its investor clientele (Graham and Kumar (2006)). Individual investors in the highest tax brackets have traditionally preferred stocks that pay low dividends

[15]In earlier versions of this paper, I tested how different proxies for creditworthiness related to unsecured debt holdings in debt structure. I used book net worth, market net worth, retained earnings over total assets, credit ratings and Altman's Z score. All proxies are positively and significantly correlated with unsecured debt holdings in debt structure. Additionally, I tested how unsecured debt holdings in debt structure affected investment. The effect was positive and statistically significant. Moreover, the interaction term between higher unsecured debt and high creditworthiness yielded a stronger positive impact on investment.

[16]The cash inflow could partly (or completely) offset the cash outflow. From the statement of cashflows (CF) identity:

$$\text{Operating CF} + \text{Investing CF} + \text{Financing CF} + \text{Exchange Rate Effects} = \Delta\text{Cash Balance},$$

where cash dividends and share repurchases reduce Financing CF.

due to the tax disadvantage, whereas nontaxed investors like corporations, institutions, or pension funds preferred stocks that pay high dividends. Taking this into account and building on results by Brown et al. (2007) and Chetty and Saez (2005), I define the *treatment group* as firms in the fourth quartile of the individual investors' share ownership distribution. Once the tax rates drop, at the margin, firms in the treatment group will be more likely to find it profitable to initiate/increase payouts than those in other quartiles of the distribution.

On the other hand, whether firms substituted share repurchases for dividend payouts is key in the context of this identification strategy. A substitution would imply no re-allocation of capital due to off-setting cashflows. Chetty and Saez (2005) show that the new law caused an increase in total payouts as opposed to a substitution effect. From the free cashflows to equityholders identity, higher dividend payouts need to be compensated for, either with higher operating cashflows, lower reinvestment needs, and/or further debt issues (holding share repurchases fixed).[17] Operating cashflows are fixed in the short-term because the JGTRRA did not vary the set of investment opportunities available; consequently, debt issues may be insufficient to finance both higher dividend payouts and reinvestment needs, leading to a reduction in investment.

Assuming that the substitution hypothesis has been ruled out, the accounting treatment of each policy decision allows me to identify a clear causation channel. Although net income not paid out to shareholders as dividend payouts directly impacts retained earnings in stockholders' equity, share repurchases have no direct effect. They impact the "Treasury Stock Account" in stockholders' equity rather than retained earnings. Thus, I look at how retained earnings rather than cash holdings/dividend payouts responded to the new law. Moreover, this methodology allows me to directly link the change in policy to firms' debt and capital structure decisions.[18]

2.1.1 Empirical Design: Unsecured Debt Is Determined by Firms' Creditworthiness

I follow an empirical design similar to that of Waldinger (2010) in which he combines DID estimation with an IV set-up. I perform DID estimation to quantify the effect of the JGTRRA on retained earnings among firms in the treatment group. To alleviate concerns regarding other

[17] The free cashflows to equityholders identity (FCFE):

$$FCFE = \text{Dividends} + \text{Share Repurchases} = \text{Operating CF} - \text{Reinvestment Needs} + \text{Debt Issues} - \text{Debt Repayment}$$

[18] Although I focus on the response of retained earnings for practical reasons, an equivalent causation channel can be established between cash holdings and unsecured debt holdings in debt structure. Two assumptions are required. First, we need to rule out the share repurchase-dividends substitution hypothesis. Second, we need to assume that cash is negative debt as in Acharya et al. (2005). Then, as a result of the tax cut, firms that increase dividends reduce cash holdings upon payment. If cash is considered negative debt, net worth's share over total capital decreases. Provided that net worth is another proxy for firms' creditworthiness, the share of unsecured debt over total debt decreases.

sources of firm heterogeneity underlying the observed relations, I choose treatment and control groups with similar firm characteristics in terms of debt structure determinants (tangibility), with the only difference being their pre-treatment owenrship structure. Treatment assignment should thus be independent, conditional on observed covariates, minimizing the possibility of a selection bias.

Then, I use treatment-induced variation on retained earnings as an instrument to test the causal effect of firms' creditworthiness on unsecured debt over total debt choice in an IV set-up. Figure 1 shows a causal diagram with the associated empirical tests. The structural equation for unsecured debt in debt structure ($Punsec_{it}$) is as follows:

$$Punsec_{it} = \alpha + \alpha_1 D_i + \alpha_2 Post_t + \rho Rete_{it} + X_{it}^{'}\beta_p + \varphi_{it} \tag{1}$$

$$Rete_{it} = \gamma + \gamma_1 D_i + \gamma_2 Post_t + \psi Z_{it} + X_{it}^{'}\beta_r + \eta_{it} \tag{2}$$

where D_i are firms in the fourth quartile of individual investors' share ownership distribution, and $Post_t$ takes a value of one in the post-treatment fiscal years. $Rete_{it}$ is retained earnings over total assets, the variable that we want to instrument. $Z_{it} = (D_i * Post_t)$ is the instrument, the source of exogenous variation from JGTRRA. X_{it} contains all observable firm characteristics that are relevant for the proportion of unsecured debt in the overall debt structure, including tangibility, size, profitability and investment opportunities, proxied by market-to-book. I also cluster the standard errors at the firm level, as in Petersen (2009), which relaxes the i.i.d. assumption of independent errors. Doing so allows for correlation between errors within clusters of observations, as the source of variation exploited takes place at a firm level.

First, I am interested in the statistical and quantitative significance of ρ. I test whether $\rho > 0$: the more earnings the firm is able to retain, the higher the unsecured debt holdings it will be able to achieve, ceteris paribus. This proves the causal relation of interest. Second, as data is clustered at the firm level, I use the Kleibergen-Paap rk Wald F-statistic to test whether instrument relevance is satisfied.[19] I also focus on the statistical and quantitative significance of ψ. The hypothesis being tested is $\psi < 0$: firms in the fourth quartile of individual investors'

[19]The comparisson with Stock and Yogo (2005)'s weak identification test critical values to estimate the maximal IV relative bias is misleading in this case as it is based on the Cragg-Donald F-statistic, which assumes i.i.d. errors.

share distribution reduced retained earnings as result from JGTRRA more than the control group.[20]

Second, I perform a battery of falsification tests as the reduction in retained earnings should only respond to the increase in dividends and not to other confounding factors. I perform three main tests. First, I replicate my estimation procedure but choose other pre-treatment and post-treatment periods (2005-2010). In principle, firms' whose shareholders are not subject to an improved dividend tax treatment should not display the behavior seen in 2003. Second, I use the same pre-treatment and post-treatment years (2000-2005) but substitute retained earnings for restricted retained earnings. These are internal funds restricted from use due to requirements in financial debt contracts. Therefore, restricted retained earnings should not significantly respond to JGTRRA. Additionally, I redefine treatment and control groups by adding a second baseline characteristic: whether firms have a covenant limiting dividend payouts in secured or unsecured debt contracts. For firms in the fourth quartile of individual investors' share ownership with a covenant limiting dividend payouts, I should not observe a significant decrease in retained earnings compared to the control group. This would definitely pose a threat to the identification strategy. I conclude that retained earnings' reaction is not due to confounding factors but to the effect of policy change.[21]

2.2 Identification Strategy: The Asset-backed Commercial Paper Market Collapse of 2007

Asset-backed commercial paper is an off-balance sheet securitization instrument used by commercial banks to short-term finance long-term assets. In the summer of 2007, two German banks and BNP Paribas suspended net asset value calculations, which sharply increased the cost of overnight asset-backed commercial paper relative to the Federal Funds Rate. Commercial banks exposed to the collapse were also suppliers to the non-financial sector (Acharya and Schnabl (2010)). Although non-financial corporate firms do not have access to this form of financing, the collapse generated a downturn in the non-financial corporate commercial paper market, which caused a temporary shortage (Brunnermeier (2009), Ivashina and Scharfstein (2010)).

Non-financial corporate commercial paper is short-term unsecured debt; thus, it does not require the pledge of collateral. According to Colla et al. (2013), the 90^{th} percentile of the commercial paper distribution is zero, suggesting that less than 10% of U.S. public firms use commercial paper

[20]For (1) and (2) to be correctly identified, the conditional independence assumption is required. For IV, I assume $Z_{it} \perp \{\text{Punsec}_{it}(d)|X_{it}\}$ for all d (all possible values of treatment). That is, the instrument is conditionally independent of potential unsecured debt in debt structure, $\text{Punsec}_{it}(d)$.

[21]I discuss possible threats to the exclusion restriction in the Results section.

for financing. Moreover, they also rely on (unsecured) public debt for long-term financing, as evidenced by Rauh and Sufi (2010). Therefore, firms relying on commercial paper are "unconstrained" according to the traditional ex-ante definitions of financial constraints in Farre-Mensa and Ljungqvist (2015). When non-financial corporate commercial paper becomes unavailable or restricted to firms, this represents a direct shock to unsecured debt holdings for exposed firms.[22]

Defining the treatment group solely as a function of whether they had a commercial paper program prior to the shock is unlikely to adequately reflect financial constraints in terms of restricted access to unsecured debt markets. Moreover, the empirical specification may be subject to a selection bias, as it is difficult to justify that firm characteristics for treatment and control groups are as good as randomly assigned. Therefore, the conditional independence assumption would not be satisfied. I address this concern in the following manner. I define the *treatment group* as firms satisfying two conditions in pre-treatment years: i) having a commercial paper program and ii) issuing secured debt. Although firms' reliance on secured or unsecured debt depends on firm characteristics, whether firms issued secured in the three fiscal years before the collapse is exogenous to those firms' performance after the ABCP collapse. Therefore, there will be a differential effect of the shock according to whether or not firms had a commercial paper program and such differential effect is heterogeneous according to whether firms were facing some degree of restricted access to the unsecured debt market. I focus in the dynamics of firms that although rely on commercial paper, have a mixed debt structure and are not 100% unsecured debt financed. This is important, as the behavior of the *best* firms, which do not face restricted access to the unsecured debt market, should imply substituting toward unsecured public debt *if needed*.[23]

2.2.1 Empirical Design: Effect of Debt Structure on Investment

I perform DID estimation to quantify ABCP's effect on the share of unsecured debt over total debt for firms in the treatment group. To alleviate concerns regarding other sources of firm heterogeneity underlying the observed relations, I choose treatment and control groups with similar firm characteristics in terms of investment determinants, with the only difference being their pre-treatment

[22] As Ivashina and Scharfstein (2010) acknowledge "*Unsecured commercial paper holders refused to roll over their debt*".

[23] The following excerpt from the SEC's 10-K filings provides indirect evidence to sustain the argument:

> Ingersoll Rand Inc., fiscal year 2008: *"The credit markets, including the commercial paper markets in the United States, have recently experienced adverse conditions. Although* ***we have not been materially impacted*** *by these conditions, continuing volatility in the credit markets may increase costs associated with issuing commercial paper or other debt instruments due to increased spreads over relevant interest rate benchmarks."*

The financial statements in the SEC filings allow to determine that the *"other debt instruments" were unsecured debentures in fiscal year 2008.*

degree of financial constraints faced, measured by their access to unsecured debt markets. The treatment and control groups display no ex-ante significant differences in profitability, investment opportunities, retained earnings, or net worth between. This implies that treatment assignment is independent conditional on observed covariates, minimizing the possible existence of a selection bias.

Then, I use treatment-induced exogenous variation in unsecured debt in debt structure to establish a causal relation with investment. I follow the same empirical design as for JGTRRA. The causal diagram with the associated empirical tests are summarized in Figure 2. The structural equation for capital expenditures over total assets ($Capex_{it}$) is as follows:

$$Capex_{it} = \gamma_t + \theta_i + \rho Punsec_{it} + X_{it}^{'}\beta_c + \varphi_{it} \tag{3}$$

$$Punsec_{it} = \gamma_t + \theta_i + \psi Z_{it} + X_{it}^{'}\beta_p + \eta_{it} \tag{4}$$

where $Punsec_{it}$ is unsecured over total debt or the variable that we want to instrument and $Z_{it} = (D_i * Post_t)$ is the source of exogenous variation from ABCP. D_i are firms with a commercial paper conduit that are issuing secured debt in the pre-treatment years and $Post_t$ takes a value of 1 in the post-treatment years. X_{it} contains all observable firm characteristics that are relevant for investment, including; retained earnings over total assets, tangibility, size, profitability, and market-to-book. θ_i and γ_t capture firm and year fixed effects, respectively. I include firm and year fixed effects instead of D_i and $Post_t$, to limit the role of firm unobservable confounding factors and recession-driven estimated coefficients. Finally, errors are clustered at the firm-level, the source of variation.

I am interested in the sign and the statistical and quantitative significance of ρ. I expect $\rho > 0$, implying that as firms increase the proportion of unsecured debt in their debt structure, they are able to sustain larger investment projects. Moreover, ψ should be highly statistically significant to satisfy instrument relevance. As my data is clustered at the firm level, I use the Kleibergen-Paap rk Wald F-statistic to test whether instrument relevance is satisfied.[24]

Although this is a well-identified supply shock, the fact that the shock is contemporaneous to the financial crisis poses concerns on confounding factors affecting firms' responses. Two main

[24] I also require $Z_{it} \perp \{\text{Capex}_{it}(d) | X_{it}\}$ for all d (the possible values of treatment status), implying that the instrument is conditionally independent of potential investment, Capex_{it}.

concerns can be highlighted. First, as opposed to the JGTRAA, the substitution pattern for ABCP is not clear. Firms can substitute toward other liquidity management instruments as hoarded cash or credit lines (Acharya et al. (2013), Berrospide and Meisenzahl (2015), Ivashina and Scharfstein (2010)) or, they can instead overcome the shortage of short-term unsecured debt by issuing bank debt or bonds (Adrian et al. (2012)).[25] Second, although ABCP takes place in 2007, the recession and expectations of further deterioration of economic conditions after Lehman Brothers' collapse in September 2008, may also affect the demand for credit by firms.

The first concern becomes relevant if firms substituted toward hoarded cash in order to overcome the liquidity shock, as reliance on credit line drawdowns is already reflected in the definition of debt structure used throughout the paper. Acharya et al. (2013) state that the trade-off between cash and credit lines is maximized when aggregate uncertainty is high and for firms that are financially constrained. That is, firms in the control group. Evidence in Berrospide and Meisenzahl (2015) suggests that only large and investment grade firms drewdown on credit lines for precautionary reasons, namely, firms in the treatment group. Therefore, lower cash holdings to finance investment could be behind the observed responses and this poses a threat on the exclusion restriction. However, by means of DID on cash holdings' reaction as a result from ABCP I rule out a statistically significant heterogeneous response between treatment and control groups. The second concern, is easier to justify. Demand effects as a result from the expectation of a recession after the collapse of ABCP would imply that firms financially constrained (control group) are able to overcome the financial crisis with a reduction in investment which is lower than that of firms financially unconstrained (treatment group). However, there is an extensive literature validating that differences between firms financially constrained and unconstrained are the main driver of the cyclicality observed, as in Bernanke et al. (1996). That is, if demand effects were confounding my results, then, it would go against me finding that a reduction in unsecured debt in debt structure leads to a decrease in investment.

[25] The following two excerpts from the SEC's 10-K filings acknowledge these two possibilities:

Carterpillar Inc., fiscal year 2007: *"If our access to the commercial paper market is adversely affected due to a change in market conditions, we would expect to rely on a combination of* ***available cash and our unsecured committed credit facility*** *to provide short-term funding. In such event, the cost of borrowings under our unsecured committed credit facility could be higher than the cost of commercial paper borrowings."*

Gannet Company Inc., fiscal year 2008: *"During September 2008, liquidity in the commercial paper market was highly constrained [...] The company anticipates reducing the level of borrowings under its revolving credit facilities over time with cashflows from operations and will look to strategically refinance amounts borrowed with the issuance of* ***longer-term debt.****"*

I perform some robustness and falsification tests to rule out that there are confounding factors affecting the relation between debt structure and investment. First, I analyze the response of firms with a commercial paper conduit and unconstrained according to traditional ex-ante definitions for financial constraints in Farre-Mensa and Ljungqvist (2015). Firms with a commercial paper conduit that are not facing restricted access to public debt markets should not be subject to a significant decrease in investment compared to the control group. Additionally, I test whether substitution toward secured debt issues reduces investment when considering a demand-for-credit perspective. I redefine the treatment group in the JGTRRA identification strategy to capture restricted access to unsecured debt markets, namely, firms in the fourth quartile of the individual investors' share ownership distribution that issued secured in the pre-treatment years. I should observe a significant decrease in investment compared to the control group. I conclude that the effect of debt structure on investment is robust.[26]

2.3 Substitution Patterns: Empirical Design

I also analyze the substitution patterns toward secured debt issues that emerge from policy change for both treatment groups, in JGTRRA and in ABCP. Building on DeAngelo et al. (2006) we learn that firms in the treatment group for JGTRRA are, on average, in the capital infusion stage and decide to initiate dividends as a result from the tax reform. On the other hand, Rauh and Sufi (2010) and Colla et al. (2013) evidence that firms in the treatment group in ABCP are the "best" firms in the economy. Therefore, according to the traditional ex-ante financial constraints definitions, firms in the treatment group in JGTRRA will be closer to being financially constrained, while firms in the treatment group for ABCP will be considered unconstrained.

Analyzing the substitution patterns of both groups is important as different types of debt instruments have different maturities (Diamond (1993)), priorities (Barclay and Smith (1985), Brunnermeier and Oehmke (2013), sensitivity to information (Gomes and Phillips (2012), Denis and Mihov (2003)) and claims over the assets of the firm. Moreover, we need to make sure that the observed response in debt structure in both identification strategies is driven by a substitution effect instead of an income effect.

I implement the following specification for the different debt types standardized by total assets ($\frac{\text{Debt Type}}{\text{Assets}}_{it}$) for JGTRAA:

$$\left(\frac{\text{Debt Type}}{\text{Assets}}\right)_{it} = \alpha + \alpha_1 D_i^{jgtrra} + \alpha_2 Post_t^{jgtrra} + \psi\left(D_i^{jgtrra} * Post_t^{jgtrra}\right) + X_{it}'\beta + \eta_{it} \qquad (5)$$

[26] I discuss possible threats to the exclusion restriction further in the Results section.

where $\frac{\text{Debt Type}}{\text{Assets}}_{it}$ is i) secured debt, ii) senior secured loans, iii) senior secured bonds or iv) unsecured debt standardized by total assets. D_i^{jgtrra} is firms in the fourth quartile of individual investors' ownership of shares, and $Post_t^{jgtrra}$ is a dummy variable taking the value of one in post-treatment years of JGTRRA. $\left(D_i^{jgtrra} * Post_t^{jgtrra}\right)$ is the source of exogenous variation. X_{it} considers the relevant covariates in capital structure regressions as in Rajan and Zingales (1995) including tangibility, size, profitability and market-to-book.

In order to analyze substitution patterns for ABCP, I implement the following specification for the different debt types standardized by total assets ($\frac{\text{Debt Type}}{\text{Assets}}_{it}$):

$$\left(\frac{\text{Debt Type}}{\text{Assets}}\right)_{it} = \gamma_t + \theta_i + \psi\left(D_i^{abcp} * Post_t^{abcp}\right) + X_{it}'\beta + \eta_{it} \tag{6}$$

where $\frac{\text{Debt Type}}{\text{Assets}}_{it}$ is i) secured debt, ii) senior secured loans, iii) senior secured bonds or iv) senior unsecured bonds standardized by total assets. D_i^{abcp} is firms with a commercial paper conduit that issued secured the in pre-treatment years and $Post_t^{abcp}$ is post-treatment years of ABCP. $\left(D_i^{abcp} * Post_t^{abcp}\right)$ is the source of exogenous variation. X_{it} considers the relevant covariates in capital structure regressions as in Rajan and Zingales (1995) including tangibility, size, profitability and market-to-book. However, it also contains the log of total debt, in order to control for effects related to the contraction of credit supply in the 2007 financial crisis. γ_t and θ_i are year and firm fixed effects respectively.

2.4 Joint Identification Strategy: Disentangling the Effects of Debt Structure, Retention Policy and Collateral Pledged over Investment

In this section, I address the fact that not only are debt structure choice and investment endogenous, but also that retention and payout policy are jointly determined. As a result, estimated coefficients that consider each identification strategy alone could still be biased and inconsistent. Therefore, I analyze the effect of unsecured debt on investment and retained earnings when both regressors are assumed to be endogenous and, thus, correlated with the error term.

The research analyzing the effect of collateral or internal funds on firms' investment decisions have two limitations. First, if debt structure is a variable that determines firms' investment decisions, models will be poorly specified. Additionally, they will be subject to an omitted variable bias, with the sign of the bias depending on the correlation between debt structure and

the remaining covariates in the investment regression.[27] Second, only instrumenting retained earnings and unsecured debt does not overcome all the endogeneity issues present in the investment regression. An ideal experiment would allow collateral availability to be instrumented as well. To mitigate this concern, I build an estimation of collateral actually pledged in secured debt contracts in SEC financial statements using a text-search algorithm. The effect of measurement error in the specification should be lower in comparison with collateral availability or tangibility.

2.4.1 Empirical Design

I start with the following specification for investment ($Capex_{it}$):

$$Capex_{it} = \gamma_t + \theta_i + \beta_1 Rete_{it} + \beta_2 Punsec_{it} + X_{it}^{'}\alpha + \epsilon_{it} \tag{7}$$

where $Rete_{it}$ and $Punsec_{it}$ are the two endogenous variables that I want to instrument: retained earnings over total assets and unsecured debt over total debt. Equation (7) describes the investment revealed by alternative retained earnings in an experiment that holds debt structure fixed. This model likewise describes causal effects of changing firms' debt structures in an experiment that holds retained earnings fixed. In other words, (7) is a model for investment indexed against two jointly manipulable treatments. Following Angrist et al. (2015), the first-stage equations in an IV set-up would be:

$$Rete_{it} = \gamma_t + \theta_i + \mu_{11} Z_{it}^{div} + \mu_{12} Z_{it}^{cp} + X_{it}^{'}\alpha_1 + \epsilon_{1it} \tag{8}$$

$$Punsec_{it} = \gamma_t + \theta_i + \mu_{21} Z_{it}^{div} + \mu_{22} Z_{it}^{cp} + X_{it}^{'}\alpha_2 + \epsilon_{2it} \tag{9}$$

where $Z_{it}^{div} = (D1_i * Post1_t)$ is the effect of JGTRRA. $D1_i$ is the firms in the fourth quartile of the individual investors' share ownership distribution, and $Post1_t$ is a dummy variable taking the value of one for post-treatment years (2003-2005). $Z_{it}^{cp} = (D2_i * Post2_t)$ is the effect of ABCP, where $D2_i$ are firms with a commercial paper conduit issuing secured and $Post2_t$ is a dummy variable taking the value of one in post-treatment years. γ_t stands for year fixed effects, and θ_i is firm fixed effects. X_{it} includes all observable firm characteristics relevant to investment: tangibility or collateral pledged, size, profitability, and market-to-book. Standard errors are clustered at the source of variation, at a firm level as in Petersen (2009).

However, the following two assumptions allow me to simplify the first-stage equations (8) and (9):

[27] For instance, provided that size is positively correlated with unsecured debt in debt structure, the exclusion of debt structure from the investment regression generates understated estimated coefficients for size.

Assumption 1: $Rete_{it}(d) \perp Z_{it}^{cp}$, potential retained earnings are statistically independent of the effect of the shock in the ABCP identification strategy, for all possible realizations of treatment status, d.

Assumption 2: $Punsec_{it}(d) \perp Z_{it}^{div}$, potential debt structure is statistically independent of the effect of policy in the JGTRRA identification strategy, for all possible realizations of treatment status, d.[28]

If these two assumptions are satisfied, (8) and (9) boil down to:

$$Rete_{it} = \gamma_t + \theta_i + \mu_{11} Z_{it}^{div} + X_{it}^{'} \alpha_1 + \epsilon_{1it} \tag{10}$$

$$Punsec_{it} = \gamma_t + \theta_i + \mu_{22} Z_{it}^{cp} + X_{it}^{'} \alpha_2 + \epsilon_{2it} \tag{11}$$

Note that $\mu_{11} < 0$, if JGTRRA leads to a reduction in retained earnings for firms in the fourth quartile of individual investors' share ownership. Additionally, $\mu_{22} < 0$ if ABCP results in a reduction in the share of unsecured debt over total debt for those substituting toward secured debt issues when the supply of commercial paper becomes limited. Finally, by plugging (10) and (11) into (7), I derive the reduced-form causal effect equation, which I estimate through ordinary least squares (OLS):

$$Capex_{it} = \gamma_t + \theta_i + \omega_1 Z_{it}^{div} + \omega_2 Z_{it}^{cp} + X_{it}^{'} \alpha^* + \eta_{it} \tag{12}$$

where $\omega_1 = \beta_1 \mu_{11}$ is the policy change's effect through retained earnings on investment, holding the debt structure channel fixed. $\omega_2 = \beta_2 \mu_{22}$ is the policy change's effect through debt structure on investment, holding retained earnings channel fixed. Therefore, the causal effects of interest, β_1 and β_2, will be proportional to the OLS-estimated reduced-form coefficients, ω_1 and ω_2. The hypothesis being tested is $\omega_1 < 0$ and $\omega_2 < 0$, whether debt structure and retained earnings have a direct causal effect on investment, while controlling for collateral actually pledged.

3 Sample Construction

To construct the sample, I start with U.S. firms traded on AMEX, NASDAQ, and NYSE, and covered by Standard&Poor's (S&P) database Compustat, from 2000 to 2010. I remove all firm-year

[28] I provide suggestive evidence showing that these two assumptions are empirically refuted. See Table 1 in the Appendix for results of DID on retained earnings from ABCP and results of DID on unsecured debt in debt structure from JGTRRA. None are statistically significant.

observations which are not from the manufacturing sector (SIC codes 2000-3999). I further remove firm-year observations with missing, negative or zero i) total assets and ii) property, plant and equipment. Finally, I winsorize all key firm characteristics at the 1^{st} and 99^{th} percentiles (*initial sample*).

Total debt secured is defined by means of item #241 in Compustat, *Mortgages and Other Secured Debt*, which allows to define unsecured debt as the difference between total financial debt, short- and long-term, minus total secured debt. Collateral availability is proxied by tangibility, retained earnings is standardized by total assets following DeAngelo et al. (2006) and in constructing the rest of firm characteristics, namely, profitability and market-to-book, I use definitions as in Lemmon et al. (2008). I then merge the Compustat sample with Capital IQ in order to construct debt structure-specific variables. Following Colla et al. (2013), I remove firm-year observations for which the difference between total debt as reported in Compustat and the sum of debt types as reported in Capital IQ exceeds 10% of total debt. From the resulting sample I define: i) senior secured loans, ii) senior secured bonds and iii) senior unsecured bonds, all standardized by total assets.

In order to construct the sample for the JGTRRA identification strategy, I drop all firm-year observations not included in 2000-05. I follow Bertrand et al. (2004) in order to construct the pre- and post-treatment periods, using a pooled sample from 2000-02 as a general pre-treatment period and allowing post-treatment years to include i) 2003, ii) 2003-04 and iii) 2003-05 so as to test whether the effect of policy change vanishes within a year or lasts longer. Then, I merge the sample with Reuter's ThomsonOne firm ownership structure data at the beginning of calendar year 2003, as I only need the pre-treatment individual investors' share ownership distribution.[29]

I construct a variable *Ind Inv* which assigns the number of shares under *"Individual Investor"* in Reuter's ThomsonOne for each firm and compute the percentage of individual investors' ownership over the total number of shares in Compustat. Finally, I construct a dummy variable which takes the value of one for those firms in the fourth quartile of the individual investors' share distribution, the *treatment group.* Then, I generate a firm-year code with all the existing observations and I merge it with CRSP Daily Data in order to have concrete data on dividend announcement dates, dividend types and dividends per share. I build two dummy variables: one for increases in dividends per share and one for initiations in dividends per share adjusted for stock splits.

[29]Table 2 in the Appendix has the ThomsonOne data pre- and post-merge sample comparison for JGTRRA as some observations are lost in the merging process. However, there are no significant differences across samples.

I set the attrition rate of the experiment artificially to zero, as I require at least one observation per firm in pre- and post-treatment periods, such that the effect of treatment is consistently estimated. The reason why I do this is because Compustat stops providing firm-level data when firms file in Chapter 11, reorganization, and I want to avoid attrition caused by the 2001 recession. However, this sample correction only rules out 10 firms. Finally, I merge the text-search results for secured debt and unsecured debt with a covenant restricting dividend payouts.[30] The final sample comprises 5,074 firm-year observations.

In order to construct the sample for the ABCP identification strategy, I drop all firm-year observations not included in 2005-10 (based on Bertrand et al. (2004)), the pre-treatment period consisting of a pooled sample from 2005-2007 and allowing post-treatment years to include i) 2008, ii) 2008-09 and 2008-2010 in order to test whether the effect of shock vanishes within a year or lasts longer. As before, I require at least one observation per firm in pre- and post-treatment periods, so as to avoid attrition caused by the 2007 financial crisis and firms filing in Chapter 11, reorganization, or Chapter 7, liquidation. The final sample comprises 5,291 firm-year observations.

To conclude, for the joint identification's sample I take the *initial sample* (2000-10) and merge it with Reuter's ThomsonOne firm ownership structure data at the beginning of calendar year 2003 in order to have data on individual investors' share ownership distribution. Finally, I require at least one firm-year observation per firm in pre- and post-treatment periods and I merge text-search dummies for the sources of collateral pledged by each firms, so as to build the collateral absorption index. The construction of the rest of the sample is analogous to the individual identification strategy definitions. The final sample comprises 14,463 firm-year observations. Appendix A provides a detailed description of the variables used in the analysis and their construction, while Appendix C explains in detail how the collateral absorption index has been built.

Panel a) in Table 1 shows summary statistics for JGTRRA (2000-2005). Firms exhibit an average (median) preference for unsecured debt both in terms of debt structure, 67% (86%) and in terms of capital structure, where 16% (13%) is unsecured and 7% (1%) is secured. In Panel b) summary statistics for ABCP are shown (2005-2010). There are no significant differences with respect to Panel a), except for the fact that both average and median unsecured debt reliance have decreased slightly. On the other hand, Figures 3 and 4 show evidence on the effect of JGTRRA and the ABCP, respectively. Figure 3 shows average initiations/increases in dividends per share for

[30] I construct these variables in order to use them for a robustness check. See Appendix B for a description on how do I build text-search variables.

treatment and control groups in the pre- and post-treatment years. It shows that while firms in the treatment group increased dividend initiations/increases by 46%, the control group only increased by 19%. On the other hand, Figure 4 shows asset-backed commercial paper outstanding from 2002 to 2015, where we can observe the sharp contraction experienced in August 2007 as a result from the collapse.

4 Results

In this section, I first explain the nature of the relation between retained earnings and unsecured debt in debt structure by means of JGTRRA. Then, I analyze how investment responds to changes in debt structure, when debt structure is assumed to be an endogenous variable in the ABCP set-up. I also shed light on the substitution patterns toward secured debt issues that emerge for treatment groups under JGTRRA and ABCP. Finally, I allow for both, retained earnings and unsecured debt in debt structure to be endogenous. I compute the reduced-form causal effect on investment when both variables are "instrumented".

4.1 Results: Effect from Retained Earnings to Debt Structure, JGTRRA

Table 2 shows DID estimation results for the effect of policy change on retained earnings over total assets as a result from JGTRRA. Columns (1)-(2), (3)-(4) and (5)-(6) show estimated coefficients for the different post-treatment periods defined: 2003, 2003-04 and 2003-05, respectively. There is a differential effect of the reduction in the tax rate for dividends according to individual investors' share ownership on retained earnings over total total assets.[31]

The average causal effect is negative, statistically significant and the effect of policy change decays as additional post-treatment fiscal years are included. From -17.5% in 2003 in column (2) to -10.2% in 2003-05 in column (6). A different timing on the reaction to JGTRRA between treatment and control group explains the observed differences, rather than a selection issue due to a violation of the conditional independence assumption.[32] Firms in the treatment group reacted to a lower tax rate on dividends by increasing dividends, both in the intensive and extensive margins. More precisely, as compared to the control group, firms in the treatment group reduced 10.2 percentage

[31] Figure 1 in the Appendix shows that the parallel trends assumption is indeed satisfied for retained earnings over total assets, while Table 3 in the Appendix shows pre-treatment summary statistics for treatment and control groups in JGTRRA to rule out the existence of a possible selection bias.

[32] One possible limitation of the procedure in Table 2 is that additional weight is attached to those firm-year observations that resist in the sample from 2003 to 2005. Namely, the observed decay could be due to a selection problem arising from sample construction or to a different behavior between treatment and control groups in post-treatment years. In unreported results I re-run the analysis considering post-treatment years i) 2003, ii) 2004 and iii) 2005. Results validate that the decay responds to a different timing in the reaction between treatment and control groups. Dividend initiators started already in year 2003 (in line with evidence in Brav et al. (2005), while firms in the control group reacted slower.

points more retained earnings over total assets.[33]

Shareholders of firms belonging to the treatment group face a trade-off in terms of JGTRAA. On one hand, declare the dividend at the risk of deteriorating the financial condition which might cause restricted access to unsecured debt markets. On the other hand, retaining earnings today so as to earn the long-term capital gain on the increased value of the firm. Consistent with life-cycle theories, dividends tend to be paid by mature firms that are profitable with low growth prospects, while non-payers tend to be younger firms with higher investment opportunities and larger cash holdings (Fama and French (2001)). However, as DeAngelo et al. (2006) suggest, the preference for retention vs. payout evolves over time and eventually, firms will decide to initiate dividend payouts as earnings accumulate and investment opportunities decline. The tax reform increases individual shareholders' willingness to initiate dividend payouts even if the firm might suffer the consequences in the short-term.

DID estimation results in Table 2 are also the first-stage results on the IV estimation. Results suggest that the tax reform provides an orthogonal instrument. However, the concern regarding the weakness of the instrument remains. The fact that the standard errors are clustered at a firm level, relaxes the i.i.d assumption on the error term. As a result, judging whether instrument relevance is satisfied with the usual rule of thumb does not suffice (Bound et al. (1995), Stock et al. (2002)).[34] Neither does using critical values of the Cragg-Donald eigenvalue statistic in Stock and Yogo (2005). So as to address these concerns, I look at the Kleibergen-Paap rk Wald test statistic, which allows for non-i.i.d. errors.

Table 3 shows 2-stage least squares results (2SLS) for unsecured debt holdings in debt structure when retained earnings, assumed to be endogenous, is instrumented with treatment-induced variation from JGTRRA. Columns (1)-(2) show the comparison of OLS and 2SLS results for post-treatment year 2003 in the just-identified case, while (3)-(4) compare OLS and 2SLS show those for post-treatment years 2003-04 for the over-identified case.[35] Below the estimated coefficients

[33]Table 4 in the Appendix shows the response of the extensive margin, a dummy for dividend payers. The point estimates suggest that the most relevant activity took place in terms of initiations, not in terms of increases in dividend payouts for firms in the treatment group. No statistical significance is achieved when considering both, initiations and increases. This is consistent with evidence reported in Brown et al. (2007) and Chetty and Saez (2005).

[34]If the error term in the regression is correlated within groups, but not correlated across groups, then the consequences for IV estimation are similar to that of heteroskedasticity: the IV coefficient estimates are consistent, but their standard errors and the usual forms of the diagnostic tests are not.

[35]Results in column (4) include the post-treatment dummy and the dummy for the treatment group along with the interaction as instruments for retained earnings (over-identified case). D_i and $Post_t$ in equation (2). The effect of the tax cut for 2003-05 is statistically significant as evidenced by results in Table 2, but not significant enough to satisfy instrument relevance in an IV set-up.

in Table 3, the results for the Kleibergen-Paap test in which instrument relevance is satisfied are reported: 13.27 for the just-identified case reported in column (2) and 13.69 for the over-identified case in column (4). In the over-identification case, the p-value for the Sargan test is shown and it is equal to 0.17, implying that the null hypothesis of valid over-identifying restriction is accepted.

The estimated coefficients are positive and statistically significant. A one unit increase in retained earnings generates an increase in unsecured debt over total debt in the range of 7-8% according to IV estimates in columns (2) and (4), for years 2003 and 2003-04 respectively. Results are also quantitatively relevant: a 1 standard deviation increase in retained earnings causes unsecured debt in debt structure to increase by 0.2 ($= \frac{6.6}{100}\frac{1.2}{0.4}$ from column (4)) standard deviation units. Note that, in the case of collateral availability, proxied by tangibility, a 1 standard deviation increase in collateral availability reduces unsecured debt in debt structure by 0.1 ($= \frac{26}{100}\frac{0.2}{0.4}$ in column (4)) standard deviation units.[36] Therefore, retained earnings affects debt structure choice at last as much as collateral availability does.

These results yield implications related to the existing literature. First, they show that unsecured debt is not limited to S&P100 firms, but firms assumed to be financially constrained with respect to ex-ante definitions in Farre-Mensa and Ljungqvist (2015), are also willing and able to borrow on an unsecured basis if their creditworthiness is sufficiently high. Therefore, low-tangibility is by no means a necessary and sufficient condition to have limited access to external financing. Second, results are consistent with both, the pecking-order hypothesis (Myers (1984), Myers and Majluf (1984)) and trade-off theories (Myers (1984), Hennessy and Whited (2005)) of capital structure. For the former, firms exhibit a preference for internal funds not only because the cost of internal financing is lower, but because it allows them to access unsecured debt markets. Secured debt is last in line.[37] For the latter, as the probability of defaulting is lower for firms with higher creditworthiness, the present value of the tax benefits from holding debt are maximized as the present value of bankruptcy costs are likely to be very low (abstracting from all other market imperfections).

The instrument has to operate through a single known causal channel. That is, treatment-induced variation *only* affects retained earnings, which ultimately generates a causal effect on

[36] In order to compute the economic relevance of the results I rely on summary statistics for the sample 2000-04, which are not provided in Table 1. Mean, median and standard deviation for retained earnings over total assets are -0.22, 0.14 and 1.17. Mean, median and standard deviation for tangibility are 0.26, 0.23 and 0.17. Mean, median and standard deviation for unsecured debt over total debt are 0.66, 0.85 and 0.37.

[37] The problem with the standard version of the pecking-order hypothesis still remains as firms use equity issues frequently (Frank and Goyal (2007)).

unsecured debt in debt structure. I identify two possible channels that would threat the exclusion restriction. Namely, the lack of investment opportunities as a result from the 2001 recession and retained earnings responding for reasons different from the tax reform. First, firms may be decreasing unsecured debt holdings in debt structure as a result from lower investment opportunities (as in Giambona et al. (2015)) not because of lower creditworthiness. Moreover, a strand in the literature on payout policy states that firms may payout excess cash when they lack investment opportunities. I argue that firms in the treatment group are of the high-growth/low-profitability (Fama and French (2001)), which tend to retain more. These firms will initiate dividend payouts as a result from the lower tax rate, consistent with the life-cycle hypothesis in DeAngelo et al. (2006). Payout initiation depends on the costs and benefits of retention and the trade-off evolves over time as profits accumulate. This hypothesis is aligned with the agency problem in Jensen (1986). Firms in the treatment group initiate dividend payouts because they want to avoid managers from investing in low-return projects. This ensures that managers will have to access capital markets in order to fund the needs for new projects, which is a way to discipline managers. Moreover, the stock price reaction to dividend initiations is associated with abnormal returns of 3.7% and thus, it is difficult to argue that firms in the treatment group initiate dividend payouts because of the lack of investment opportunities (Bhattacharya (1979)).

Finally, in order to provide further suggestive evidence that the exclusion restriction is satisfied, I implement DID estimation for the effect of JGTRRA on unsecured debt in debt structure, tangibility and investment. These results are shown in Table 1 in the Appendix and show that the change in policy did not directly affect debt structure.[38] Moreover, collateral availability was not affected by the policy change. Namely, I provide indirect evidence to rule out that individual ownership or the average treatment effect correlate with debt structure for other reasons than their effect on retained earnings.

4.2 Results: Effect from Debt Structure to Investment, ABCP

Table 4 shows DID estimation results for the effect of the shock on unsecured debt in debt structure as a result from ABCP on the treatment group. Columns (1)-(2), (3)-(4) and (5)-(6) show estimated coefficients for the different post-treatment periods defined: 2008, 2008-09 and 2008-10, respectively. There is a differential effect of ABCP according to whether firms had a commercial paper conduit and this effect is heterogeneous according to whether or not firms were issuing secured debt or not in the pre-treatment years. We are focusing on the response of those assumed to

[38] Unreported results also validate that investment opportunities, profitability and size did not respond to the tax reform.

be facing some degree of restricted access to the unsecured bond market among the unconstrained.[39]

The average causal effect is negative and statistically significant. The supply shock generates a decrease in a range of 6-7% in unsecured debt in debt structure for firms in the treatment group (columns (1)-(6)). When an unsecured debt instrument becomes unavailable or access is restricted, firms unable to substitute toward other unsecured debt sources as credit lines or medium term notes, decrease the loading of unsecured debt in debt structure as they are forced to substitute toward secured debt issues. Moreover, estimated coefficients do not significantly vary when considering different post-treatment periods 2008 (columns(1)-(2)), 2008-09 (columns(3)-(4)) and 2008-10 (columns(5)-(6)). This could be interpreted as evidence suggesting that the pre-Lehman collapse (liquidity shock) and the post-Lehman collapse (demand effects from the financial crisis) considerations may not be driving the results in this set-up. The reason behind this result could be the unconstrained nature of those firms relying on commercial paper. Interestingly, when comparing specifications without and with controls, the existence of a selection bias seems unlikely. The additional explanatory power provided by the controls or the differences in estimated coefficients are not statistically significantly different.

Then, we can analyze the effect of shock-induced variation in debt structure on investment. Table 5 shows OLS and 2SLS estimation results for investment when unsecured debt in debt structure, is assumed to be endogenous and therefore, correlated with the error term in equation (3). Columns (1)-(2) show the results for post-treatment year 2008, while (3)-(4) and (5)-(6) show those for post-treatment years 2008-09 and 2008-10, respectively. The estimated coefficients for 2SLS are positive and statistically significant, implying that a one unit increase in unsecured debt in debt structure generates an increase in capital expenditures over total assets of 0.6-0.7%. Firms with a higher loading of unsecured debt in their debt structure are able to sustain a larger size for their investment projects and this is independent of their collateral availability. Results are also quantitatively relevant: a 1 standard deviation increase in unsecured debt in debt structure, generates an increase of 0.06 ($= \frac{0.6}{100}\frac{0.38}{0.04}$ from column (6)) standard deviation units on capital expenditures over total assets.[40] Note that, 2SLS results for post-treatment periods 2008 in column (2) and 2008-09 in column (4) are not valid to derive causal statements about the relation of interest

[39] Figure 2 in the Appendix shows that the parallel trends assumption is satisfied for unsecured debt in debt structure, while Table 3 in the Appendix shows pre-treatment summary statistics for treatment and control groups in ABCP to rule out the existence of a possible selection bias.

[40] So as to guarantee that the variance-covariance matrix is full-rank given clustered standard errors and singleton dummies in the form of firm and year fixed effects, I use the Frisch-Waugh-Lowell Theorem to partial out fixed effects included in the specification.

as the instrument relevance is not satisfied according to the Keibergen-Paap rk Wald F-statistic.

This result suggests that the attention devoted by the literature to how collateral promotes investment may have been misplaced, as in the context of the identification strategy, the pledge of collateral leads to lower investment. Moreover, by focusing on how firms in the treatment group reacted to ABCP, we can conclude that there is a credit channel operating, through the use of unsecured debt, that can have real effects on investment.

I claim that treatment-induced variation through unsecured debt in debt structure is the *only* channel affecting capital expenditures as a function of treatment status. However, I identify and discuss one possible channel that could threat the exclusion restriction: the *collateral channel*. Real estate prices decreased sharply after August 2007 and according to Chaney et al. (2012) this is important, as the average U.S. corporation invests \$0.06 out of each additional \$1 of real estate collateral. Therefore, the fact that firms had the market value of their collateral shrunk, might have generated the reduction in investment. There are two reasons why this is unlikely to be the case. First, firms with a commercial paper conduit tend to have at least an A credit rating. As Rauh and Sufi (2010) show, these firms do not rely on secured debt extensively.[41] Thus, the reduction in investment cannot be generated by the reduction in the market value of their collateral, as the usual dependence on secured debt is not large. Second, several authors (Cerqueiro et al. (2014), Liberti and Mian (2010), Degryse et al. (2014)) show that firms pledge other sources of collateral beyond property, plant and equipment such as; accounts receivable, inventories or intangible assets. Therefore, it is unlikely that decreases in collateral availability/valuation are responsible for the observed response in investment for the treatment group as firms can also pledge other sources of collateral in addition to property, plant and equipment.

In a similar fashion as in JGTRRA, we can test through DID estimation whether the change in policy affected other firm characteristics beyond unsecured debt holdings, such that we can rule out that the effect from ABCP goes through some other channel other than debt structure. Table 1 in the Appendix shows the suggestive evidence in support of the exclusion restriction. Retained earnings, tangibility or capital expenditures are not affected by the effect ABCP.[42]

[41] Check Figure 1 in Rauh and Sufi (2010) for further evidence.

[42] Unreported results show that investment opportunities, profitability or size do not significantly react for firms in the treatment group either.

4.3 Results: Substitution Patterns

Table 6 shows the results for DID estimation from JGTRRA when firms face restricted access to unsecured debt due to a deteriorated financial condition for post-treatment period 2003-05.[43] I analyze the response of secured debt over total assets (column (1)), senior secured loans over total assets (column (2)), senior secured bonds over total assets (column (3)) and unsecured debt over total assets (column (4)). Results are aligned with the substitution hypothesis; while secured debt over total assets significantly increased for firms in the treatment group, 1.9% more (column (2)), unsecured debt over total assets does not yield a statistically significant response (column (8)). More important is what type of secured debt increased the most as a result from the substitution effect. Although senior secured bonds increased, the senior secured loans increased almost twice as much as senior secured bonds (0.6% (column (4)) vs. 1.1% (column (6)) more) for firms in the treatment group.

Lower creditworthiness reduces repayment capacity in the eyes of unsecured (bank) creditors and puts upward pressure on spreads. This in turn, may restrict access to the unsecured debt market and forces substitution toward secured debt issues by firms in the treatment group. When there is substitution, different financial constraints become more relevant. In the context of JGTRRA, limited contract enforceability becomes more relevant. New creditors require the pledge of collateral to enforce repayment. The type of secured debt instrument toward which firms substitute in turn depends on the degree of information asymmetries faced. While informationally-opaque firms increase senior secured bank debt issues by 1.2% more, more transparent firms substitute toward senior secured bonds instead by 0.6% more than the control group. The conclusions are consistent with evidence reported in Rauh and Sufi (2010) as firms with lower credit quality tend to borrow secured bank debt, provided that lower credit quality is correlated with earnings retained in the capital structure.

Table 7 shows the results for DID estimation from ABCP when firms face restricted access to unsecured debt due to a shortage in supply for post-treatment period 2008-2010. I analyze the response of secured debt over total assets (column (1)), senior secured bonds over total assets (column (2)), senior secured loans over total assets (column (3)) and senior unsecured bonds over total assets (column (4)). As we can observe, firms substitute from unsecured bonds (-2% in column (8)) to bank debt. More precisely, they substitute toward senior secured loans (0.9% in column (6)).

[43]The pre-treatment year only considers fiscal years 2002 for the purpose of the present discussion, as Capital IQ data is only consistent from 2002 onward.

However, when analyzing the substitution patterns for those firms that were relying on commercial paper *only* before ABCP, which is reflected by variable *Commercial Paper 2008-10* in Table 7, the patterns of substitution are just the opposite. We observe that firms that did not face restricted access to the unsecured bond market, increased senior unsecured bond issues significantly, 3.7% in column (8), and decreased senior secured loans by 1.4% more in column (6).

The temporary shortage in unsecured commercial paper forces firms in the treatment group to substitute toward other unsecured debt sources of financing as senior unsecured bonds. Firms with a commercial paper program increased senior unsecured bond holdings as a result from the supply shock by 3.7% more than the control group. However, some firms may face restricted access to the bond market and thus, they are forced to substitute toward bank debt instead. As asymmetric information becomes more relevant when firms switch markets, creditors require the pledge of collateral to enforce repayment. More precisely, firms reduced senior unsecured bond holdings by 2.2% and increased senior secured bank debt by 0.9% more than the control group. These results are consistent with evidence in Ivashina and Scharfstein (2010) and Berrospide and Meisenzahl (2015) that credit line drawdowns increased during the financial crisis. Moreover, it also explains the shift in the composition of credit between loans and bonds evidenced in Adrian et al. (2012).

4.4 Results: Disentangling the Effect of Debt Structure, Retained Earnings and Collateral Pledged on Investment, JGTRRA&ABCP

I assume now that both, unsecured debt over total debt and retained earnings over total assets are endogenous in the investment regressions (as it is the case in practice). I am interested on the sign and statistical significance of the estimated coefficients for retained earnings over total assets, β_1, and for unsecured debt in debt structure, β_2 in equation (12), as the estimated coefficient is proportional to the to the causal effect on investment that could be derived from an IV set-up. Table 8 shows the results for collateral availability proxied by tangibility (columns (2), (5) and (8)) and for an estimation of collateral actually pledged over total assets (columns (3), (6) and (9)).[44]

When we take away the endogeneity present in both variables and assuming additive constant treatment effects, in an experiment that holds unsecured debt over total debt fixed, retained earnings does not have a reduced-form causal effect on investment (columns (1)-(6)). This is independent of the choice of collateral availability or pledged. On the other hand, when holding

[44]See Appendix C for further details on the collateral absorption index and Table 5 in the Appendix for the summary statistics of the joint identification strategy.

retained earnings fixed, the estimated coefficients gather the reduced-form causal effect over investment of changing debt structure. Namely, the effect on investment of reducing unsecured debt in debt structure: -1.4% in column (3), -0.8% in column (6) and -0.6% in column (9) for post-treatment years in ABCP 2008, 2008-09 and 2008-10, respectively. We observe that when using collateral availability proxied by tangibility the effect of policy change over investment is negative, -0.483 (column (8)). On the other hand, when using collateral actually pledged instead, we observe that the effect does not vary significantly, -0.577 (column (9)).

Results point out two implications. First, using collateral availability or pledged does not change the effect that unsecured debt holdings in debt structure have on investment. Second and more important, it suggests that collateral pledged and retained earnings may have an indirect effect only on investment, though the determination of secured and unsecured debt holdings in debt structure.

5 Threats to Validity: Robustness, Placebo and Falsification Tests

In this section I explore the plausibility of alternative explanations to the observed responses in the different variables of interest in JGTRRA and ABCP. Additionally, I perform some falsification tests.

5.1 Robustness: Investment's Response to Substitution toward Secured Debt Issues, JGTRRA

I test whether firms that substitute toward secured debt issues as a result from lower retained earnings, decrease investment as a result. I use two baseline characteristics in order to define the treatment group. First, firms in the fourth quartile of the individual investors' share ownership distribution. Second, firms issuing secured debt at pre-treatment years. That is, the effect of the JGTRRA varies according to individual investors' share ownership and the effect is heterogeneous according to whether or not firms were issuing secured debt before the tax-cut. The second baseline characteristics allows to capture restricted access to the unsecured debt market. Table 1 in Robustness Checks shows that firms that substitute toward secured debt issues have to reduce the size of their investment projects as a result, -0.8% in column (6). However, there is no effect on investment when considering the ownership structure as the treatment group alone, estimated coefficient for *Q4 Individual Investors in 2003-05*. This result is consistent with Yagan (2015), showing that the JGTRRA of 2003 did not have an impact on investment. Namely, only firms that decreased unsecured debt holdings due to substitution toward secured debt issues, reduced the size of their investment projects.

5.2 Response in Retained Earnings is driven by Other Factors in JGTRRA (2001 recession, Accounting Malfeasance.)

Restricted Retained Earnings: I run DID estimation on the effect of JGTRRA in the treatment group with restricted retained earnings. These are retained earnings that are limited due to covenants or restrictions gathered in financial contracts. The main idea is to check whether excluded retained earnings responded to the policy change. If they do, it would prove that there is something else beyond the tax-cut which is affecting retained earnings. Therefore, the identification strategy would still be subject to the endogeneity critique. Table 2 in Robustness Checks shows these results and rules out this hypothesis.

Covenants Limiting Dividend Payouts: I run a triple DID estimation on the effect of JGTRRA in the treatment group on retained earnings. The first baseline characteristic is firms in the fourth quartile of individual investors' ownership of share distribution, whereas the second baseline characteristic is firms with a covenant in secured or unsecured debt contracts limiting dividend payouts. That is, the effect of the JGTRRA varies according to individual investors' ownership and the effect is heterogeneous according to whether firms had a covenant limiting dividend payouts. Table 2 in Robustness Checks shows these results and the effect is positive, which is line with the fact that these firms can only retain whatever they generate. Moreover, it rules out the hypothesis that retained earnings reacted for other factors different from the dividend tax cut.

Falsification Test (2005-10): I run DID estimation for the effect of JGTRRA on retained earnings over total assets but with a different sample selection, pre-treatment fiscal years being 2005-07 and post-treatment years 2008-10. The main idea is to test whether retained earnings over total assets respond significantly when there is no event that exogenously affects retention/payout policy. Table 3 in Robustness Checks shows these results and rules out this hypothesis.

5.3 Point Estimates in ABCP for the Effect of Debt Structure on Investment are driven the Demand Effects for the Recession

Unconstrained Firms' Response: I run DID estimation for the causal effect of ABCP on capital expenditures for those financially unconstrained according to ex-ante definitions in Farre-Mensa and Ljungqvist (2015). The main idea is that commercial paper program holders are likely to be unconstrained firms but the reversal may not be true. Not all firm considered unconstrained have a commercial paper conduit. Given this, if we find no statistically significant response on investment, it would imply that the results are not driven by the recession but to the fact that those affected by

ABCP were affected in terms of debt structure. Table 4 in Robustness Checks shows these results using size as a measure for being financial constrained and rules out the hypothesis.[45], while Table 4 shows that investment did not significantly respond for these firms as a result from ABCP.

6 Discussion

I address the traditional question in corporate finance of how firms' financing decisions affect investment policy. However, I innovate by linking financial constraints to debt structure choice and firms facing restricted access to the unsecured debt market. More precisely, by means of two identification strategies to avoid endogeneity concerns, I shed light on the role of unsecured debt in debt structure in generating an effect on investment in the presence of financial constraints. This paper exploits the *Jobs and Growth Tax Relief Reconciliation Act* of 2003, which reduced the tax rate for dividends and long-term capital gains, as an exogenous demand shock affecting firms' creditworthiness. A lower repayment capacity in connection with unsecured debt allows analyzing the response of debt structure and investment as a result. Then, by means of the *Asset-backed Commercial Paper Market Collapse* of 2007, I explore the effect on investment of a reduction in unsecured debt in firms' debt structure due to a temporary shortage in short-term unsecured commercial paper.

I derive two main results. First, results suggest a positive causal mechanism from firms' creditworthiness to the share of unsecured debt over total debt. The accumulation of retained earnings increases firms' repayment capacity in the eyes of creditors, especially for unsecured creditors. This in turn, allows them to use more unsecured debt sources of financing, which is consistent with evidence reported in Rauh and Sufi (2010). This is important because it highlights that firms may not necessarily render financially constrained when the valuation of their collateral drops or have limited collateral to pledge to secure debt financing. Additionally, the preference for holding unsecured debt sources of financing in debt structure suggests that even if firms have available collateral to pledge, firms prefer not to do it.

Second, I show that as firms increase their holdings of unsecured debt in debt structure, they are able to finance larger investment projects. Moreover, the effect is quantitatively relevant: a one standard deviation increase in unsecured debt in debt structure leads to an increase of 0.06 standard deviation units in investment. Although the income effect is interesting to analyze, I focus on the substitution effect arising from the positive relation between unsecured debt and investment. I show that when firms face restricted access to unsecured sources of debt due to i) a deterioration

[45]I unreported results I also use the Kaplan&Zingales Index, the Size&Age Index in Hadlock and Pierce (2010), a dividend payer dummy and a S&P Long-term Bond Rating. They yield the same conclusion.

of the financial condition or to ii) a shortage of an unsecured debt instrument, they substitute toward secured debt issues. As a result, firms are forced to reduce the size of their investment projects. I argue that the cost-effectiveness of unsecured debt and the a different intensity of the different financial constraints faced is behind this result. Therefore, as opposed to the traditional literature on the so-called *collateral channel* suggests, this paper shows that the pledge of collateral can also have a dampening effect on firms' investment. Moreover, the empirical strategy allows identifying a balance sheet channel and a credit channel through which financial constraints can impact investment through debt structure choice.

The main contribution of the paper is to show that a departure from the debt homogeneity assumption by allowing unsecured debt to play a role, is able to generate a sizable effect on investment. Additionally, it contributes by showing that restricted access to the unsecured debt market provides a useful benchmark to assess the effect of financial constraints. This result may be relevant in terms of business cycle dynamics. Therefore, it should be further explored to shed light on the specific mechanism that generates the reduction in investment from relying more on secured debt sources of financing. Real effects of debt structure heterogeneity in this paper along with the conclusions in a recent paper by Azariadis et al. (2015) suggest that collateral constraints may not be binding. The authors show that unsecured debt has a role in generating variation in output over the business cycle that is larger than that of secured debt. Relaxing the assumption that all financial contracts available are secured may generate dynamics on aggregate investment and over the business cycle that are worth being studied further.

Appendix A. Variable Description

Compustat

- **Total Debt**: Debt in current liabilities (item 34) + Long-term debt (item 9).
- **Percentage of Debt Unsecured in Debt Structure:** Total Debt minus Mortgages and Other Secured Debt (item 241) over Total Debt.
- **Percentage of Debt Unsecured in Capital Structure:** Total Debt minus Mortgages and Other Secured Debt (item 241) over Total Assets (item 6).
- **Percentage of Debt Secured in Capital Structure:** Mortgages and Other Secured Debt (item 241) over Total Assets (item 6).
- **Retained Earnings:** Retained Earnings (item 36) over Total Assets (item 6).
- **MV Equity:** Stock price (item 199) times Common shares used to calculate earnings per share (item 54).
- **Net Worth, Book:** Equity (item 6 - item 181) over Equity plus Total Debt (item 6 - item 181 + item 9). Equity is computed as Total Assets minus Total Liabilities.
- **Net Worth, Market:** MV Equity over MV Equity plus Total Debt.
- **Tangibility or Collateral Availability:** Property, Plant and Equipment, Net (item 8) over Total Assets (item 6).
- **Investment:** Capital Expenditures (item 128) over Total Assets (item 6).
- **Size:** Total assets (item 6), total assets in million USD.
- **Profitability:** Operating income before depreciation (item 13) over Total assets (item 6).
- **Market-to-Book:** Market Value of Equity plus Total debt plus Preferred stock liquidating value (item 10) minus Deferred taxes and investment tax credit (item 35) over Total assets (item 6).
- **Dummy Rated:** Dummy variable, takes the value of one if the firm-year observation has a S&P Long-term Bond Rating (item 280).
- **Dummy Dividend Payer:** Dummy variable, takes the value of one if the firm-year observation has a positive value for common dividends (item 21).

Capital IQ:

- **Sr Secured Bonds and Notes:** SR SEC BONDS NOTES over Total assets (item 6).
- **Sr Unsecured Bonds and Notes:** SR UNSEC BONDS NOTES over Total assets (item 6).
- **Sr Secured Loans:** SR SEC LOANS over Total assets (item 6).
- **Commercial Paper Outstanding:** CP.

Thomson One:

- **Individual Investors:** Number of shares in hands of individual investors.

CRSP Daily Files:

- **Dummy Initiate/Increase Dividends:** Dummy variable, takes the value of one if the firm-year observation has initiated/increased dividends per share adjusted for stock splits, CRSP data.

Appendix B. Text-search Algorithm Description

I use a text-search algorithm searching for keywords in every 10-K, 10-KT, 10-K405, 10KSB, and 10KSB40 available in SEC's EDGAR system to generate specific data requirements. More precisely, I generate the following dummy variables: covenants restricting dividend payouts in secured contracts and covenants restricting dividend payouts in unsecured contracts.

For each specific text-search:

- **Covenants for Dividends in Secured Contracts:** I look for "covenant" in combination with "secured" or "security interest". When the keywords are identified, I further search for the keyword "dividend" excluding those hits that contain "no/not".
- **Covenants for Dividends in Unsecured Contracts:** I look for "covenant" in combination with "unsecured". When the keywords are identified, I further search for the keyword "dividend" excluding those hits that contain "no/not".

When a hit is found, I read the surrounding text and to rule out false positives. If a firm-year's filing has no reference of my keywords, or contains such keywords but the surrounding text suggests that the firm does not use/have that financial contract or limitation, I treat that firm-year as nonuser. Finally, I match the dummy variable generated by the text-search algorithm with my

sample.

Table C. Collateral Absorption Index

Looking for the sources of collateral pledged for secured debt contracts is relatively easy, as firms disclose this information in a relatively standardized manner.

- **Collateral Financial Debt Contracts:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keywords "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" excluding those hits that contain "no/not".

- **Tangible Assets as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keywords "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keywords "propert", "plant", "equipment", "land", "machine", "real estate", "capital stock", "fixture","tangible asset" and "fixed asset" excluding those hits that contain "no/not".

- **Intangible Assets as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keywords "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keywords "patent", "trademark", "royalt", "intellectual propert" and "intangible asset" excluding those hits that contain "no/not".

- **Receivable Assets as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keyword "receivable" excluding those hits that contain "no/not".

- **Inventories as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keyword "inventor" excluding those hits that contain "no/not".

- **Cash and Marketable Securities as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in

combination with keywords "cash" and "marketable securit" excluding those hits that contain "no/not".

- **Cashflows as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keywords "cash flow" excluding those hits that contain "no/not".

- **Stocks as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keywords "stock" and "share" excluding those hits that contain "no/not" or "capital".

- **All Assets as Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keywords "all asset","all of the asset","all of the"+"ANY TEXT"+"company's/firm's" and "all the asset" excluding those hits that contain "no/not".

- **First-priority Lien Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keyword "first" and "lien" and "security interest", excluding those hits that contain "no/not".

- **Second-priority Lien Collateral:** I look for "secured by" and "collateral". When the keywords are identified, I further search for the keyword "loan", "bond", "note", "facilit", "revol", "credit line", "line of credit", "commercial paper","credit" and "borrow" in combination with keyword "second" and "lien" and "security interest", excluding those hits that contain "no/not".

Example 1: The following excerpt is from AMD's 10-K, fiscal year 2008:

> *On November 1, 2006, Spansion LLC entered into a new senior secured term loan facility with a certain domestic financial institution, as administrative agent, and the lenders party thereto, in the aggregate amount of $500 million... In connection with the senior secured term loan facility, the Company and each of Spansion LLC, STI, Spansion International and Cerium, collectively referred to as the loan parties, executed a pledge and security agreement pursuant to which the administrative agent received a* ***first***

priority security interest in (a) all present and future capital stock of each of the Company's present and future direct and indirect subsidiaries,... (b) all present and future debt of each loan party, but excluding certain intercompany debt to a foreign subsidiary, (c) all present and future other property and assets of each loan party, but excluding intellectual property and any equipment subject to a lien securing a capitalized lease permitted by the credit agreement for the senior secured term loan facility, and (d) all proceeds and products of the property and assets described above. *The net book value of the pledged assets as of December 31, 2006 was approximately $663.5 million."*

There are several things to consider:

- All hits for a specific source of collateral that is surrounded by the words *excluding* or *excluded* are considered as a false positive.
- All hits for a specific source of collateral that is surrounded by the words *leas* or *leasing* are considered as a false positive.

Then, given the above example, the text-search algorithm generates the following dummy variables:

- Dummy Tangible Assets=1
- Dummy Intangible Assets=0
- Dummy All Assets=1
- Dummy First priority lien=1
- Dummy Second priority lien=1
- Rest of sources of collateral would be set=0

Example 2: The following excerpt is from AK Steel Inc. 10-K, fiscal year 2013:

"AK Steel Holding Corporation announced today that its subsidiary, AK Steel Corporation, has successfully priced a private offering of $30.0 million aggregate principal amount of its 8.750% senior secured notes due 2018 , which were offered as an add-on to its outstanding $350.0 million aggregate principal amount of 8.750% senior secured notes due 2018. The add-on notes will be fully and unconditionally guaranteed on a senior basis by AK Holding and will be ***secured by substantially all real property, plant and equipment of AK Steel and proceeds thereof****. "*

Given the above example, the text-search algorithm generates the following dummy variables:

- Dummy Tangible Assets=1
- Rest of sources of collateral would be set=0

Example 3: The following excerpt is from Alon USA Energy Inc. 10-K, fiscal year 2012:

> *"The Alon Energy Term Loan is* ***secured by a second lien on cash, accounts receivable and inventory and a first lien on most of our remaining assets****.... We have a $240.0 million revolving credit facility... The Alon USA LP Credit Facility is* ***secured by (i) a first lien on our cash, accounts receivables, inventories and related assets and (ii) a second lien on our fixed assets and other specified property,****... The Paramount Credit Facility is primarily* ***secured by (i) a first lien on cash, accounts receivables, inventories and related assets and (ii) a second lien on Alon Holdings' fixed assets and other specified property.*** *In October 2009, Alon Refining Krotz Springs, Inc. issued 13.50% senior secured notes in aggregate principal amount of $216.5 million in a private offering. In February 2010, ARKS exchanged $216.5 million of Senior Secured Notes for an equivalent amount of Senior Secured Notes registered under the Securities Act of 1933. ...The terms of the Senior Secured Notes are governed by an indenture and the obligations under the Indenture are* ***secured by a first priority lien on ARKS' property, plant and equipment and a second priority lien on ARKS' cash, accounts receivable and inventory.****"*

Then, given the above example, the text-search algorithm generates the following dummy variables:

- Dummy Tangible Assets=1
- Dummy Receivable Assets=1
- Dummy Inventory Assets=1
- Dummy Cash and Marketable=1
- Dummy First priority lien=1
- Dummy Second priority lien=1
- Rest of sources of collateral would be set=0

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Table 1: **Summary Statistics, JGTRRA 2000-2005 and ABCP 2005-2010**

This table contains summary statistics for key firm characteristics from U.S. public manufacturing firms (SIC codes 2000-3999) from Compustat. Panel a) contains summary statistics for JGTRRA (2000-2005), where the treatment group is defined as firms in the fourth quartile of the individual investors' share ownership distribution (Reuter's ThomsonOne data), while Panel b) contains summary statistics for ABCP (2005-2010), where the treatment group is defined as firms with a commercial paper conduit issuing secured (Capital IQ data). Dividend payout data is from CRSP's daily files. Appendix A provides a detailed description of the variables used in the analysis, while Table 2 in the Appendix shows a comparison for summary statistics of pre- and post-ThomsonOne merge samples.

	Panel a) (2000-2005)			Panel b) (2005-2010)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Individual Investors Shares	0.15	0.03	0.25	n/a	n/a	n/a
Increase/Initiate Dividends	0.19	-	0.39	n/a	n/a	n/a
Commercial Paper Program	n/a	n/a	n/a	0.31	-	0.46
Unsecured (Total Debt)	0.67	0.86	0.37	0.65	0.82	0.38
Unsecured (Total Assets)	0.16	0.13	0.15	0.14	0.11	0.14
Secured (Total Assets)	0.07	0.01	0.10	0.07	0.01	0.11
Retained Earnings	- 0.25	0.14	1.24	- 0.34	0.15	1.54
Net Worth (Book)	0.70	0.71	0.21	0.70	0.72	0.21
Capital Expenditures	0.04	0.03	0.04	0.04	0.03	0.04
Log (Size)	5.62	5.51	1.97	6.01	6.07	2.05
Profitability	0.06	0.10	0.17	0.07	0.11	0.17
Mkt-to-book	1.59	1.14	1.27	1.46	1.13	1.06
Tangibility	0.26	0.23	0.17	0.24	0.20	0.16
# Observations	5,074			5,291		

Notes: n/a stands for not applicable.

Table 2: **Retained Earnings' reaction to JGTRRA of 2003, First-Stage IV**

This table contains regression results for the average treatment effect, ATE_{it}(=(Post*Q4)$_{it}$), on retained earnings over total assets (the dependent variable) as a result from the policy change for the treatment group (2000-2005). ATE_{it} is computed as the interaction term between, $Post_t$ and $Q4_i$, where $Post_t$ takes value one for firm-year observations in post-treatment years and $Q4_i$ takes value one for firms in the fourth quartile of the individual share ownership distribution in pre-treatment years (ThomsonOne data), the treatment group. Retained earnings is multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009). Columns (1)-(2), (3)-(4) and (5)-(6) show results for post-treatment years 2003, 2003-04 and 2003-05, respectively. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

$$Rete_{it} = \gamma + \gamma_1 \text{Q4}_i + \gamma_2 Post_t + \psi ATE_{it} + X_{it}^{'}\beta_r + \eta_{it}$$

	Dependent Variable: Retained Earnings over Total Assets					
Post-treatment Years	2003		2003-04		2003-05	
Pre-treatment Years			2000-02			
	(1)	(2)	(3)	(4)	(5)	(6)
ATE 2003	-17.51***	-17.49***				
	(5.013)	(4.606)				
ATE 2003-04			-16.20***	-11.88***		
			(4.769)	(4.423)		
ATE 2003-05					-14.32**	-10.17*
					(5.979)	(5.516)
Post 2003	-8.038***	-2.969				
	(2.076)	(2.035)				
Post 2003-04			-6.930***	-8.831***		
			(2.534)	(2.478)		
Post 2003-05					-9.221**	-13.41***
					(3.819)	(3.694)
Q4 Individual Investors	-44.16***	11.53**	-40.46***	12.81**	-41.75***	16.18***
	(7.773)	(5.693)	(7.615)	(5.658)	(7.767)	(6.189)
Tangibility		8.363		12.37		15.70
		(15.62)		(14.83)		(16.41)
Log (Size)		11.80***		10.41***		10.86***
		(2.913)		(3.022)		(3.238)
Mkt-to-book		-16.82***		-16.21***		-15.59***
		(3.524)		(3.301)		(3.237)
Profitability		370.0***		378.3***		415.9***
		(25.90)		(22.86)		(25.68)
Constant	62.89***	-51.44*	62.80***	-47.71**	67.17***	-55.82**
	(22.48)	(29.87)	(17.70)	(23.63)	(16.75)	(22.65)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
R-squared	0.101	0.419	0.089	0.381	0.086	0.372
# Observations	3,215	3,210	4,260	4,247	5,067	5,052

Table 3: **IV Estimation, Effect of Retained Earnings on Debt structure**

This table contains OLS and 2SLS estimation results of the causal effect from retained earnings to unsecured debt over total debt (dependent variable) (2000-2005). Retained earnings is instrumented ($Z_{it} = (Post * Q4)_{it}$) with the average treatment effect from JGTRRA of 2003 on the treatment group in Table 2. Unsecured debt is multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009). Columns (1)-(2) compare OLS and 2SLS in the just-identified case for post-treatment year 2003, while columns (3)-(4) show the over-identified case for post-treatment years 2003-04. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

$$Punsec_{it} = \alpha + \alpha_1 \text{Q4}_i + \alpha_2 Post_t + \rho Rete_{it} + X_{it}^{'}\beta_p + \varphi_{it}$$

$$Rete_{it} = \gamma + \gamma_1 \text{Q4}_i + \gamma_2 Post_t + \psi Z_{it} + X_{it}^{'}\beta_r + \eta_{it}$$

	Dependent Variable: Unsecured Debt over Total Debt			
Post-treatment Years	2003		2003-04	
Pre-treatment Years			2000-02	
	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)
Retained Earnings	6.743**	8.105**	5.345**	6.568*
	(2.647)	(4.011)	(2.419)	(3.841)
Tangibility	-27.95***	-27.07***	-25.87***	-25.96***
	(5.662)	(5.670)	(5.301)	(5.310)
Log (Size)	8.318***	8.277***	8.326***	8.240***
	(0.446)	(0.495)	(0.424)	(0.477)
Mkt-to-book	-0.655	-0.162	-0.834	-0.374
	(0.569)	(0.578)	(0.544)	(0.556)
Profitability	9.273	8.552	8.349	8.454
	(6.303)	(6.297)	(5.927)	(5.965)
Constant	26.54***	19.36***	25.60***	19.32***
	(3.421)	(3.084)	(3.242)	(2.985)
KP-stat 1^{st} stage	n/a	13.27	n/a	13.69
Just Identified	n/a	Yes	n/a	No
Sargan-Hansen J-test	n/a	n/a	n/a	0.17
Clustered SE	Firm	Firm	Firm	Firm
Firm&Year Dummy	Yes	Yes	Yes	Yes
R-squared	0.211	0.195	0.207	0.194
# Observations	3,215	3,215	4,260	4,260

Notes:
KP-stat is the Kleibergen-Paap rk Wald F-statistic, allowing for non i.i.d. errors.
The F-test for 2003-05 does not satisfy the relevance condition (KP-stat: 3.24)

Table 4: **Unsecured debt in Debt Structure's reaction to ABCP Market Collapse of 2007, First-Stage IV**

This table contains regression results for the average treatment effect, ATE_{it}(=Post*CPSec$_{it}$), on the share of unsecured debt over total debt (the dependent variable) as a result from the supply shock for the treatment group (2005-2010). ATE_{it} is computed as the interaction term between, $Post_t$ and $CPSec_i$, where $Post_t$ takes value one for firm-year observations in post-treatment years and $CPSec_i$ takes value one for firms in with a commercial paper conduit and issuing secured in pre-treatment years (Capital IQ data), the treatment group. Unsecured debt is multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Retained Earnings* is defined as in DeAngelo et al. (2006), while *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009) and regressions include firm and year fixed effects. Columns (1)-(2), (3)-(4) and (5)-(6) show results for post-treatment years 2008, 2008-09 and 2008-10, respectively. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

$$Punsec_{it} = \gamma_t + \theta_i + \psi \text{ATE}_{it} + X_{it}^{'}\beta_p + \eta_{it}$$

	Dependent Variable: Unsecured over Total Debt					
Post-treatment Years	2008		2008-09		2008-10	
Pre-treatment Years			2005-07			
	(1)	(2)	(3)	(4)	(5)	(6)
ATE 2008	-6.504**	-6.774***				
	(2.523)	(2.512)				
ATE 2008-09			-5.603***	-5.732***		
			(1.865)	(1.885)		
ATE 2008-10					-6.364***	-6.388***
					(1.635)	(1.659)
Retained Earnings		-0.0293		-0.555		-0.495
		(1.124)		(0.737)		(0.685)
Tangibility		-10.60		-14.54		-16.52
		(14.54)		(12.97)		(11.21)
Log (Size)		-2.772		-0.409		1.601
		(3.269)		(2.614)		(2.243)
Mkt-to-book		-0.831		-0.588		-0.412
		(0.947)		(0.783)		(0.705)
Profitability		6.887		8.918		6.919
		(9.480)		(6.829)		(6.449)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.828	0.829	0.789	0.790	0.761	0.762
# Observations	3,243	3,238	4,504	4,491	5,291	5,275

Table 5: **IV Estimation, Effect of Debt Structure on Investment**

This table contains OLS and 2SLS estimation results of the causal effect from the share of unsecured debt over total debt to capital expenditures over total assets (dependent variable) (2005-2010). Debt structure is instrumented ($Z_{it} = (Post * CPSec)_{it}$) with the average treatment effect from ABCP market collapse of 2007 on the treatment group in Table 4. Capital expenditures are multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Retained earnings* is defined as in DeAngelo et al. (2006), while *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009) and all specifications include firm and year fixed effects. Columns (1)-(2), (3)-(4) and (5)-(6) show the just-identified results for post-treatment years 2008, 2008-09 and 2008-10, respectively. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

$$Capex_{it} = \gamma_t + \theta_i + \rho Punsec_{it} + X_{it}^{'}\beta_c + \varphi_{it}$$

$$Punsec_{it} = \gamma_t + \theta_i + \psi Z_{it} + X_{it}^{'}\beta_p + \eta_{it}$$

	Dependent Variable: Capital Expenditures over Total Assets					
Post-treatment Years	2008		2008-09		2008-10	
Pre-treatment Years			2005-07			
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Unsecured (Total Debt)	-0.380	0.741***	-0.457**	0.608***	-0.335*	0.598***
	(0.275)	(0.202)	(0.220)	(0.173)	(0.190)	(0.163)
Retained Earnings	-0.0729	-0.0823	0.165	-0.0755	0.218**	-0.0581
	(0.135)	(0.0548)	(0.103)	(0.0464)	(0.0873)	(0.0429)
Tangibility	24.66***	16.24***	18.70***	14.58***	17.87***	14.13***
	(1.177)	(0.388)	(0.955)	(0.322)	(0.830)	(0.297)
Log (Size)	1.326***	0.0335	0.744***	0.0336	0.600***	0.0334
	(0.255)	(0.0463)	(0.198)	(0.0381)	(0.167)	(0.0354)
Mkt-to-book	0.286***	0.584***	0.321***	0.636***	0.407***	0.642***
	(0.0755)	(0.0528)	(0.0674)	(0.0455)	(0.0610)	(0.0430)
Profitability	-0.798	2.438***	0.356	2.810***	0.530	2.815***
	(0.750)	(0.463)	(0.577)	(0.396)	(0.507)	(0.369)
KP-stat 1^{st} stage	n/a	7.27	n/a	9.29	n/a	14.83
Just Identified	n/a	Yes	n/a	Yes	n/a	Yes
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
Year&Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.775	0.371	0.714	0.337	0.697	0.324
# Observations	3,237	3,237	4,488	4,488	5,271	5,271

Notes:
I partial out fixed effects by means of the Frisch-Waugh-Lovell Theorem.
KP-stat is the Kleibergen-Paap rk Wald F-statistic, allowing for non i.i.d. errors.

Table 6: **Substitution Pattern JGTRRA: Lower Creditworthiness (firms' side)**

This table contains regression results for the average treatment effect, ATE_{it}(=(Post*Q4)$_{it}$), on debt types over total assets (the dependent variable) as a result from the policy change for the treatment group (2000-2005). ATE_{it} is computed as the interaction term between, $Post_t$ and $Q4_i$, where $Post_t$ takes value one for firm-year observations in post-treatment years and $Q4_i$ takes value one for firms in the fourth quartile of the individual share ownership distribution in pre-treatment years (ThomsonOne data), the treatment group. Debt types are multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Kaplan and Zingales (1995) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009). ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

	Dependent Variable: Debt Type over Total Debt							
	Secured Debt		Sr Secured Bonds		Sr Secured Loans		Unsecured Debt	
Post-treatment Years	2003-05							
Pre-treatment Years	2002							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ATE 2003-05	1.665***	1.888***	0.495*	0.636**	1.147**	1.145**	-1.857**	-0.614
	(0.575)	(0.569)	(0.258)	(0.262)	(0.475)	(0.476)	(0.817)	(0.825)
Post 2003-05	0.966***	1.512***	0.319**	0.490***	0.420*	0.770***	5.910***	5.026***
	(0.267)	(0.277)	(0.132)	(0.138)	(0.224)	(0.236)	(0.575)	(0.578)
Q4 Individual Investors	3.059***	0.00961	0.526*	-0.382	2.320***	0.431	-4.104***	0.857
	(0.557)	(0.602)	(0.290)	(0.311)	(0.472)	(0.503)	(0.786)	(0.909)
Tangibility		10.69***		6.177***		3.626**		0.997
		(1.993)		(1.267)		(1.646)		(2.483)
Log (Size)		-1.310***		-0.271**		-0.991***		3.064***
		(0.184)		(0.108)		(0.146)		(0.254)
Mkt-to-book		-0.804***		-0.130		-0.580***		-0.797***
		(0.152)		(0.0903)		(0.119)		(0.269)
Profitability		-2.928**		-3.578***		2.413**		-10.59***
		(1.472)		(0.936)		(1.124)		(2.593)
Constant	5.764**	11.51***	2.343	2.769	3.636	8.524***	2.154	-12.22***
	(2.833)	(3.112)	(1.562)	(1.980)	(3.047)	(2.688)	(2.146)	(2.389)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
R-squared	0.103	0.163	0.048	0.089	0.084	0.121	0.117	0.202
# Observations	3,471	3,471	3,471	3,471	3,471	3,471	3,471	3,471

Table 7: **Substitution Pattern ABCP: Supply Shortage (capital markets' side)**

This table contains regression results for the average treatment effect, ATE_{it}(=(Post*CPSec)$_{it}$), on debt types over total assets (the dependent variable) as a result from the shock for the treatment group (2005-2010). ATE_{it} is computed as the interaction term between, $Post_t$ and $CPSec_i$, where $Post_t$ takes value one for firm-year observations in post-treatment years and $CPSec_i$ takes value one for firms in with a commercial paper conduit and issuing secured in pre-treatment years (Capital IQ data), the treatment group. Debt types are multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Kaplan and Zingales (1995) (Compustat data). *Log (Total Debt)* intends to control for the contraction in bank credit supply. Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009) and all specifications include firm and year fixed effects. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

	Dependent Variable: Debt Type over Total Assets							
	Secured Debt		Sr Secured Bonds		Sr Secured Loans		Sr Unsecured Bonds	
Post-treatment Years	2008-10							
Pre-treatment Years	2005-07							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ATE 2008-10	0.833	0.286	-0.431	-0.491	1.310**	0.882*	-1.847	-2.242*
	(1.011)	(1.002)	(0.728)	(0.725)	(0.522)	(0.517)	(1.262)	(1.192)
Commercial Paper 2008-10	-0.346	-0.0981	1.440	1.518	-1.538***	-1.389***	3.843***	3.718***
	(2.372)	(2.290)	(2.193)	(2.164)	(0.477)	(0.492)	(1.047)	(0.959)
Retained Earnings		-0.831*		-0.712		-0.229		0.0693
		(0.448)		(0.443)		(0.175)		(0.213)
Tangibility		4.445		-0.268		2.700		-5.755
		(6.304)		(4.717)		(3.723)		(4.935)
Log (Size)		-2.649***		-0.876		-1.268		-0.820
		(0.988)		(0.606)		(0.797)		(0.828)
Mkt-to-book		-0.265		-0.0561		-0.0864		0.262
		(0.258)		(0.149)		(0.219)		(0.320)
Profitability		-0.837		-0.370		1.110		-4.022*
		(2.995)		(2.338)		(1.848)		(2.389)
Log (Total Debt)		2.903***		0.564***		2.138***		2.000***
		(0.318)		(0.155)		(0.274)		(0.312)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.691	0.721	0.584	0.597	0.729	0.750	0.778	0.792
# Observations	3,649	3,632	3,649	3,632	3,649	3,632	3,649	3,632

Notes:
The double interaction, *Issue Secured 2008-10*, is omitted. None of the estimated coefficients are statistically significant.

Table 8: **Joint Identification Strategy: Disentangling the Effect of Debt Structure, Retained Earnings and Collateral Pledged on Investment**

This table contains regression results for investment's response when both unsecured debt over total debt and retained earnings are assumed to be endogenous. Unsecured debt over total debt is replaced by the interaction between the dummy for post-treatment years ($Post_t$) and firms with a commercial paper conduit issuing secured ($CPSec_i$) in ABCP, $Z_{it}^{cp} = (Post * CPSec)_{it}$, while retained earnings is replaced with the interaction between the dummy for post-treatment years ($Post_t$) and firms in the fourth quartile of individuals' share ownership distribution ($Q4_i$) in JGTRRA, $Z_{it}^{div} = (Post * Q4)_{it}$. Capital expenditures are multiplied by 100. Results are for U.S. public manufacturing firms (SIC codes 2000-3999) from 2000 to 2010. *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Kaplan and Zingales (1995) (Compustat data). The estimation for *Collateral Pledged* is performed by means of a text-search algorithm that looks for the sources of collateral pledged in each secured contract in the SEC's 10-K filings. Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009) and all specifications include firm and year fixed effects. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis, while Appendix C contains a detailed description of how the collateral absorption index has been computed.

$$Capex_{it} = \gamma_t + \theta_i + \omega_1 Z_{it}^{div} + \omega_2 Z_{it}^{cp} + X_{it}^{'}\alpha^* + \eta_{it}$$

	Dependent Variable: Capital Expenditures over Total Assets								
Post-treatment Years	2003-05 & 2008			2003-05 & 2008-09			2003-05 & 2008-10		
Pre-treatment Years				2000-02 & 2005-07					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ATE 2008 (Unsecured)	-1.437***	-1.429***	-1.390***						
	(0.325)	(0.320)	(0.326)						
ATE 2008-09 (Unsecured)				-0.749***	-0.707***	-0.761***			
				(0.252)	(0.247)	(0.256)			
ATE 2008-10 (Unsecured)							-0.581**	-0.483**	-0.577**
							(0.244)	(0.232)	(0.248)
ATE 2003-05 (Retained Earnings)	-0.0891	-0.125	-0.0897	-0.0862	-0.123	-0.0863	-0.0852	-0.123	-0.0855
	(0.184)	(0.181)	(0.182)	(0.184)	(0.181)	(0.182)	(0.184)	(0.181)	(0.182)
Tangibility		18.14***			18.13***			18.13***	
		(1.234)			(1.237)			(1.237)	
Collateral Pledged			-0.292			-0.303			-0.298
			(0.341)			(0.342)			(0.342)

Table 8: continued

Dependent Variable: Capital Expenditures over Total Assets									
Post-treatment Years	2003-05 & 2008			2003-05 & 2008-09			2003-05 & 2008-10		
Pre-treatment Years				2000-02 & 2005-07					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ATE 2008 (Unsecured)	-1.437***	-1.429***	-1.390***						
	(0.325)	(0.320)	(0.326)						
ATE 2008-09 (Unsecured)				-0.749***	-0.707***	-0.761***			
				(0.252)	(0.247)	(0.256)			
ATE 2008-10 (Unsecured)							-0.581**	-0.483**	-0.577**
							(0.244)	(0.232)	(0.248)
ATE 2003-05 (Retained Earnings)	-0.0891	-0.125	-0.0897	-0.0862	-0.123	-0.0863	-0.0852	-0.123	-0.0855
	(0.184)	(0.181)	(0.182)	(0.184)	(0.181)	(0.182)	(0.184)	(0.181)	(0.182)
Log (Size)		0.648***	0.181		0.648***	0.181		0.648***	0.180
		(0.152)	(0.161)		(0.153)	(0.162)		(0.153)	(0.162)
Mkt-to-book		0.427***	0.267***		0.427***	0.267***		0.426***	0.267***
		(0.0614)	(0.0723)		(0.0615)	(0.0723)		(0.0614)	(0.0722)
Profitability		1.138**	0.399		1.138**	0.402		1.139**	0.405
		(0.511)	(0.571)		(0.511)	(0.571)		(0.511)	(0.571)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.588	0.630	0.595	0.588	0.629	0.595	0.588	0.629	0.594
# Observations	14,463	14,463	14,044	14,463	14,463	14,044	14,463	14,463	14,044

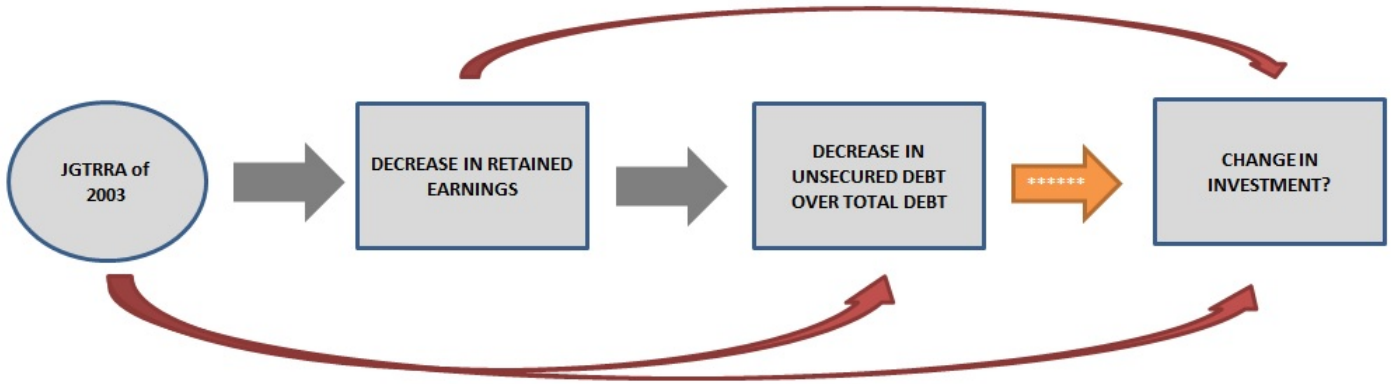

Figure 1: **Summary of Identification Strategy: Jobs and Growth Tax Relief Reconciliation Act of 2003.**

Goal: Showing that an increase in unsecured debt in debt structure increases investment (orange arrow).

The *Jobs and Growth Tax Relief Reconciliation Act* of 2003 reduces the tax rate on dividends and capital gains, which affects retained earnings over total assets (DID estimation). The reduction in retained earnings, as the financial condition of the firm deteriorates, leads firms to a substitution toward secured debt issues (IV estimation). The substitution toward secured debt issues forces firms to reduce the size of their investment projects and thus, debt structure heterogeneity has real effects over investment (Triple DID estimation). I estimate a reduced-form causal effect as we cannot rule out retained earnings may directly affect investment (Kaplan and Zingales (1997)).

I rule out the following lines of causation to support the *exclusion restriction* (red arrows).

1. The tax-cut does not directly affect debt structure (DID estimation).
2. Tangibility, the key determinant for secured debt issues/holdings, does not change as a result from the tax-cut (DID estimation).
3. The tax-cut does not directly affect capital expenditures (DID estimation).

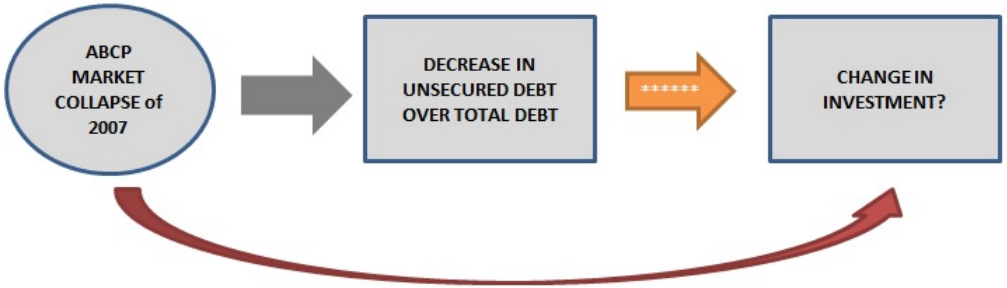

Figure 2: **Summary of Identification Strategy: Asset-backed Commercial Paper Market Collapse of 2007.**

Goal: Showing that an increase in unsecured debt in debt structure increases investment (orange arrow).

The *Asset-backed Commercial Paper Market Collapse* of 2007 causes a downturn in the market for non-financial corporate commercial paper market. The effect of the shock reduces unsecured debt in debt structure for those relying on commercial paper and unable to substitute toward other unsecured financial debt sources (DID estimation). The substitution toward secured debt issues forces firms to reduce the size of their investment (IV estimation).

I rule out the following lines of causation to support the *exclusion restriction* (red arrow).

1. The collapse does not directly affect investment (DID estimation). Results in Yagan (2015) are also consistent with this result.
2. Tangibility, retained earnings, market-to-book, profitability and size are not directly affected by the shock (DID estimation).

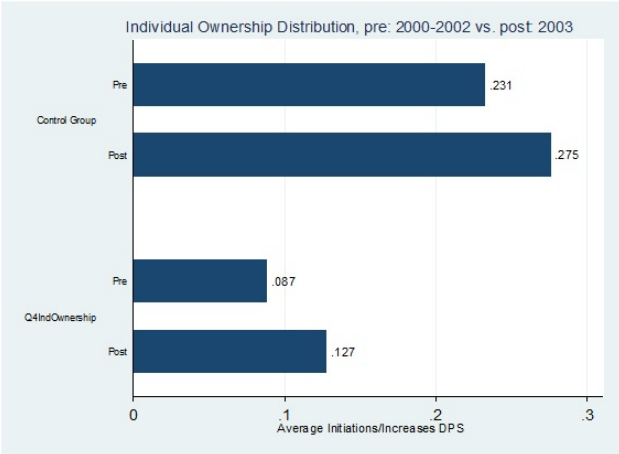

Figure 3: **Average Initiations/Increases in dividends per share for Treatment and Control Groups in pre- and post-treatment periods, 2000-2003.**

Initiations and increases in dividends per share adjusted for stock splits are from CRSP Daily files. The treatment group is defined as the fourth quartile of the individual share ownership distribution using ThomsonOne institutional ownership data, while the control group is formed with the remaining firm-year observations. The pre-treatment period is 2000-2002 and the post-treatment year is 2003.

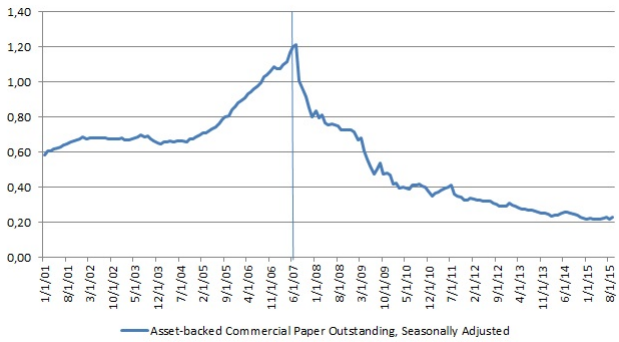

Figure 4: **Asset-backed Commercial Paper Outstanding, 2002-2015.**

Source: Federal Reserve Bank of Saint Louis.

Appendix, Table 1: Exclusion Restriction, JGTRRA and ABCP

This table contains suggestive evidence to that support the exclusion restriction is not a concern. Panel a) shows DID results for the average treatment effect, *ATE*, on tangibility (1)-(3), debt structure (4)-(6) and investment (7-9) as a result from the policy change for the treatment group (2000-2005) in JGTRRA. Panel b) shows DID results for the average treatment effect, *ATE*, on retained earnings (1)-(3), tangibility (4)-(6) and collateral pledged (7-9) as a result from the shock for the treatment group (2005-2010) in ABCP. Dependent variables are multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009) and includes firm and year fixed effects. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

Panel a) Exclusion Restriction JGTRRA

	Tangibility			Unsecured (Total Debt)			Capital Expenditures		
Post-treatment Years	2003	2003-04	2003-05	2003	2003-04	2003-05	2003	2003-04	2003-05
Pre-treatment Years					2000-02				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ATE 2003	0.434			0.751			-0.0179		
	(0.471)			(1.938)			(0.306)		
ATE 2003-04		0.205			0.0996			0.0191	
		(0.474)			(1.781)			(0.272)	
ATE 2003-05			0.247			0.450			-0.0121
			(0.471)			(1.765)			(0.252)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.948	0.937	0.931	0.796	0.779	0.750	0.614	0.582	0.565
Observations	3,221	4,267	5,074	3,221	4,267	5,074	3,221	4,267	5,074

Panel b) Exclusion Restriction ABCP

	Retained Earnings			Tangibility			Capital Expenditures		
Post-treatment Years	2008	2008-09	2008-10	2008	2008-09	2008-10	2008	2008-09	2008-10
Pre-treatment Years					2005-07				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ATE 2008	-6.998			0.452			-0.157		
	(9.160)			(0.545)			(0.283)		
ATE 2008-09		0.592			0.234			-0.139	
		(8.416)			(0.511)			(0.245)	
ATE 2008-10			1.803			0.220			0.0571
			(9.164)			(0.512)			(0.240)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.934	0.918	0.908	0.946	0.935	0.929	0.720	0.669	0.650
Observations	3,238	4,491	5,275	3,243	4,504	5,291	3,243	4,504	5,291

Appendix, Table 2: Pre- and Post-ThomsonOne merge Compustat Sample Comparisson, JGTRRA

This table contains summary statistics for key firm characteristics from U.S. public manufacturing firms (SIC codes 2000-3999) from 2000 to 2005, for the i) pre-ThomsonOne merge and the ii) post-ThomsonOne merge Compustat samples in JGTRRA. The *p-value* column provides results for the difference in means test. Appendix A provides a detailed description of the variables used in the analysis.

	Pre-ThomsonOne Merge		Post-ThomsonOne Merge		
	Mean	Std. Dev.	Mean	Std. Dev.	
	Median		Median		p-value
% Unsecured (Total Debt)	0.66	0.37	0.67	0.37	0.28
	0.84		0.86		
% Unsecured (Total Assets)	0.16	0.15	0.16	0.15	0.36
	0.13		0.13		
% Secured (Total Assets)	0.07	0.11	0.07	0.10	0.10
	0.01		0.01		
Retained Earnings	- 0.28	1.30	- 0.25	1.24	0.14
	0.13		0.14		
Capital Expenditures	0.05	0.04	0.04	0.04	0.35
	0.03		0.03		
Log (Size)	5.54	1.96	5.62	1.97	0.04
	5.45		5.51		
Profitability	0.06	0.17	0.06	0.17	0.33
	0.10		0.10		
Mkt-to-book	1.56	1.26	1.59	1.27	0.19
	1.12		1.14		
Tangibility	0.27	0.17	0.26	0.17	0.07
	0.23		0.23		
Net Worth	0.69	0.22	0.70	0.21	0.18
	0.71		0.71		
# Observations	6,886		5,074		
% Matched			74%		

Appendix, Table 3: Pre-treatment Summary Statistics for JGTRRA of 2003 and ABCP of 2007

This table contains summary statistics for pre-treatment firm characteristics in both identification strategies. Panel a) shows summary statistics for treatment and control groups in JGTRRA. The treatment group is defined as firms in the fourth quartile of the individual investors' ownership distribution in the pre-treatment years. Panel b) shows summary statistics for treatment and control groups in ABCP. The treatment group is defined as firms with a commercial paper program that were issuing secured in the pre-treatment years. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). The *p-value* column provides results for the difference in means test. Appendix A provides a detailed description of the variables used in the analysis.

Panel a) Pre-treatment Summary Statistics, JGTRRA (2000-02)

	TG: Q4 II			CG: Rest			
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	p-value
Unsecured (Total Debt)	0.55	0.56	0.37	0.76	0.97	0.34	0.00
Retained Earnings	- 0.37	0.06	1.26	0.01	0.20	0.88	0.00
Net Worth	0.69	0.71	0.22	0.68	0.68	0.21	0.12
Log (Size)	4.44	4.34	1.44	6.65	6.60	1.68	0.00
Profitability	0.02	0.09	0.20	0.09	0.12	0.14	0.00
Mkt-to-book	1.38	0.90	1.25	1.61	1.15	1.35	0.00
Tangibility	0.27	0.24	0.17	0.27	0.23	0.17	0.36
Capital Expenditures	0.05	0.03	0.04	0.05	0.04	0.04	0.05
	1,293			1,237			

Panel b) Pre-treatment Summary Statistics, ABCP (2005-07)

	TG: CP&Sec			CG: Rest			
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	p-value
Unsecured (Total Debt)	0.56	0.57	0.37	0.66	0.85	0.37	0.00
Retained Earnings	- 0.47	0.07	1.65	- 0.23	0.18	1.37	0.01
Net Worth	0.68	0.70	0.19	0.71	0.73	0.21	0.01
Log (Size)	5.53	5.17	2.44	6.03	6.10	1.95	0.00
Profitability	0.06	0.10	0.17	0.08	0.12	0.16	0.03
Mkt-to-book	1.71	1.30	1.26	1.69	1.33	1.13	0.36
Tangibility	0.27	0.25	0.17	0.23	0.19	0.16	0.00
Capital Expenditures	0.06	0.05	0.05	0.04	0.03	0.04	0.00
	434			2,259			

Appendix, Table 4: Dividend Payer Dummy (Extensive Margin) reaction to JGTRRA of 2003

This table contains regression results for the average treatment effect, *ATE*, on a dividend payer dummy (the dependent variable) as a result from the policy change for the treatment group (2000-2005). Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Post* variables take value one for firm-year observations in post-treatment years, while *Q4 Individual Investors* takes value one for firms in the fourth quartile of the individual share ownership distribution in pre-treatment years (ThomsonOne data), the treatment group. *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009). Columns (1)-(2), (3)-(4) and (5)-(6) show results for post-treatment years 2003, 2003-04 and 2003-05, respectively. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

	Extensive Margin								
	Dependent Variable: Dividend Payers' Dummy								
	Post: 2003			Post: 2003-04			Post: 2003-05		
	Pre: 2000-02								
ATE 2003	0.0207	0.0366**	0.0333**						
	(0.0162)	(0.0160)	(0.0158)						
ATE 2003-4				-0.00177	0.0262	0.0232			
				(0.0166)	(0.0163)	(0.0159)			
ATE 2003-5							-0.00955	0.0167	0.0146
							(0.0173)	(0.0167)	(0.0163)
Size		0.0938***	0.0903***		0.0965***	0.0930***		0.0986***	0.0959***
		(0.00791)	(0.00800)		(0.00746)	(0.00754)		(0.00722)	(0.00724)
Mkt-to-book		-0.0164**	-0.00879		-0.0123*	-0.00573		-0.0114*	-0.00455
		(0.00703)	(0.00690)		(0.00674)	(0.00668)		(0.00659)	(0.00656)
Profitability		0.464***	0.360***		0.435***	0.350***		0.424***	0.341***
		(0.0563)	(0.0566)		(0.0511)	(0.0520)		(0.0487)	(0.0494)
Tangibility		0.336***	0.280***		0.351***	0.296***		0.341***	0.289***
		(0.0763)	(0.0794)		(0.0723)	(0.0748)		(0.0712)	(0.0734)
Constant	0.462***	-0.278***	-0.121	0.451***	-0.307***	-0.154	0.448***	-0.319***	-0.137
	(0.0240)	(0.0597)	(0.271)	(0.0230)	(0.0559)	(0.232)	(0.0227)	(0.0541)	(0.229)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
State FE			Yes			Yes			Yes
R-squared	0.058	0.264	0.325	0.058	0.269	0.327	0.061	0.274	0.332
Observations	3,216	3,216	3,216	4,254	4,254	4,254	5,059	5,059	5,059

Appendix, Figure 1. Parallel Trends Assumption JGTRRA: Retained Earnings, controlling for firm observables, from 2000-05. The treatment period is from 2003-05. The table reports output of stata dqd command, which tests the parallel trends assumption conditional on observed covariates. The p-value of 0.17 implies that the parallel trends assumption for the pre-treatment period is satisfied.

Unconditional Fully Flexible Model
Output: rete — Number of obs = 5067
Sample Period: 2000:2005 — H0: Common Pre-dynamics = 3.506
Treatment Period: 2003:2005 — p-value = .1732

	s=1	s=2	s=3	H0: q=q-1	H0: s=s-1
q=1	.0721127	.0980726	.1246704		.0713587
	(0.1688)	(0.1487)	(0.1640)		[0.9649]
q=2	.1454754	.2447981	.3447586	-.0733628	.371271
	(0.2622)	(0.3711)	(0.4999)	[0.5897]	[0.8306]
q=3	.0844915	.0618463	-.021145	.0609839	.0220842
	(0.4355)	(0.9577)	(1.7095)	[0.7731]	[0.9890]

Std. Err. in parenthesis adjusted for clusters in gvkey
p-values in brackets

Appendix, Figure 2. Parallel Trends Assumption ABCP: Unsecured debt over Total Debt, controlling for firm observables, from 2005-10. The treatment period is from 2008-10. The table reports output of stata dqd command, which tests the parallel trends assumption conditional on observed covariates. The p-value of 0.97 implies that the parallel trends assumption for the pre-treatment period is satisfied.

Unconditional Fully Flexible Model
Output: f_punsec — Number of obs = 5291
Sample Period: 2005:2010 — H0: Common Pre-dynamics = .0546
Treatment Period: 2008:2010 — p-value = .9731

	s=1	s=2	s=3	H0: q=q-1	H0: s=s-1
q=1	-.0411166	.111827	-.0038813		11.14343
	(0.0433)	(0.0406)	(0.0560)		[0.0038]
q=2	-.0501014	.0938574	-.0308357	.0089848	10.59966
	(0.0670)	(0.1015)	(0.1488)	[0.8170]	[0.0050]
q=3	-.0620847	.0579076	-.1027353	.0119833	10.61933
	(0.1229)	(0.2913)	(0.5416)	[0.8649]	[0.0049]

Std. Err. in parenthesis adjusted for clusters in gvkey
p-values in brackets

Appendix, Table 5: Summary Statistics Joint Identification Strategy, JGTRRA and ABCP (2000-2010)

This table contains summary statistics for firm characteristics in the joint identifications strategy (2000-2010). Appendix A provides a detailed description of the variables used in the analysis, while Appendix C contains a detailed description of how the sources of collateral have been built.

	Joint ID: Sample (2000-10)		
	Mean	Median	Std. Dev.
Unsecured (Total Debt)	0.65	0.81	0.37
Retained Earnings	- 0.40	0.09	1.50
Net Worth	0.70	0.72	0.22
Tangibility	0.25	0.21	0.17
Collateral, Cash&Mktable	0.07	-	0.26
Collateral, Inventories	0.06	-	0.25
Collateral, Receivables	0.08	-	0.27
Collateral, Intangible Assets	0.04	-	0.20
Collateral, Tangible Assets	0.15	-	0.35
Collateral, Financial Debt	0.36	-	0.48
Pledged (Total Assets)	0.08	-	0.20
Log (Size)	5.58	5.49	2.04
Profitability	0.04	0.10	0.20
Mkt-to-book	1.56	1.12	1.30
Capital Expenditures	0.05	0.03	0.05
Rated	0.25	-	0.43
# Observations	14,463		

Robustness Checks, Table 1: Capital Expenditures Response to Substitution to Secured, JGTRRA

This table contains regression results for the average treatment effect, *ATE*, for capital expenditures over total assets as a result from the policy change for the treatment group (2000-2005). Data is from U.S. public manufacturing firms (SIC codes 2000-3999). The treatment group is defined as firms in the fourth quartile of the individual investors' share ownership distribution and issuing secured debt in pre-treatment years. Capital expenditures are multiplied by 100. *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009) and the specification includes firm and year fixed effects. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

	Dependent Variable: Capital Expenditures over Total Assets Substitution to Secured					
Post-Treatment Years	2003		2003-04		2003-05	
Pre-treatment Years			2000-02			
	(1)	(2)	(3)	(4)	(5)	(6)
ATE 2003	-0.627	-0.484				
	(0.661)	(0.633)				
Q4 Individual Investors 2003	0.250	0.186				
	(0.367)	(0.358)				
ATE 2003-04			-0.514	-0.525		
			(0.580)	(0.553)		
Q4 Individual Investors 2003-04			0.227	0.225		
			(0.332)	(0.326)		
ATE 2003-05					-0.783	-0.866*
					(0.533)	(0.505)
Q4 Individual Investors 2003-05					0.310	0.261
					(0.310)	(0.306)
Retained Earnings		0.527*		0.308		0.276
		(0.312)		(0.329)		(0.237)
Tangibility		20.02***		20.06***		18.45***
		(3.594)		(2.953)		(2.399)
Log (Size)		1.282***		1.590***		1.165***
		(0.484)		(0.432)		(0.333)
Mkt-to-book		0.255*		0.370***		0.395***
		(0.134)		(0.136)		(0.116)
Profitability		-0.734		-0.145		0.214
		(1.810)		(1.572)		(1.286)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.615	0.647	0.582	0.623	0.566	0.605
Observations	3,221	3,210	4,267	4,247	5,074	5,052

Notes:
The double interactions, *Issue Secured 2003-**, are omitted. No statistical significant.

Robustness Checks, Table 2: Restricted Retained Earnings and Covenants Limiting Dividends JGTRRA of 2003

This table contains regression results for the average treatment effect, *ATE*, on restricted retained earnings in columns (1)-(3) and for retained earnings for firms with a covenant limiting dividend payouts in columns (4)-(6) as a result from the policy change for the treatment group (2000-2005). Retained earnings are multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Post* variables take value one for firm-year observations in post-treatment years, while *Q4 Individual Investors* takes value one for firms in the fourth quartile of the individual share ownership distribution in pre-treatment years (ThomsonOne data) in columns (1)-(3) and for the previous and firms with covenants limiting dividend payouts in columns (4)-(6). *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009). ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

	Restricted Retained Earnings			Retained Earnings Covenant Restricting Dividend Payouts		
Post-treatment Years	2003	2003-04	2003-05	2003	2003-04	2003-05
Pre-treatment Years				2000-02		
	(1)	(2)	(3)	(4)	(5)	(6)
ATE 2003	4.911			12.64		
	(3.445)			(16.62)		
ATE 2003-04		4.078			12.16	
		(3.416)			(17.25)	
ATE 2003-05			5.723			9.945
			(3.595)			(17.37)
Post 2003	-0.368			-11.94***		
	(1.868)			(2.403)		
Post 2003-04		2.196			-14.87***	
		(2.072)			(2.334)	
Post 2003-05			0.374			-18.56***
			(1.893)			(2.934)
Q4 Individual Investors	-7.650	-8.207	-8.396	6.402	7.894	11.18*
	(7.139)	(6.232)	(5.659)	(5.736)	(5.825)	(6.595)
Log (Size)	-3.168	-3.019	-3.549*	11.91***	10.51***	10.94***
	(2.298)	(2.175)	(1.880)	(2.912)	(3.025)	(3.251)
Mkt-to-book	-3.598*	-4.488*	-3.814**	-17.03***	-16.39***	-15.74***
	(2.078)	(2.325)	(1.906)	(3.517)	(3.289)	(3.229)
Profitability	-18.52	-0.838	-4.448	368.7***	377.4***	415.2***
	(25.86)	(24.43)	(22.58)	(25.85)	(22.84)	(25.72)
Tangibility	10.00	8.059	11.56	8.381	12.43	15.67
	(11.93)	(10.57)	(10.15)	(15.63)	(14.85)	(16.46)
Constant	13.83	17.42	17.32	-48.81	-45.39*	-53.57**
	(13.93)	(12.60)	(10.59)	(29.90)	(23.76)	(22.81)
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
R-squared	0.565	0.528	0.535	0.419	0.380	0.372
Observations	3,210	4,247	5,052	3,210	4,247	5,052

Robustness Checks, Table 3: Retained Earnings in 2005-2010

This table contains regression results for the average treatment effect, *ATE*, for retained earnings as a result from the policy change for the treatment group (2005-2010). Retained earnings are multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). *Post* variables take value one for firm-year observations in post-treatment years, while *Q4 Individual Investors* takes value one for firms in the fourth quartile of the individual share ownership distribution in pre-treatment years (ThomsonOne data). *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009). ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

	Retained Earnings		
Post-treatment Years	2008	2008-09	2008-10
Pre-treatment Years		2005-07	
	(1)	(2)	(3)
ATE 2008	-1.496		
	(7.909)		
ATE 2008-09		-8.804	
		(8.722)	
ATE 2008-10			-7.501
			(9.671)
Post 2008	-21.43***		
	(5.578)		
Post 2008-09		-15.00***	
		(4.840)	
Post 2008-10			-17.70***
			(5.969)
Q4 Individual Investors	22.66*	25.05**	27.49**
	(12.13)	(11.13)	(11.14)
Log (Size)	11.68**	11.61**	11.58**
	(5.145)	(4.740)	(4.994)
Mkt-to-book	-19.07***	-19.64***	-20.35***
	(5.924)	(5.215)	(4.944)
Profitability	657.4***	649.5***	647.8***
	(91.95)	(92.23)	(82.51)
Tangibility	3.768	2.432	10.78
	(33.46)	(33.81)	(34.89)
Constant	-138.5***	-136.6***	-140.3***
	(37.62)	(34.20)	(34.07)
Clustered SE	Firm	Firm	Firm
R-squared	0.326	0.292	0.267
Observations	2,247	3,072	3,574

Robustness Checks, Table 4: Response of Unconstrained's Capital Expenditures to ABCP

This table contains regression results for the average treatment effect, *ATE*, for capital expenditures over total assets as a result from the policy change for the treatment group (2005-2010). Capital expenditures are multiplied by 100. Data is from U.S. public manufacturing firms (SIC codes 2000-3999). The treatment group is defined as firms with a commercial paper conduit and unconstrained in terms of size in the pre-treatment years. *Tangibility*, *Size*, *Mkt-to-book* and *Profitability* are defined as in Lemmon, Roberts and Zender (2008) (Compustat data). Standard errors are clustered at the source of variation, at a firm-level as in Petersen (2009) and the specification includes firm and year fixed effects. ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively. Appendix A provides a detailed description of the variables used in the analysis.

	Capital Expenditures		
Post-treatment Years	2008	2008-09	2008-10
Pre-treatment Years		2005-07	
	(1)	(2)	(3)
ATE 2008	-0.279		
	(0.259)		
ATE 2008-09		-0.251	
		(0.242)	
ATE 2008-10			-0.105
			(0.231)
Retained Earnings	-0.00607	0.0851	0.120
	(0.107)	(0.0868)	(0.0780)
Tangibility	26.41***	19.31***	18.44***
	(3.297)	(2.421)	(2.118)
Log (Size)	1.298***	0.762**	0.594**
	(0.419)	(0.331)	(0.292)
Mkt-to-book	0.299**	0.340***	0.441***
	(0.124)	(0.104)	(0.104)
Profitability	-1.225	0.259	0.497
	(1.427)	(0.944)	(0.851)
Clustered SE	Firm	Firm	Firm
Firm&Year FE	Yes	Yes	Yes
R-squared	0.764	0.704	0.688
Observations	3,238	4,491	5,275