Do leverage decreasing recapitalizations reflect market timing efforts?

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Abstract

We show that leverage decreasing recapitalizations (LDRs) occur during periods of high equity valuations, but argue that they are unlikely to be driven by market timing efforts. First, up to half of all observed LDRs occur among firms with an implied default credit rating. Second, the positive relation of LDRs with valuation ratios also persists among firms that presumably have little time to time the market - such as firms with high (excess) leverage or those that violate financial covenants. We further show that the existence and subsequent exercise of growth opportunities provides a more likely explanation as corporate investment rates increase substantially following periods of LDRs. Moreover, we document that abnormal stock returns of firms undertaking LDRs are indistinguishable from zero which is difficult to square with successful market timing efforts.

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1 Introduction

It is a well known fact that firms which conduct seasoned equity offerings have high valuations (Asquith and Mullins, 1986; Masulis and Korwar, 1986). Moreover, these firms experience pre-issue stock price run-ups that are large and positive, whereas (abnormal) returns following the SEO are often negative (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995). However, there is little agreement as to the underlying explanation for these empirical findings.

For example, Baker and Wurgler (2002) suggest that market timing efforts drive equity issues and thereby they also have a long-lasting impact on corporate capital structures. Leary and Roberts (2005), on the other hand, conclude that the high valuations reflect growth opportunities and that the corresponding effect on capital structures can be rationalized with the existence of leverage adjustment costs. Kim and Weisbach (2008) further observe that firms stockpile cash following periods of equity issues and argue that this behavior is consistent with market timing efforts. DeAngelo, DeAngelo, and Stulz (2010) instead argue that the increase in cash reflects asset growth effects and that - without the SEO - firms would have quickly run out of funds.

In this paper, we investigate the potential impact of market timing efforts by instead focusing on leverage decreasing recapitalizations (LDRs), which we define as years in which firms simultaneously issue equity and use the proceeds to either retire debt and/or increase cash. The focus on LDRs is interesting for several reasons. First, it attempts to isolate periods of neutral asset growth and could therefore help in identifying the impact of market timing efforts. Second, from a theoretical perspective LDRs should not exist outside of bankruptcy or strategic debt renegotiation, implying that their existence could reflect other considerations than trade-off behavior.[1] Finally, focusing on recapitalizations as opposed to individual leverage reducing transactions (such as debt retirements or equity issues) likely reveals that the underlying motive for the transaction was financial and further deemed to be optimal by management.

Our analysis distinguishes between two different types of LDRs. Under a so-called strict LDR, a firm issues equity and uses the proceeds to actively retire debt. In other words, the strict definition of a LDR only involves the liability side of a firm's balance sheet which is consistent with a literal interpretation of trade-off theory of capital structure (Fischer et al., 1989; Leland, 1994; Strebulaev, 2007). Alternatively,

[1] Traditional trade-off models of capital structure do not imply the existence of LDRs outside of bankruptcy or strategic debt renegotiation (Fischer et al., 1989; Leland, 1994; Goldstein et al., 2001; Strebulaev, 2007). The same finding also pertains in a principal-agent setting in the context of agency costs (Titman and Tsyplakov, 2007; Admati et al., 2012).

we also employ a broad LDR definition that allows the firm to use equity issues for both debt retirements and cash hoarding. While the inclusion of cash hoarding is not part of a dynamic trade-off theory of capital structure (which, after all, relies on the existence of security issuance costs to explain periods of *inactivity*), it may capture financial flexibility considerations reflecting future investment financing needs (Gamba and Triantis, 2008).

Using a large Compustat sample of 14,321 firms (147,256 firm-years) over the period from 1965 to 2015, we find that LDRs occur at a slightly higher frequency than their leverage increasing counterparts. Moreover, we show that both types of LDRs are not limited to firms in financial distress. In fact, up to one third of all the LDRs happen for firms with an (implied) investment grade credit rating. These firms are unlikely to be at risk of bankruptcy, yet they engage in a financial transaction that should not exist according to trade-off theory of capital structure. While dynamic financing and investment models suggest that debt retirements may be optimal to restore debt capacity (DeAngelo et al., 2011), the simultaneous involvement of costly equity issues for our sample firms is nonetheless puzzling.

Perhaps most surprisingly, we find that 6% of all firms undertaking a strict LDR choose to become all-equity financed. The fraction increases to 30% for firms that become almost all-equity financed - defined as those with a market leverage ratio of less than 5% (Strebulaev and Yang, 2013). The decision to actively decrease leverage by issuing equity and retiring debt, suggests that (at least) management perceives the transaction to be optimal. This contrasts with a vast literature documenting negative announcement returns surrounding seasoned equity offerings (Masulis, 1980; Eckbo et al., 2007).

We then investigate whether LDRs reflect market timing efforts and therefore extend the annual valuation framework Fama and French (1998) to specifically account for LDRs. Our findings suggest that LDRs take place during periods of high shareholder value and that this finding is robust as it obtains for both small and large firms. This finding raises the possibility that managers successfully time the recapitalization with periods of high equity valuation (Baker and Wurgler, 2002).

Empirically, it is however very difficult to disentangle market timing from rational behavior in the context of growth opportunities (Leary and Roberts, 2005). In simple words, equity values could be high because the company faces substantial growth opportunities and the leverage decreasing recapitalization solely occurs in response to the high growth environment. Because the market-to-book ratio (or variants of it) identify both periods of high equity valuations (market timing) and the presence of growth opportunities, it is hard to distinguish between the two forces - even in the context of a valuation model that controls for research and development expenses in an attempt to isolate growth opportunities.

We address this problem using capital structure theory to guide our test design. First, dynamic trade-off theory of capital structure implies that LDRs should not exist outside of bankruptcty or strategic debt renegotitation (Fischer et al., 1989; Leland, 1994; Goldstein et al., 2001; Strebulaev, 2007). Consistent with this argument, our descriptive evidence shows that up to 50% of all LDRs occur among firms with an implied default credit rating or among those with high leverage ratios. We further hypothesize that for those firms, market timing efforts are unlikley to be the main driver of the recapitalization. The underlying intuition is that once a firm approaches a so-called *default boundary*, there is presumable little time left to time the market. Moreover, these periods are typically associated with falling equity values for the company.

Second, contracting theory rationalizes the existence of debt covenants to mitigate the ex-post sub-optimality of LDRs (Smith and Warner, 1979; Aghion and Bolton, 1992; Dewatripont and Tirole, 1994). That is, shareholders and creditors can agree ex-ante on a set of (financial) covenants which the company must meet. If breached, creditors typically gain substantial control rights which - among others - can force the company to issue equity. We hypothesize that for those firms, market timing efforts are unlikley to be the main driver of the recapitalization.

Our findings suggest that the positive relation between LDR and equity value also exists among firms with high leverage, for those that are over-levered, that have an implied default credit rating or among firms that violated financial covenants. We argue that for all these subsamples, market timing considerations are unlikely to be the driving force as - by construction - in the cases creditors have substantial influence over the firm.

These findings raise the possibility that the existence of growth opportunities explains the decision of firms to undertake a leverage decreasing recapiatlization. Accordingly, we show that investment rates increase substantially in periods of recapitalizations which is consistent with the exericse of growth options. Moreover, while investment rates increase valuation ratios decrease which could be consistent with a decrease in the firm's risk (Carlson et al., 2004).

Consistent with this intuition, we further show that the abnormal returns following periods of LDRs are statistically indistinguishable from zero in the context of an empirical asset pricing model that controls for the existence of growth opportunities. Taken together, our findings are difficult to square with the market timing hypothesis but are consistent with a rational decrease in valuation ratios of LDR firms due to the exercise of growth opportunities.

The paper proceeds as follows. Section 2 presents the sample and provides descriptive evidence on LDRs. Section 3 estimates the impact of LDRs on shareholder value, while Section 4 attempts to provide explanations for the observed valuation effect of LDRs. Section 5 concludes the paper.

2 Data and descriptive evidence

2.1 Sample Construction

The sample consists of U.S. public industrial corporations listed on Crisp/Compustat (CCM) over the period from 1971 to 2015. As usual, we exclude financial firms, utilities and government entities. In addition, we require the availability of one-year lagged information on our main variables (to be introduced below). All other sample selection criteria are standard and are in Table **??**. The final sample consists of 14,321 firms and 147,256 firm-years.

In this paper, we focus on leverage decreasing recapitalizations (LDRs). In principle, firms can reduce leverage in two ways. First, they can issue equity and use the proceeds to retire debt. This definition is consistent with dynamic trade-off of capital structure (Fischer et al., 1989) in which cash holdings are absent and, moreover, any period of capital structure inactivity is driven by security issuance costs. We refer to this transaction as a strict LDR (LDR^S) and define it exactly as follows

$$LDR_t^S = 1 \; if \; \frac{EI_t}{A_t} > th \; and \; \frac{\Delta D_t}{A_t} < -th \tag{1}$$

where EI are common and preferred stock issues (obtained from the cash flow statement), A is the book value of assets and ΔD is the change in the book value of long-term debt. The variable th is a size threshold which, in most situations, is set equal to 5%. The choice of this cutoff value is motivated by Hovakimian et al. (2001) who show that the 5% classification scheme produces similar results than a direct merge with the SDC Database.

Alternatively, a firm can reduce leverage by issuing equity and decreasing its net debt. In other words, the can hoard the cash from the equity issue and/or retire only some debt. While the inclusion of cash hoarding is not part of a dynamic trade-off theory of capital structure (which, after all, relies on the existence of security issuance costs to explain periods of *inactivity*), it may capture financial flexibility considerations reflecting future investment financing needs (Gamba and Triantis, 2008). The broad LDR (LDR^B) is defined as follows

$$LDR_t^B = 1 \; if \; \frac{EI_t}{A_t} > th \; and \; \frac{\Delta D_t - \Delta C_t}{A_t} < -th \tag{2}$$

where C_t denotes cash and cash equivalents.

Figure 1 displays the relative frequency of both strict and broad LDRs over the sample period and suggests that both type of transactions have become more frequent since the late 1980s. In addition, we can see that broad LDRs are much more common corporate events than strict LDRs. In fact, up until the financial crisis of 2008, broad LDRs occurred among roughly 10% of all publicly listed corporations in a given year. Appendix Table 1 further tabulates the yearly frequencies and compares them to the frequency of leverage increasing recapitalizations (LIRs). In general, the frequency of LDRs and LIRs is similar under the strict definition (occurring in 2% of all cases), whereas LDRs happen more frequently than LIRs under the broad definition (6% versus 4%, respectively).

Table 2 reports descriptive information on selected financial characteristics for the full sample of firms as well as two subsamples: years in which firms perform either a strict or a broad LDR. Beginning with the market leverage ratio (L), we can see that firms performing a LDR have lower leverage in the year of the LDR (20% strict versus 9% broad) than the full sample of firms (25%). Interestingly, book leverage ratios are higher for firms performing LDRs (25% strict versus 13$ broad), suggesting a relatively high market valuation of the firm's assets (confirmed by higher values of Q below). Furthermore, the table shows that 6% of all firms performing a strict LDR are all-equity financed and 31% are almost all-equity financed, which we define as those with a market leverage of less than 5% (Strebulaev and Yang, 2013). For firms performing a broad LDR, the corresponding fractions are 26% and 64%.

Furthermore, the table shows that while LDR performing firms hoard more cash than the full sample (18% strict vs 41% broad vs 16% full sample), they are substantially less profitable. The average ratio of operating profits to assets is -9% (-6%) under the strict (broad) definition. While the median profitability is positive, it is still also that of the full sample of firms (9% strict vs 4% broad vs 12% full sample). Notwithstanding the low current profitability, equity valuations - measured as the market-to-book ratio (Q) - are higher for firms performing LDRs. Finally, we can see that LDR firms are somewhat smaller and they invest more into physical assets ($Capex$) as well as intangible capital ($R\&D$).

Taken together, Table 2 shows that firms deliberately choose a very conservative capital structure in the year of the LDR. In fact, a substantial fraction of firms choose a capital structure which Strebulaev and Yang (2013) conclude is a mystery. Moreover, firms performing LDRs are less profitable, they have relatively high equity valuations and they invest substantially into physical and intangible capital. While far from a proof, these findings open op for the possibility that LDR performing firms choose a capital structure that allows them to invest in an unconstrained way.

2.2 Why do firms perform LDRs?

Table 3 describes the evolution of leverage, profitability and investment over a five year event window surrounding the year of the LDR. Panel A displays corresponding information for strict LDRs and shows that leverage peaks in the year prior to the LDR. The effect of the recapitalization on the capital structure is significant as it reduces market and book leverage by at least 10 percentage points. Interestingly, the average ratio of cash to assets is almost constant across all event years (ranging between 15% and 18%). Also, LDR firms persistently generate negative operating profits over the five year period.

Turning to the investment side, we can see that outlays for both *Capex* and *R&D* are economically significant for each event year. Interestingly, the market-to-book ratio (Q) peaks in the year of the LDR. Thus, notwithstanding the large losses, the market values LDR firms highly in the year of the recapitalization. This descriptive finding is both consistent with the possibility that firms face significant investment opportunities (Hayashi, 1982; Hennessy, 2004) or, alternatively, that managers try to time the market (Baker and Wurgler, 2002).

Panel B displays corresponding information under the broad LDR definition. The main difference concerns leverage and cash policy. Gross leverage ratios are now low in each year (relative to the full sample and to strict LDRs) and cash holdings are large, resulting in negative net leverage. Profitability and investment is similar to the case of strict LDRs: broad LDR firms persistently generate negative operating profits and they incur substantial investment outlays.

Trade-off theory of capital structure implies that firms recapitalize only when close to bankruptcy (Fischer et al., 1989; Goldstein et al., 2001). While an early recapitalization is thus *ex-post suboptimal* for shareholders, it is still possible that it reflects trade-off behavior. For example, the existence of bond covenants or unobserved contracts / negotiations with private creditors might induce shareholders to commit to (and execute) pro-active leverage reductions (Nini et al., 2009).

As a first approximation, we infer the firm's credit risk by calculating its interest coverage ratio (ICR). The ICR is a measure of the firm's ability to make payments to creditors and it compares a firm's earnings before interest and taxes (EBIT) to the level of interest payments. We then assign a synthetic credit rating for each sample firm, by using Damodaran's mapping table (which we display in Appendix Table 2). Companies receiving a AAA rating are considered to be the safest, those with a D rating are in bankruptcy. Ratings below BBB are referred to as non-investment grade ratings.

Table 5 displays synthetic credit ratings for firms performing both broad and strict LDRs as well as the full sample of firms. For strict LDRs, half of the observed recapitalizations occur among firms with an implied default rating and 74% have a non-investment grade credit rating. These cases are broadly consistent with trade-off theory of capital structure which implies that leverage decreasing recapitalizations should occur close to (or at) bankruptcy (Fischer et al., 1989; Goldstein et al., 2001). For broad LDRs, the corresponding fractions are 38% (default) and 49% (non-investment grade). However, investigating the top of the rating scale, it turns out that 25% of all strict LDR firms receive at least an A rating. For broad LDRs, the corresponding fraction is 50% and 41% even receive an implied AAA credit rating.

These findings are interesting and suggest the possible co-existence of two alternative types of firms performing LDRs: those that adjust leverage that adjust leverage downwards towards a (possibly) optimal capital structure and another type of *financially sound* firms.

To further characterize these two types of firms, we condition on the initial (i.e. one period lagged) market leverage ratio. To be precise, we first compute the distribution of lagged market leverage for the full sample of firms and then use the corresponding decile cutoff values to categorize our LDR firms into ten different groups (ranging from low to high leverage). Table 5 displays the corresponding results for strict (Panel A) and broad LDR firms (Panel B).

Panel A confirms that strict LDR firms on average have relatively high leverage. While only 9% of the strict LDR firms are in the lowest three leverage groups (and thus among the third of all firms with the lowest market leverage), 38% of them are in the three highest leverage groups. Conditioning on the lagged market leverage, further reveals systematic differences in cash policy, profitability, market valuation and investment. Strict LDR firms with low initial leverage have large (lagged) cash holdings, are highly unprofitable but are valued at high multiples (Q). Moreover, these firms face significant capital expenditures and $R\&D$ expenses. On the other hand, strict LDR firms with high initial leverage are profitable, have low Q, are large and invest significantly in $Capex$ but little into $R\&D$.

Columns 13 and 14 display the average size of the net equity issue (NEI) and the long-term net debt retirement (NDR) and offer a potential explanation for these cross-sectional differences. Among strict LDR firms with low initial leverage, we can see that net equity issues substantially exceed long-term net debt retirements. In other words, these firms issue substantial amounts of equity and use the proceeds to both retire debt but also increase assets (through an increase in cash holdings and $Capex$). The higher the initial market leverage, the smaller the difference in net equity issues and net debt retirements. That is, firms with relatively high initial leverage are likely to be the best candidates to identify *pure* recapitalizations.

Panel B displays corresponding information for broad LDR firms and confirms that the fraction of firms with low initial market leverage is much larger: 53% of the broad LDR firms are in the lowest three leverage groups (and thus among the third of all firms with the lowest market leverage), whereas only 15% of them are in the three highest leverage groups. In addition, the cross-sectional differences concerning cash policy, profitability, market valuation and investment also persist among broad LDR firms. Finally, we can see that that the size of the net equity issue decreases and approaches the average size of the net debt retirement for firms with initial market leverage.

Taken together, the descriptive findings in this section suggest two potential explanations for why firms perform a leverage decreasing recapitalization. First, the LDR may be driven by the main objective to change the firm's capital structure. This explanation is consistent with trade-off behavior of capital structure and the existence of financial constrains and is likely among firms with relatively high market leverage. Alternatively, the LDR could be described as more of a "by-product" of a very significant equity issue where the proceeds are used not only to retire net debt but also to increase cash holdings and physical investment.

3 Do firms undertaking LDRs time the market?

Our findings above show that firms performing a LDR have high market-to-book ratios and that, subsequently, those valuations decline. At the same time, the presented descriptive evidence suggests that firms may have different motivations to perform a leverage decreasing recapitalization.

In this section, we therefore investigate more formally to what degree LDRs may reflect market timing efforts. To this end, we first estimate the correlation between LDRs and shareholder value and then attempt to disentangle whether it is market timing that explains our findings. We begin with a quick explanation of the underlying valuation framework.

3.1 Valuation framework

The approach below is based on an extension to Fama and French (1998) who estimate the value impact of debt and dividend paymets.[2] To arrive at our regression specification, we start from the well-known fact that levered firm value (V^L) can be decomposed into the value of the firm's unlevered assets (V_U) and the tax shield associated with debt financing (τD):[3]

$$V^L = V_U + \tau D$$

Assuming that unlevered firm value consists of both assets in place (V_A) and growth options (V_G), we can further write that

$$V^L = V_A + V_G + \tau D$$

Using the book value of assets (A) as an approximation for the value of assets in place, leads to the following regression specification

$$V^L - A = \alpha + \beta V_G + \gamma D + \epsilon$$

where the dependent variable is interpreted as the spread of *value over cost*. In order to estimate the valuation model, one needs to control for the value of growth opportunities. Therefore (levels and changes of) operating profits ($prof$), R&D expenses (rd) and capital expenditures ($capex$) are included as additional control variables, thus implying that

[2] The Fama-French valuation framework has been used extensively in the cash literature which attempts to estimate the shadow value of cash holdings (Pinkowitz and Williamson, 2004; Pinkowitz et al., 2006; Kisser, 2013).

[3] If the financial markets are competitive and corporations are taxed then, ceteris paribus, the value of the levered firm equals that of the unlevered firm plus the value of the debt tax shield, i.e., $V_L = V_U + \tau D$, where the L and U denote levered and unlevered, respectively, and (τD) denotes the value of the debt tax shield (Modigliani and Miller, 1958).

$$
\begin{aligned}
\frac{V_t^L - A_t}{A_t} &= \alpha + \beta_1 \frac{prof_t}{A_t} + \beta_2 \frac{rd_t}{A_t} + \beta_3 \frac{capex_t}{A_t} + \eta_1 \frac{dprof_t}{A_t} + \eta_2 \frac{drd_t}{A_t} + \eta_3 \frac{dcapex_t}{A_t} \\
&= +\phi_1 \frac{dprof_{t+v}}{A_t} + \phi_2 \frac{drd_{t+v}}{A_t} + \phi_3 \frac{dcapex_{t+v}}{A_t} + \gamma \frac{D_t}{A_t}
\end{aligned}
$$

where all variables are scaled by assets in order to both deal with heteroskedasticity and the fact that otherwise the largest firms drive the results. The compact notation $dX_t = (X_t - X_{t-1})/A_t$ denotes the lagged one year change in the variable of interest ($prof$, rd or $capex$). Relatedly, $dX_{t+v} = (X_{t+v} - X_t)/A_t$ denotes the corresponding future one year ($v = 1$) or two year ($v = 2$) change. Using a two-year future change is in line with evidence that two years is as far ahead as the market can predict (Fama, 1990; Fama and French, 1998).

3.2 LDRs and equity valuations

In this section, we use the valuation framework above to investigate the correlation between shareholder value and leverage decreasing recapitalizations. Beginning with strict LDRs, we estimate the following regression

$$
\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+v}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon \quad (3)
$$

where $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). To further save space, we employ the previously introduced compact notation dX_t (dX_{t+v}) to denote the one year lag and the v year lead change for the three variables $prof$, rd and $capex$. Further note that we use the lagged book leverage ratio in the regression in order to disentangle the effect of the leverage decreasing recapitalization.

Table 6 displays the correlation between strict LDRs and shareholder value using the baseline regression given by equation 3. To maximize sample size, we focus on one year future changes in the control variables ($v = 1$).[4] Because we are mainly interested in disentangling the cross-sectional correlation, our main estimation method is based on cross-sectional (i.e. year-by-year) regressions (Fama and MacBeth,

[4]Alternative results when using two year future changes in the control variables ($v = 2$) are quantitatively similar and are displayed in the Appendix.

1973). Corresponding results for the full sample of firms are displayed in column 1. For completeness, we supplement estimation results using OLS regression (column 2) and when accounting for firm-fixed effects (column 3).

Focusing on the coefficient of LDR in column 1, we can see that the existence of a strict LDR increases the value over cost ratio (i.e. the dependent variable) by 0.55 units. In other words, this suggests that firms undertaking a leverage decreasing recapitalization have a market-to-book ratio that is approximately 0.6 units higher than for the average sample, which is consistent with the descriptive evidence above documenting high valuation ratios for LDR firms. Moreover, the coefficient is highly statistically significant and robust to alternative estimation methods including OLS estimation (column 2) or the presence of firm fixed effects (column 3).

Turning to the coefficient estimate of operating profitability ($Prof$), we can see that more profitable firms have lower value over cost ratios. In other words, the negative correlation implies that low profitability firms on average have higher valuations, which is consistent with characteristics of high market-to-book firms (Fama and French, 1992). In addition, the correlation with lagged leverage is negative. Both coefficient estimates are also consistent with our previous evidence which has revealed substantial cross-sectional differences in profitability and valuations for firms performing LDRs. That is, Table 5 shows that LDR firms with low initial leverage are unprofitable but valued highly whereas those with high leverage are more profitable and have lower market-to-book ratios.

To better understand the negative impact of profitability, we further control for the size of the company. Small firms are on average less profitable than large firms and they account for a larger fraction of the Compustat universe. We therefore categorize firms into three different groups using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. Columns (4) to (6) display the corresponding results for small, medium and large leverage firms and reveal a relatively even distribution of LDRs across the three leverage terciles: 903 LDRs occur among small firms and 1,108 (714) among medium (large) firms. Turning to the coefficient estimate of LDR, we can see that the correlation with the dependent variable is positive across all three subsamples. In addition, the correlation of profitability ($Prof$) with the the value over cost ratio increases with the market value of equity and becomes positive for large firms.

Moving on to broad LDRs, we estimate

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+v}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon \quad (4)$$

where NBL is the ratio of net debt $(D - C)$ to assets (A) and the LDR dummy now identifies broad recapitalizations. Table 4 displays corresponding results. The full sample results (columns 1 to 3) are comparable to the case of strict LDRs and reveal a positive correlation between the LDR and the equity valuation. Moreover, profitability is again negatively correlated (though not statistically significant in all three specifications) with the dependent variable. Conditioning further on the market value of equity (columns 4 to 6), we can see again that the positive impact of LDRs is robust across all three subsamples. As before, the impact of $Prof$ turns positive among large firms.

Taken together, the findings in this section suggest that LDRs are associated with higher valuation ratios. This holds true irrespectively of whether we employ the strict or the broad definition of leverage decreasing recapitalizations and it also obtains fur subsamples of firms formed on the market value of equity. The positive correlation could reflect an attempt of LDR performing firms to time the market (Baker and Wurgler, 2002), it could indicate the presence of growth opportunities (Hayashi, 1982; Hennessy, 2004) or the alternative possibility that value increases in response to the leverage decreasing transaction. In the remainder of this paper, we attempt to shed light on the three potential explanations.

3.3 Is it *really* market timing?

The findings above strongly point towards a robust positive correlation between the value over cost ratio (a measure of market value) and the decision to undertake a leverage decreasing recapitalization. Importantly, the finding also obtains for different subsamples of firms, ranging from small to large companies. This raises the possibility that managers successfully time the recapitalization with periods of high equity valuation (Baker and Wurgler, 2002).

Empirically, it is however very difficult to disentangle market timing from rational behavior in the context of growth opportunities (Leary and Roberts, 2005). In simple words, equity values could be high because the company faces substantial growth opportunities and the leverage decreasing recapitalization solely occurs in response to the high growth environment. Because the market-to-book ratio (or variants of it) identify both periods of high equity valuations (market timing) and the presence of growth opportunities, it is hard to distinguish between the two forces.

We address this problem using capital structure theory to guide our test design. First, dynamic trade-off theory of capital structure implies that LDRs should not exist outside of bankruptcty or strategic debt renegotitation (Fischer et al., 1989; Leland, 1994; Goldstein et al., 2001; Strebulaev, 2007). Consistent with this argument, the descriptive evidence in the previous section has shown that up to 50% of all LDRs occur among firms with an implied default credit rating or among those with high leverage ratios. We hypothesize that for those firms, market timing efforts are unlikley to be the main driver of the recapitalization. The underlying intuition is that once a firm approaches a so-called *default boundary*, there is presumable little time left to time the market. Moreover, these periods are typically associated with falling equity values for the company.

Second, contracting theory rationalizes the existence of debt covenants to mitigate the ex-post sub-optimality of LDRs (Smith and Warner, 1979; Aghion and Bolton, 1992; Dewatripont and Tirole, 1994). That is, shareholders and creditors can agree ex-ante on a set of (financial) covenants which the company must meet. If breached, creditors typically gain substantial control rights which - among others - can force the company to issue equity. We hypothesize that for those firms, market timing efforts are unlikley to be the main driver of the recapitalization. The underlying assumption of this exercise is that the covenant violation occurs for reasons that are unrelated to the high equity valuation of the company. We argue that this assumption is plausible as covenant violations are more likely during periods of falling equity values (which increase leverage) or during periods of deteriorating profitability.

Table 8 displays results in case we condition on different measures for a firm's distance to its default boundary. Columns (1) to (3) contain results for three subsamples, obtained by categorizing firms into three different groups using the tercile cutoff values of the lagged market leverage ratio distribution for the full sample of firms. The categorization results in an uneven distribution of LDRs across the three leverage terciles: only 333 LDRs occur among low leverage firms but 1,209 (1,183) among medium (high) leverage firms. However, turning to the coefficient estimate of LDR, we can see that the correlation with the dependent variable is nevertheless positive across all three subsamples.

Even though firms in the subsample of high leverage firms have substantial leverage ($L = 52\%$) at the beginning of the year, it is possible that the absolute leverage ratio does not succesfully sort on a firm's distance to default. Therefore, columns (4) to (6) present results separately for firms with different magnitudes of excess leverage. That is, we first estimate the lagged leverage target of each firm and then categorize each firm as overed-levered in case the lagged market leverage ratios exceeds the estimated target by a positive amount (column 4), by at least 5 percentage points (column 5) or at least by 10 percentage points (column 6).[5] Results show that even among firms with leverage at least 10 percentage points above the target, the correlation between LDR and the value over cost spread is positive. Finally, columns 7 and 8 display results separately for firms with an implied junk (column 7) or an implied default rating (column 8). In both cases, the correlation remains positive.

Results for broad LDRs are qualitatively similar and are displayed in Table 9. Taken together, the findings suggest that the positive correlation between LDRs and value over cost spread also persists among firms with high leverage, those that are over-levered and those with an implied default rating. Before taking a final stance on the likelihood that market timing explains our findings, we proceed to an analysis of firms that violate financial covenants. We refer to recapitalizations that happen in the same year as covenant violations as *forced*.

Practically, the identification of such forced recapitalizations is done using data from Nini, Smith, and Sufi (2009). This dataset is based on quarterly SEC filings for public U.S. corporations over the period from 1996 to 2008. For those firms, the authors identify whether a (at least one) financial covenant was violated or not. We then merge this dataset with our full annual Compustat sample, which results in the successful merge of 40,503 firm-years. In 12% (or 4,922 cases) financial covenants are violated for our sample firms. Moreover, we find that the frequency of covenant violations is relatively larger during periods of strict LDRs (17%, or 166 cases) than for broad LDRs (10%, 329 cases).

We then re-visit the correlation between the value over cost spread and the LDR dummy variable by focusing only on firms that violated financial covenants. Tables 10 and 11 display results for strict and broad LDRs, respectively. Both tables show that the cross-sectional correlation between LDRs and the value over cost spread also persists among firms that violated financial covenants. When we further categorize firms into small, medium and large, we find that for strict LDRs the relation only persists among medium sized firms. However, the number of LDRs among the three categories (small, medium and large) is quite small (52, 60 and 54) which may explain the missing statistical significance among small and large firms. Turning to broad LDRs, the relation is positive and statistically significant also

[5]To avoid mechanical mean reversion in leverage ratios, we estimate the target on a rolling basis. The set of control variables is standard and includes lagged values of size, profitability, market-to-book ratio, cash ratio, asset tangibility, R&D expenses, capital expenditures and the median industry market leverage ratio. In addition, we account for firm-fixed and time-fixed effects.

when conditioning on firm size.

Taken together, the results in this section suggest that the positive relation between LDR and equity value also exists among firms with high leverage, those that are over-levered, that have an implied default credit rating or among firms that violated financial covenants. We argue that for all these subsamples, market timing considerations are unlikely to be the driving force as - by construction - in the cases creditors have substantial influence over the firm. As a consequence, we now turn to an alternative explanation for the documented positive correlation between value and the decision to do a LDR.

4 LDRs, the exercise of growth options and abnormal returns

The findings above reveal a robust positive correlation between the presence of a leverage decreasing recapitalization and the value over cost spread. Moreover, it was shown that this correlation also obtains among subsamples of firms which are relatively close to a default boundary or where creditors have substantial influence over the firm due to a breach of financial covenants.

A potential alternative explanation for the positive relation may therefore be given by the existence of growth opportunities. After all, the dependent variable is mathematically equivalent to a scaled version of the market-to-book ratio (precisely, the value over cost spread is equal to the difference between the market-to-book ratio and one). While the valuation framework above controls for $R\&D$, $Prof$ and $Capex$, it is possible that some incremental information on growth options is reflected in the value over cost spread.

To investigate this possibility, we perform two main tests. The first one explores whether the presence of LDRs leads to an (increased) exercise of growth options. The second one investigates the value and asset pricing implications of LDRs. Specifically, we hypothesize that the exercise of growth options leads to a decrease in subsequent valuations ratios but - at the same time - abnormal stock returns of LDR firms should indistinguishable zero in the context of a multi-factor asset pricing model that controls for the exposure to growth opportunities.

4.1 The exercise of growth options following periods of LDRs

It is possible that the positive relation between LDRs and the value over cost spread is explained by the presence of substantial growth opportunities among LDR firms. If this is indeed the case, we would expect that - ceteris paribus - the LDR allows firms to invest in a less constrained way. Put differently, the LDR should be followed an increase in the physical investment activity of firms which is conceptually equivalent to the exercise of growth options.

To explore whether this is the case, we regress the increase in capital expenditures on the initial decision to undertake a LDR:

$$\frac{dCapex_{t+v}}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \eta\frac{dX_t}{A_t} + \phi\frac{dX_{t+v}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon \quad (5)$$

$$\frac{dCapex_{t+v}}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \eta\frac{dX_t}{A_t} + \phi\frac{dX_{t+v}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon \quad (6)$$

where $dCapex_{t+v} = capex_{t+v} - capex_t$ and dX_{t+v} now only includes subsequent changes in profits ($prof$) and R&D outlays (rd).

Table 12 displays corresponding results for strict recapitalizations and confirms that the LDR leads to a subsequent increase in physical investment. Specifically, columns 1 to 3 explore the impact on capital expenditures over the subsequent year and show that they increase by 1.9 percentage points of assets over the subsequent period. This effect is not only statistically significant but also economically large. As was shown in Table 2, capital expenditures on average equal 7 percent of assets, thus implying that the LDR increases *Capex* by nearly 30 percent. Furthermore, columns 4 to 6 show that the effect is even larger when measured over a subsequent two year period. In that case, capital expenditures increase by as much as 2.6 percentage points of assets.

Turning to the case of broad LDRs, results in Table 13 suggest that the impact on capital expenditures is even more significant. Focusing on the year following the LDR, *Capex* increases by 2.5 percentage points whereas over two years the impact is as large 3.4 percentage points (which corresponds to a 50% increase in the initial capital expenditures to assets ratio).

4.2 Value and return implications of LDRs

If LDRs are correlated with (an increase in) the exercise of growth opportunities, we would expect that valuations decrease in subsequent periods. At the same time, abnormal returns of LDR stocks should be zero in the presence of a multi-factor asset pricing model (Fama and French, 1992, 2014).

Beginning with the valuation impact, we use the the v period change (from year t to $t+v$) of the value over cost spread to test whether LDRs are correlated with reductions of valuation ratios in subsequent years, i.e. we estimate

$$d\left(\frac{V_{t+v}^{L} - A_{t+v}}{A_{t+v}}\right) = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+v}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon$$

$$d\left(\frac{V_{t+v}^{L} - A_{t+v}}{A_{t+v}}\right) = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+v}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon$$

where $d\left(\frac{V_{t+v}^{L}-A_{t+v}}{A_{t+v}}\right) = \frac{V_{t+v}^{L}-A_{t+v}}{A_{t+v}} - \frac{V_t^L-A_t}{A_t}$ denotes the v-perio change in the valuation ratio.

Table 14 shows results for the year following the strict LDR ($v = 1$). Columns 1 to 3 correspond to the estimation for the full sample of firms using cross-sectional (column 1), OLS (column 2) and fixed effect regressions (column 3). In all cases, the LDR dummy variable is negative and statistically significant. Furthermore, the magnitude of the coefficient estimate is similar and suggests that the value over cost spread decreases by 0.13 units in the year following the strict LDR. Columns 4 to 6 further investigate the impact of firm size and suggest that the finding is driven by medium sized and large firms, whereas for small companies no subsequent decrease in valuations can be detected in the data.

Table 15 presents regression estimates when focusing on broad LDRs and reveals similar findings: valuation ratios decrease in the year following the LDR. In the Appendix, we further show that the decrease in valuation ratios becomes even more pronounced when focusing on two year changes in the valuation ratio. Taken together, the findings suggest that valuation ratios decrease following the year of the LDR. To further distinguish between the market timing hypothesis and a rational decrease in valuation ratios due to the exercise of growth options, we turn to an investigation of subsequent abnormal returns for firms undertaking a LDR.

To this end, we merge our annual sample of Compustat data with monthly stock returns using the CRSP database. Monthly market returns, risk-free rates and returns of the book-to-market, size and momentum factors are obtained from Ken French's data library. Consistent with Fama and French (1993), accounting data for all fiscal yearends in calendar year $t-1$ are merged with returns for July of year t to June of year $t+1$, the book-to-market ratio is computed using market equity at the end of December for year $t-1$ and negative book-equity firms are dropped from the sample.

Each July of year t, we invest into firms that performed a LDR (strict or broad) in year $t-1$ and hold these stocks for a period of 12 months (until June of year $t+1$). We expect that if managers successfully timed the market, abnormal returns of such a trading strategy would be negative. Alternatively, if the documented decrease in valuation ratios is due to a reduction in risk (due to the exercise of growth opportunities), abnormal returns should be indistinguishable from zero.

Table 16 presents monthly value-weighted excess returns of a trading strategy investing in firms that either performed a strict (Panel A) or a broad (Panel B) LDR. Excess returns are computed relative to three competing asset pricing models: the market-model, the Fama and French three-factor model and the four factor model which also accounts for momentum.

Beginning with strict LDRs, we can see that abnormal returns are indistinguishable from zero for all three asset pricing models. These findings are difficult to square with successful market timing efforts of management. Moreover, accounting for size and value as additional risk factors further reduces the absolute value of abnormal returns, which is consistent with the argument that variations in growth opportunities explain the decrease in valuation ratios of LDR firms. Turning to broad LDRs, abnormal returns are negative (and statistically significant) under the market model but the inclusion of size and value kills the statistical significance of the abnormal return.

All in all, our findings are difficult to square with the market timing hypothesis but are consistent with a rational decrease in valuation ratios of LDR firms due to the exericise of growth opportunities.

5 Conclusion

This paper investigates leverage decreasing recapitalizations and shows that their issue frequency is at par with that of leverage increasing recapitalizations. Irrespective of whether LDRs firms actively retire debt or increase cash, we find that as much as half of all cases reflect financially distressed firms.

We then investigate whether the decision to undertake LDRs reflect market timing efforts. While LDRs occur during periods of high equity valuations, our findings suggest that they are more likely driven by the existence (and subsequent exercise) of growth options. Firms increase investment rates in periods following the LDR, valuation ratios decrease but abnormal stock returns are statistically indifferent from zero in the context of an asset pricing model that controls for the existence of growth opportunities.

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Figure 1: **Frequency of leverage decreasing recapitalizations**

The figure displays the relative yearly frequency of leverage decreasing recapitalizations (LDRs) using both the strict and the broad definition of LDRs. The strict definition only involves the liability side of a firm's balance sheet and consists of an equity issue and a simultaneous debt retirement. The broad definition introduces cash holdings and consists of a simultaneous equity issue and a combination of debt retirement and cash hoarding. LDRs are measured in excess of a size threshold which is set to 5% of assets (net assets) under the strict (broad) definition. Exact variable definitions are given in Appendix Table 1. Total sample of 14,321 firms and 147,256 firm-years.

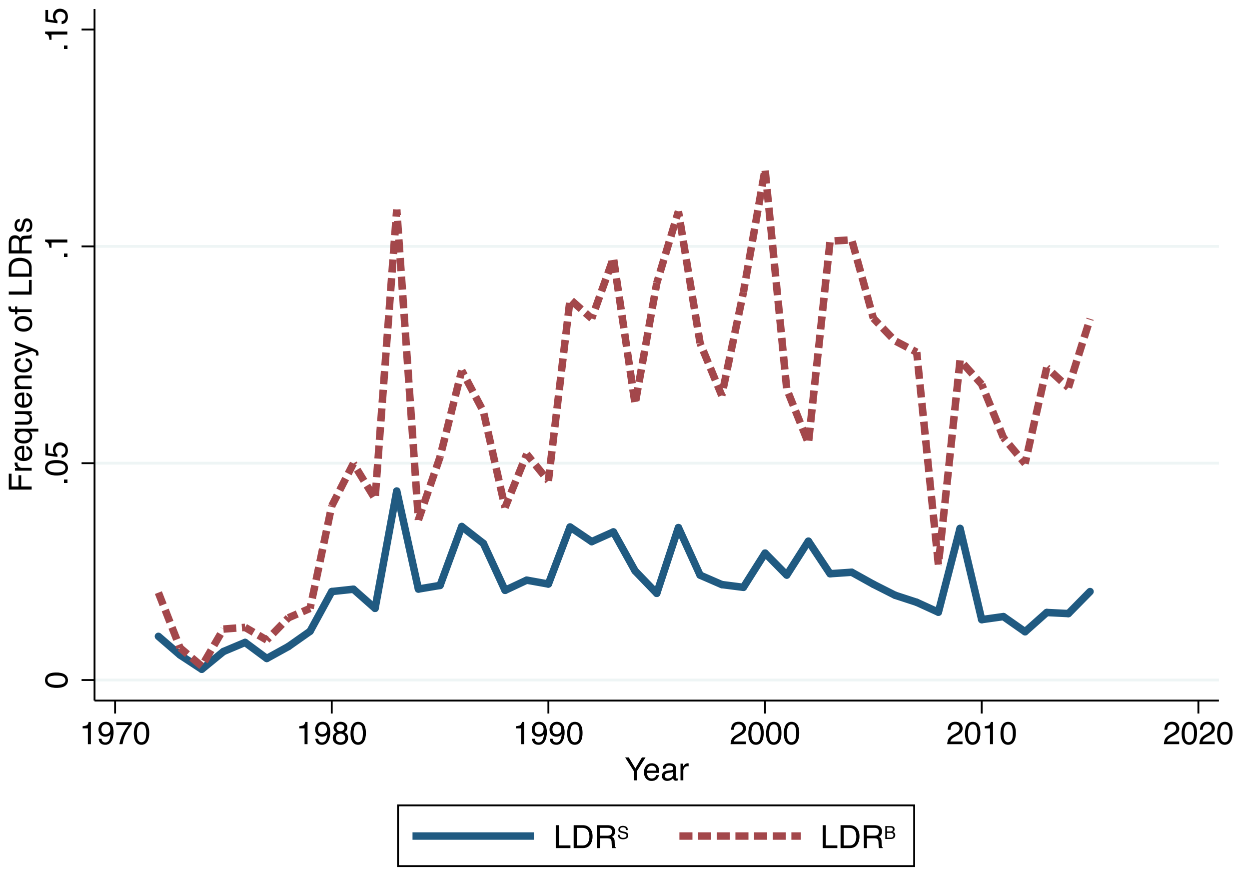

Table 1: **Sample selection**

Sample restriction	Observations	Firms
A: Annual CRSP/Compustat (CCM) sample, 1972-2015		
Initial CCM sample	266545	24178
U.S. domiciled firms only	-23297	-2367
Nongovernmental, industrial firms only[a]	-70626	-5889
No multiple annual observations	-479	-18
No missing information on book value of assets	-1692	0
Consistent cash-flow statement data[b]	-1465	-288
Consistent other financial statement data[c]	-4785	-127
Lagged information	-16942	-1168
Final Sample	147259	14321

[a] Eliminates utilities (SIC codes 4899-5000), financial firms (SIC codes 5999-7000), and government entities (SIC codes greater than 8999).

[c] For cash-flow data consistency, we first set missing entries for items in the cash flow statement to zero and then drop observations in case total sources or uses of funds equal zero or deviate by more than 1% from each other.

[d] For balance sheet data consistency, we require non-missing data for the market value of the firm's equity (prcc_f × csho), Tobin's Q (dltt + dlc + prcc_f × csho)/at), total debt (dltt + dlc), cash holdings (che), property plant and equipment (ppent) and operating profits (oibdp). We further drop observations in case the book leverage ratio is outside the unit interval or cash holdings are negative. The last criterium is not applied to the quarterly dataset (given that consistency is ensured at the annual level).

Table 2: **Selected firm characteristics**

The table displays firm characteristics for the full sample of firms and two subsamples: firms undertaking a leverage decreasing recapitalization (LDR) under the strict and the broad definition. The strict definition only involves the liability side of a firm's balance sheet and consists of an equity issue and a simultaneous debt retirement. The broad definition introduces cash holdings and consists of a simultaneous equity issue and a combination of debt retirement and cash hoarding. LDRs are measured in excess of a size threshold which is set to 5% of assets (net assets) under the strict (broad) definition. The table displays average and median values of the following variables: the market leverage ratio (L), the book leverage ratio (BL), the fraction of all-equity financed firms (AE), the fraction of almost all-equity financed firms (AAE), the cash ratio (CR), the ratio of operating profits to assets ($Prof$), the market-to-book ratio (Q), the logarithm of assets ($Size$), the ratio of capital expenditures to assets ($Capex$) and the ratio of R&D expenditures to assets ($R\&D$). Exact variable definitions are given in Appendix Table 1. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample		Strict LDRs		Broad LDRs	
	Average	Median	Average	Median	Average	Median
L	0.25	0.19	0.20	0.12	0.10	0.02
BL	0.23	0.21	0.25	0.21	0.13	0.06
AE	0.13	0.00	0.06	0.00	0.23	0.00
AAE	0.29	0.00	0.31	0.00	0.62	1.00
CR	0.16	0.08	0.18	0.09	0.39	0.33
$Prof$	0.07	0.12	-0.09	0.06	-0.08	0.03
Q	1.55	1.04	2.35	1.53	3.19	2.32
$Size$	4.85	4.70	3.94	3.84	3.98	3.95
$Capex$	0.07	0.04	0.07	0.04	0.06	0.04
$R\&D$	0.05	0.00	0.09	0.00	0.11	0.05
N	147259	147259	3238	3238	9292	9292

Table 3: **The evolution of leverage, profitability and investment**

The table displays the evolution of leverage, profitability and investment in the years surrounding leverage decreasing recapitalizations (strict LDRs in Panel A; broad LDRs in Panel B). The strict definition only involves the liability side of a firm's balance sheet and consists of an equity issue and a simultaneous debt retirement. The broad definition introduces cash holdings and consists of a simultaneous equity issue and a combination of debt retirement and cash hoarding. LDRs are measured in excess of a size threshold which is set to 5% of assets (net assets) under the strict (broad) definition. The table displays average alues of the following variables: the market leverage ratio (L), the book leverage ratio (BL), the cash ratio (CR), the ratio of operating profits to assets ($Prof$), the market-to-book ratio (Q), the ratio of capital expenditures to assets ($Capex$) and the ratio of R&D expenditures to assets ($R\&D$). Exact variable definitions are given in Appendix Table 1. Total sample of 14,321 firms and 147,256 firm-years.

	-2	-1	0	1	2
Panel A: Strict LDRs					
L	0.28	0.31	0.20	0.21	0.23
BL	0.33	0.40	0.25	0.25	0.25
CR	0.17	0.15	0.18	0.17	0.17
$Prof$	-0.06	-0.08	-0.09	-0.04	-0.02
Q	2.17	2.21	2.35	2.15	2.00
$Capex$	0.09	0.08	0.07	0.08	0.08
$R\&D$	0.08	0.09	0.09	0.08	0.07
N	2829	3238	3238	2725	2389
Panel B: Broad LDRs					
L	0.16	0.15	0.10	0.12	0.14
BL	0.19	0.21	0.13	0.15	0.17
CR	0.31	0.29	0.39	0.33	0.31
$Prof$	-0.12	-0.13	-0.08	-0.10	-0.09
Q	2.87	3.38	3.19	2.75	2.48
$Capex$	0.07	0.07	0.06	0.07	0.07
$R\&D$	0.14	0.14	0.11	0.12	0.12
N	7795	9292	9292	8308	7344

Table 4: **Synthetic credit ratings**

The table displays the number and fraction of credit ratings for the full sample of firms and two subsamples: firms performing strict or broad LDRs. The strict definition only involves the liability side of a firm's balance sheet and consists of an equity issue and a simultaneous debt retirement. The broad definition introduces cash holdings and consists of a simultaneous equity issue and a combination of debt retirement and cash hoarding. LDRs are measured in excess of a size threshold which is set to 5% of assets (net assets) under the strict (broad) definition. The implied credit rating is based on the firm-specific interest coverage ratio (ICR, defined as the ratio of earnings before interest and taxes (EBIT) to the level of interest payments) which is mapped into credit ratings using Damodaran's mapping table (see Appendix Table 2). Exact variable definitions are given in Appendix Table 1. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample		Strict LDRs		Broad LDRs	
Rating	Obs.	Fraction	Obs.	Fraction	Obs.	Fraction
D	33,673	0.23	1,624	0.50	3,756	0.40
C	2,800	0.02	55	0.02	76	0.01
CC	5,094	0.03	118	0.04	172	0.02
CCC	3,285	0.02	62	0.02	93	0.01
B-	5,901	0.04	129	0.04	199	0.02
B-	5,566	0.04	102	0.03	141	0.02
B+	5,278	0.04	96	0.03	151	0.02
BB	4,558	0.03	99	0.03	146	0.02
BB+	4,139	0.03	85	0.03	138	0.01
BBB	3,776	0.03	67	0.02	128	0.01
A-	9,221	0.06	146	0.05	276	0.03
A	6,651	0.05	121	0.04	224	0.02
A+	6,032	0.04	81	0.03	205	0.02
AA	6,190	0.04	90	0.03	222	0.02
AAA	45,092	0.31	363	0.11	3,365	0.36
// N	147,256	1	3,238	1	9,292	1

Table 5: **Leverage decreasing recapitalizations (LDRs), leverage and firm characteristics.**

The table categorizes LDR firms based on its lagged market leverage ratio. It assigns LDR firms into ten different groups using the decile cutoff values of the lagged market leverage ratio distribution for the full sample of firms. Panel A displays information for strict LDR firms, Panel B for broad LDR firms. The strict definition only involves the liability side of a firm's balance sheet and consists of an equity issue and a simultaneous debt retirement. The broad definition introduces cash holdings and consists of a simultaneous equity issue and a combination of debt retirement and cash hoarding. LDRs are measured in excess of a size threshold which is set to 5% of assets (net assets) under the strict (broad) definition. The table displays average of the following variables: the market leverage ratio (L), the book leverage ratio (BL), the cash ratio (CR), the ratio of operating profits to assets ($Prof$), the market-to-book ratio (Q), the logarithm of assets ($Size$), the ratio of capital expenditures to assets ($Capex$) and the ratio of R&D expenditures to assets ($R\&D$). Exact variable definitions are given in Appendix Table 1. Total sample of 14,321 firms and 147,256 firm-years.

Deciles (L_{t-1})	N	Fraction	Period $t-1$		Period t									
			L	CR	L	BL	CR	$Prof$	Q	$Size$	$Capex$	$R\&D$	NEI	NDR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Strict LDRs														
1 (= low L)	n.A.		n.A.	n.A.	n.A.	n.A.	n.A.	n.A.	n.A.	n.A.	n.A.	n.A.	n.A.	n.A.
2	18	0.01	0.01	0.44	0.02	0.11	0.41	-0.64	6.85	1.97	0.08	0.18	0.49	-0.08
3	256	0.08	0.03	0.36	0.04	0.14	0.37	-0.45	5.25	2.78	0.07	0.22	0.46	-0.11
4	467	0.14	0.08	0.28	0.06	0.16	0.31	-0.28	3.79	3.23	0.07	0.17	0.39	-0.15
5	477	0.15	0.14	0.18	0.10	0.19	0.22	-0.12	2.65	3.63	0.08	0.10	0.31	-0.15
6	401	0.12	0.21	0.14	0.13	0.21	0.18	-0.06	2.15	3.81	0.08	0.09	0.27	-0.16
7	401	0.12	0.29	0.10	0.18	0.25	0.13	0.00	1.78	4.09	0.07	0.05	0.24	-0.16
8	411	0.13	0.40	0.08	0.24	0.29	0.11	0.03	1.56	4.51	0.07	0.04	0.21	-0.16
9	418	0.13	0.53	0.06	0.34	0.36	0.09	0.04	1.24	4.55	0.06	0.02	0.18	-0.17
10 (= high L)	389	0.12	0.75	0.05	0.49	0.43	0.08	0.05	1.01	4.72	0.06	0.01	0.17	-0.19
Panel B: Broad LDRs														
1 (= low L)	1794	0.19	0.00	0.54	0.01	0.01	0.63	-0.17	4.38	3.88	0.04	0.17	0.46	-0.29
2	1285	0.14	0.00	0.47	0.01	0.03	0.56	-0.14	4.44	3.99	0.05	0.15	0.45	-0.27
3	1503	0.16	0.03	0.34	0.03	0.07	0.47	-0.14	3.93	3.64	0.06	0.14	0.44	-0.26
4	1120	0.12	0.07	0.22	0.05	0.13	0.35	-0.10	3.26	3.62	0.07	0.11	0.38	-0.23
5	841	0.09	0.14	0.17	0.09	0.17	0.28	-0.05	2.51	3.92	0.07	0.09	0.31	-0.21
6	662	0.07	0.21	0.13	0.12	0.19	0.22	0.00	2.08	4.02	0.08	0.07	0.28	-0.21
7	564	0.06	0.29	0.10	0.18	0.25	0.17	0.02	1.83	4.19	0.07	0.05	0.25	-0.20
8	561	0.06	0.40	0.08	0.24	0.28	0.15	0.05	1.58	4.58	0.07	0.03	0.21	-0.19
9	517	0.06	0.53	0.06	0.33	0.35	0.12	0.04	1.31	4.55	0.07	0.02	0.19	-0.21
10 (= high L)	445	0.05	0.75	0.05	0.49	0.43	0.09	0.05	1.00	4.77	0.06	0.01	0.17	-0.21

Table 6: **Strict LDRs and equity valuations**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+1}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, BL is the book leverage ratio and LDR^S is a dummy variable equal to one in case the firm simultaneously issues net equity and retires net debt for at least 5% of assets. Results are displayed for the full sample of firms using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). In addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	-0.613*	-1.078**	-0.320**	-1.804**	-2.293**	3.627**
	(0.302)	(0.052)	(0.094)	(0.190)	(0.426)	(0.470)
$R\&D$	5.401**	4.560**	4.720**	3.168**	3.435**	5.204**
	(0.217)	(0.096)	(0.204)	(0.341)	(0.503)	(0.648)
$Capex$	1.969**	2.099**	2.622**	2.096**	1.951**	0.139
	(0.164)	(0.067)	(0.128)	(0.189)	(0.181)	(0.165)
BL	-0.773**	-0.853**	-0.455**	0.01	-0.812**	-0.999**
	(0.059)	(0.021)	(0.038)	(0.048)	(0.078)	(0.092)
LDR	0.554**	0.551**	0.354**	0.345**	0.412**	0.459**
	(0.051)	(0.036)	(0.031)	(0.064)	(0.067)	(0.096)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDR	2,725	2,725	2,725	903	1,108	714
R^2	0.26	0.29	0.14	0.27	0.35	0.25
N	131,830	131,830	131,830	43,504	43,505	44,823

Table 7: **Broad LDRs and equity valuations**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+1}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, NBL is the net book leverage and LDR^B is a dummy variable equal to one in case the firm simultaneously issues net equity and uses a combination of net debt retirement and cash hoarding for at least 5% of assets. Results are displayed for the full sample of firms using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). In addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	-0.37	-0.708**	-0.172	-1.720**	-2.095**	3.646**
	(0.277)	(0.052)	(0.093)	(0.176)	(0.375)	(0.366)
$R\&D$	4.769**	3.705**	4.576**	3.043**	3.116**	4.066**
	(0.236)	(0.098)	(0.204)	(0.330)	(0.472)	(0.575)
$Capex$	2.263**	2.288**	2.767**	2.135**	2.240**	0.739**
	(0.142)	(0.066)	(0.126)	(0.185)	(0.180)	(0.143)
NBL	-0.833**	-0.858**	-0.654**	-0.185**	-0.751**	-1.228**
	(0.041)	(0.016)	(0.029)	(0.043)	(0.067)	(0.075)
LDR	0.845**	0.959**	0.745**	0.485**	0.737**	0.695**
	(0.054)	(0.026)	(0.023)	(0.067)	(0.058)	(0.066)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDRs	8,308	8,308	8,308	1,899	3,742	2,667
R^2	0.30	0.33	0.17	0.28	0.37	0.33
N	131,832	131,832	131,832	43,504	43,505	44,823

Table 8: **Strict LDRs, distance to default and equity valuations**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+1}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, BL is the book leverage ratio and LDR^S is a dummy variable equal to one in case the firm simultaneously issues net equity and retires net debt for at least 5% of assets. Results are displayed using Fama-MacBeth regressions for different subsamples. Columns (1) to (3) correspond to subsamples consisting of firms with low (column 4), medium (column 5) and high leverage (column 6). The categorization is based using the tercile cutoff values of the lagged market leverage ratio distribution for the full sample of firms. Columns (4) to (6) present results separately firms with different magnitudes of excess leverage: we first estimate the lagged leverage target of each firm and then categorize each firm as overe-levered in case the lagged market leverage ratios exceeds the estimated target by a positive (column 4), by at least 5 percentage points (column 5) or at least by 10 percentage points (column 6). Finally, columns (7) and (8) display results separately for firms with an implied junk and default credit rating. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Subsamples: L is			Subsamples: $L_{t-1} - L^*_{t-1} >$			Subsamples: Rating is	
	Low	Medium	High	0	0.05	0.1	Junk	Default
	FMB	FMB	FMB	FMB	FMB	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Prof$	-0.866*	-0.046	0.253*	-0.073	-0.155	0.024	-3.135**	-3.564**
	(0.401)	(0.182)	(0.102)	(0.175)	(0.161)	(0.151)	(0.204)	(0.236)
$R\&D$	5.016**	3.153**	2.456**	5.254**	5.320**	4.538**	3.804**	4.047**
	(0.452)	(0.235)	(0.196)	(0.300)	(0.317)	(0.358)	(0.305)	(0.571)
$Capex$	1.798**	0.687**	0.688**	1.353**	1.264**	1.038**	2.212**	2.625**
	(0.298)	(0.119)	(0.079)	(0.116)	(0.136)	(0.136)	(0.178)	(0.310)
BL	6.201**	3.038**	0.958**	-0.503**	-0.034	0.440**	0.381**	0.120
	(0.405)	(0.091)	(0.025)	(0.077)	(0.083)	(0.073)	(0.038)	(0.072)
LDR	0.570**	0.536**	0.228**	0.468**	0.323**	0.178**	0.373**	0.489**
	(0.191)	(0.061)	(0.036)	(0.071)	(0.081)	(0.064)	(0.053)	(0.091)
ΔX_t	yes	yes	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes	yes	yes
Year fixed effects	no	no	no	no	no	no	no	no
LDRs	333	1,209	1,183	1,044	737	484	1,914	1,219
R^2	0.23	0.30	0.23	0.26	0.26	0.24	0.39	0.37
N	43,504	43,505	44,823	43,221	25,615	15,011	61,036	27,401

Table 9: **Broad LDRs, distance to default and equity valuations**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+1}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, NBL is the net book leverage and LDR^B is a dummy variable equal to one in case the firm simultaneously issues net equity and uses a combination of net debt retirement and cash hoarding for at least 5% of assets. Results are displayed using Fama-MacBeth regressions for different subsamples. Columns (1) to (3) correspond to subsamples consisting of firms with low (column 4), medium (column 5) and high leverage (column 6). The categorization is based using the tercile cutoff values of the lagged market leverage ratio distribution for the full sample of firms. Columns (4) to (6) present results separately firms with different magnitudes of excess leverage: we first estimate the lagged leverage target of each firm and then categorize each firm as overe-levered in case the lagged market leverage ratios exceeds the estimated target by a positive (column 4), by at least 5 percentage points (column 5) or at least by 10 percentage points (column 6). Finally, columns (7) and (8) display results separately for firms with an implied junk and default credit rating. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Subsamples: L is			Subsamples: $L_{t-1} - L^*_{t-1} >$			Subsamples: Rating is	
	Low	Medium	High	0	0.05	0.1	Junk	Default
	FMB	FMB	FMB	FMB	FMB	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Prof$	-0.682	-0.229	0.235*	0.105	0.029	0.191	-2.838**	-3.267**
	(0.409)	(0.209)	(0.105)	(0.161)	(0.160)	(0.147)	(0.196)	(0.221)
$R\&D$	5.495**	3.802**	2.654**	4.467**	4.679**	4.129**	3.566**	3.584**
	(0.572)	(0.290)	(0.227)	(0.269)	(0.305)	(0.338)	(0.303)	(0.518)
$Capex$	3.238**	1.133**	0.769**	1.620**	1.406**	1.053**	2.296**	2.841**
	(0.333)	(0.145)	(0.082)	(0.116)	(0.115)	(0.129)	(0.170)	(0.291)
BL	-0.444**	1.097**	0.685**	-0.708**	-0.375**	0.015	-0.078	-0.356**
	(0.093)	(0.053)	(0.021)	(0.060)	(0.075)	(0.082)	(0.041)	(0.077)
LDR	1.322**	0.547**	0.294**	0.832**	0.636**	0.385**	0.748**	0.947**
	(0.185)	(0.060)	(0.038)	(0.078)	(0.088)	(0.070)	(0.074)	(0.128)
ΔX_t	yes	yes	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes	yes	yes
Year fixed effects	no	no	no	no	no	no	no	no
LDRs	4,500	2,281	1,527	2,169	1,208	700	4,218	3,177
R^2	0.22	0.21	0.19	0.31	0.29	0.24	0.41	0.39
N	43,504	43,505	44,823	43,221	25,615	15,011	61,036	27,401

Table 10: **Strict LDRs, covenant violations and equity valuations**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+1}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, BL is the book leverage ratio and LDR^S is a dummy variable equal to one in case the firm simultaneously issues net equity and retires net debt for at least 5% of assets. The table focuses on the subsample of firms that violated financial covenants during the period 1996 to 2008. The identification of financial covenant violations is obtained from Nini et al. (2009). Results are displayed for the full sample of firms that violated covenants using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). In addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 2,319 firms and 4,944 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	-0.787	-1.054**	-0.678*	-0.841**	-2.657**	-0.621
	(0.386)	(0.235)	(0.272)	(0.219)	(0.531)	(0.598)
$R\&D$	4.410**	4.360**	4.511**	1.958**	3.074**	4.624**
	(0.450)	(0.368)	(0.451)	(0.387)	(0.881)	(1.118)
$Capex$	2.182**	2.420**	2.525**	2.262**	2.570**	1.671**
	(0.485)	(0.291)	(0.382)	(0.697)	(0.624)	(0.444)
BL	-0.306**	-0.264**	-0.252*	0.413**	0.163	-0.888**
	(0.063)	(0.090)	(0.111)	(0.070)	(0.141)	(0.195)
LDR	0.478**	0.422**	0.382**	0.192	0.240*	0.220
	(0.140)	(0.129)	(0.111)	(0.137)	(0.105)	(0.165)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDR	166	166	166	52	60	54
R^2	0.23	0.24	0.13	0.20	0.31	0.28
N	4,944	4,944	4,944	1,631	1,632	1,681

Table 11: **Broad LDRs, covenant violations and equity valuations**

TThe table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+1}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, NBL is the net book leverage and LDR^B is a dummy variable equal to one in case the firm simultaneously issues net equity and uses a combination of net debt retirement and cash hoarding for at least 5% of assets. The table focuses on the subsample of firms that violated financial covenants during the period 1996 to 2008. The identification of financial covenant violations is obtained from Nini et al. (2009). Results are displayed for the full sample of firms that violated covenants using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). In addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 2,319 firms and 4,944 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	-0.454	-0.774**	-0.498	-0.806**	-2.345**	-0.090
	(0.388)	(0.238)	(0.272)	(0.233)	(0.549)	(0.578)
$R\&D$	4.008**	3.961**	4.129**	1.925**	3.212**	3.728**
	(0.382)	(0.360)	(0.445)	(0.397)	(0.928)	(1.200)
$Capex$	2.127**	2.318**	2.497**	2.143**	2.408**	1.635**
	(0.463)	(0.289)	(0.376)	(0.538)	(0.618)	(0.414)
BL	-0.430**	-0.395**	-0.418**	0.272**	0.004	-0.866**
	(0.081)	(0.073)	(0.093)	(0.072)	(0.130)	(0.187)
LDR	0.874**	0.897**	0.737**	0.349**	0.564**	0.775**
	(0.149)	(0.103)	(0.096)	(0.098)	(0.166)	(0.155)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDR	329	329	329	71	115	143
R^2	0.26	0.28	0.15	0.21	0.32	0.31
N	4,944	4,944	4,944	1,631	1,632	1,681

Table 12: **Strict LDRs and the exercise of growth options**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{dCapex_{t+v}}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \eta\frac{dX_t}{A_t} + \phi\frac{dX_{t+v}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon$$

where $dCapex_{t+v}$ denotes the change in capital expenditures ($capex$), A is the book value of assets and $Prof$, RD denote the ratios of $prof$, rd to book assets (A). The compact notation dX_t denote the one year lag change for the three variables $prof$, rd and $capex$. The variable dX_{t+v} denotes the v year lead change for the two variables $prof$, rd. Finally, BL is the book leverage ratio and LDR^S is a dummy variable equal to one in case the firm simultaneously issues net equity and retires net debt for at least 5% of assets. Columns 1 to 3 display results over the subsequent year ($v = 1$), columns 4 to 6 over two years ($v = 2$). Results are based on cross-sectional Fama-MacBeth regressions. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	$v = 1$			$v = 2$		
				Small	Medium	Large
	FMB	FMB	FMB	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	0.032**	0.033**	0.032**	0.039**	0.040**	0.037**
	(0.005)	(0.006)	(0.005)	(0.009)	(0.010)	(0.003)
$R\&D$	-0.01	0.001	0.026**	-0.038**	0.018	0.050**
	(0.008)	(0.008)	(0.009)	(0.012)	(0.014)	(0.004)
BL	-0.001	-0.003	0.001	0.007	0.002	0.009*
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.013)
LDR	0.019**	0.019**	0.019**	0.024**	0.026**	0.025**
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	
ΔX_t	yes	yes	$prof$	yes	yes	$prof$
ΔX_{t+1}	yes	$prof$	$prof$	yes	$prof$	$prof$
Year fixed effects	no	no	no	no	no	no
LDRs	2,725	2,725	2,725	2,389	2,389	2,389
R^2	0.07	0.05	0.03	0.11	0.08	0.06
N	131,832	131,832	131,832	118,239	118,239	118,239

Table 13: **Broad LDRs and the exercise of growth options**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{dCapex_{t+v}}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \eta\frac{dX_t}{A_t} + \phi\frac{dX_{t+v}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon$$

where $dCapex_{t+v}$ denotes the change in capital expenditures ($capex$), A is the book value of assets and $Prof$, RD denote the ratios of $prof$, rd to book assets (A). The compact notation dX_t denote the one year lag change for the three variables $prof$, rd and $capex$. The variable dX_{t+v} denotes the v year lead change for the two variables $prof$, rd. Finally, NBL is the net book leverage and LDR^B is a dummy variable equal to one in case the firm simultaneously issues net equity and uses a combination of net debt retirement and cash hoarding for at least 5% of assets. Columns 1 to 3 display results over the subsequent year ($v = 1$), columns 4 to 6 over two years ($v = 2$). Results are based on cross-sectional Fama-MacBeth regressions. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	$v = 1$			$v = 2$		
	FMB (1)	FMB (2)	FMB (3)	FMB (4)	FMB (5)	FMB (6)
$Prof$	0.035**	0.037**	0.035**	0.041**	0.044**	0.040**
	(0.005)	(0.005)	(0.005)	(0.009)	(0.009)	(0.002)
$R\&D$	-0.013	-0.005	0.018*	-0.039**	0.011	0.041*
	(0.008)	(0.008)	(0.009)	(0.013)	(0.014)	(0.003)
BL	-0.002	-0.004**	-0.000	0.003	-0.001	0.005
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.013)
LDR	0.024**	0.026**	0.025**	0.027**	0.034**	0.032**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	
ΔX_t	yes	yes	$prof$	yes	yes	$prof$
ΔX_{t+1}	yes	$prof$	$prof$	yes	$prof$	$prof$
Year fixed effects	no	no	no	no	no	no
LDRs	8,308	8,308	8,308	2,389	2,389	2,389
R^2	0.07	0.06	0.04	0.12	0.09	0.07
N	131,832	131,832	131,832	118,239	118,239	118,239

Table 14: **Strict LDRs and change in equity valuations**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$d\left(\frac{V^L_{t+1} - A_{t+1}}{A_{t+1}}\right) = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+v}}{A_t} + \gamma BL_{t-1} + \delta LDR^S_t + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets, $d\left(\frac{V^L_{t+1}-A_{t+1}}{A_{t+1}}\right) = \frac{V^L_{t+1}-A_{t+1}}{A_{t+1}} - \frac{V^L_t - A_t}{A_t}$ denotes the one year change in the valuation ratio, and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, BL is the book leverage ratio and LDR^S is a dummy variable equal to one in case the firm simultaneously issues net equity and retires net debt for at least 5% of assets. Results are displayed for the full sample of firms using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). In addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	0.146	0.263**	0.261**	0.135	0.701**	0.023
	(0.107)	(0.032)	(0.031)	(0.069)	(0.168)	(0.218)
$R\&D$	-0.125	0.184**	0.174**	0.243	0.377	0.027
	(0.195)	(0.064)	(0.064)	(0.194)	(0.231)	(0.253)
$Capex$	-0.633**	-0.646**	-0.935**	-0.464**	-0.633**	-0.500**
	(0.095)	(0.042)	(0.049)	(0.126)	(0.120)	(0.113)
BL	0.175**	0.188**	0.196**	-0.061	0.190**	0.327**
	(0.035)	(0.013)	(0.014)	(0.034)	(0.039)	(0.051)
LDR	-0.139**	-0.151**	-0.151**	-0.082	-0.139**	-0.123**
	(0.032)	(0.024)	(0.024)	(0.046)	(0.047)	(0.037)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDR	2,725	2,725	2,725	903	1,108	714
R^2	0.03	0.09	0.09	0.02	0.05	0.06
N	131,832	131,832	131,832	43,504	43,505	44,823

Table 15: **Broad LDRs and change in equity valuations**

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$d\left(\frac{V^L_{t+1} - A_{t+1}}{A_{t+1}}\right) = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+v}}{A_t} + \gamma NBL_{t-1} + \delta LDR^B_t + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets, $d\left(\frac{V^L_{t+1}-A_{t+1}}{A_{t+1}}\right) = \frac{V^L_{t+1}-A_{t+1}}{A_{t+1}} - \frac{V^L_t - A_t}{A_t}$ denotes the one year change in the valuation ratio, and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+1}) to denote the one year lag (lead) change for the three variables $prof$, rd and $capex$. Finally, NBL is the net book leverage and LDR^B is a dummy variable equal to one in case the firm simultaneously issues net equity and uses a combination of net debt retirement and cash hoarding for at least 5% of assets. Results are displayed for the full sample of firms using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). In addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	0.092	0.172**	0.185**	0.163*	0.657**	-0.017
	(0.099)	(0.032)	(0.031)	(0.064)	(0.156)	(0.183)
$R\&D$	-0.044	0.327**	0.295**	0.2	0.328	0.226
	(0.181)	(0.065)	(0.066)	(0.188)	(0.223)	(0.226)
$Capex$	-0.686**	-0.672**	-0.980**	-0.459**	-0.647**	-0.636**
	(0.093)	(0.042)	(0.048)	(0.127)	(0.118)	(0.108)
NBL	0.142**	0.148**	0.169**	-0.048	0.100**	0.315**
	(0.031)	(0.010)	(0.011)	(0.028)	(0.033)	(0.050)
LDR	-0.206**	-0.289**	-0.296**	0.024	-0.147**	-0.227**
	(0.036)	(0.017)	(0.018)	(0.042)	(0.037)	(0.038)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDR	8,308	8,308	8,308	1,899	3,742	2,667
R^2	0.04	0.10	0.10	0.02	0.05	0.08
N	131,832	131,832	131,832	43,504	43,505	44,823

Table 16: **LDRs and subsequent abnormal returns**

The table presents monthly value-weighted abnormal returns (α) of a strategy investing into strict LDR firms (Panel A) or broad LDR firms (Panel B). Abnormal returns are estimated relative to the market-model [includes the market factor (MKT)], the the Fama and French three factor model [includes the market factor (MKT), the size factor small-minus large (SMB) and the value factor high-minus-low (HML)] and the four factor model [includes the 3 FF factor plus momentum (MOM)]. Detailed variable definitions are given in Appendix Table 1.

	Market Model		3 Factor Model		4 Factor Model	
	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.
Panel A: Strict LDRs						
α	-0.24	-1.14	-0.17	-0.83	-0.27	-1.32
MKT	1.24***	20.72	1.10***	16.76	1.13***	17.15
SMB			0.49***	5.58	0.48***	5.74
HML			-0.30**	-2.64	-0.26*	-2.30
MOM					0.12	1.76
N	522		522		522	
R^2	0.57		0.62		0.63	
Panel B: Broad LDRs						
α	-0.41*	-2.13	-0.18	-1.09	-0.15	-0.88
MKT	1.40***	27.51	1.21***	25.57	1.21***	26.31
SMB			0.46***	6.58	0.46***	6.48
HML			-0.62***	-7.94	-0.64***	-8.13
MOM					-0.03	-0.75
N	522		522		522	
R^2	0.68		0.78		0.78	

Appendix Table 1: **Yearly frequency of recapitalizations for U.S. public industrial firms, 1972 - 2015**

The table displays the frequency of recapitalizations for U.S. public industrial firms, 1972 - 2015. Column 1 displays the number of yearly observations, columns 2 and 3 the relative frequencies of leverage decreasing recapitalizations (LDRs) and columns 4 and 5 those of leverage increasing recapitalizations (LIRs). Both types of recapitalizations (LDRs and LIRs) are computed under a strict and a broad definition. The strict definition only involves the liability side of a firm's balance sheet and consists of an equity issue and a simultaneous debt retirement (LDR) or a debt issue and a simultaneous equity retirement (LIR). The broad definition introduces cash holdings and consists of a simultaneous equity issue and a combination of debt retirement and cash hoarding (LDR) or a combination of a debt issue and cash payout and a simultaneous equity retirement (LIR). LDRs and LIRs are measured in excess of a size threshold which is set to 5% of assets (net assets) under the strict (broad) definition. Exact variable definitions are given in Appendix Table 1. Total sample of 14,321 firms and 147,256 firm-years.

Year	Firms	LDR		LIR	
		Strict	Broad	Strict	Broad
	(1)	(2)	(3)	(4)	(5)
1972	1687	0.01	0.02	0.01	0.01
1973	2428	0.01	0.01	0.01	0.02
1974	2824	0.00	0.00	0.01	0.02
1975	2893	0.01	0.01	0.00	0.01
1976	2883	0.01	0.01	0.00	0.01
1977	2819	0.00	0.01	0.01	0.02
1978	2717	0.01	0.01	0.01	0.02
1979	2846	0.01	0.02	0.01	0.02
1980	3039	0.02	0.04	0.01	0.02
1981	3104	0.02	0.05	0.01	0.02
1982	3328	0.02	0.04	0.01	0.02
1983	3373	0.04	0.11	0.01	0.01
1984	3575	0.02	0.04	0.02	0.03
1985	3575	0.02	0.05	0.02	0.03
1986	3531	0.04	0.07	0.02	0.03
1987	3714	0.03	0.06	0.02	0.04
1988	3771	0.02	0.04	0.02	0.04
1989	3647	0.02	0.05	0.02	0.03
1990	3614	0.02	0.05	0.02	0.03
1991	3599	0.04	0.09	0.01	0.02
1992	3635	0.03	0.08	0.01	0.02
1993	3894	0.03	0.10	0.01	0.02
1994	4211	0.03	0.06	0.01	0.03
1995	4403	0.02	0.09	0.01	0.02
1996	4608	0.04	0.11	0.01	0.03
1997	4878	0.02	0.08	0.02	0.03
1998	4679	0.02	0.07	0.03	0.05
1999	4351	0.02	0.09	0.02	0.05
2000	4203	0.03	0.12	0.02	0.03
2001	4009	0.02	0.07	0.01	0.03
2002	3716	0.03	0.05	0.01	0.03
2003	3468	0.02	0.10	0.02	0.03
2004	3340	0.02	0.10	0.02	0.03
2005	3261	0.02	0.08	0.02	0.05
2006	3171	0.02	0.08	0.03	0.07
2007	3069	0.02	0.08	0.05	0.09
2008	3005	0.02	0.03	0.04	0.10
2009	2861	0.03	0.07	0.01	0.02
2010	2728	0.01	0.07	0.02	0.04
2011	2666	0.01	0.06	0.04	0.06
2012	2605	0.01	0.05	0.04	0.08
2013	2568	0.02	0.07	0.04	0.06
2014	2610	0.02	0.07	0.05	0.09
2015	2353	0.02	0.08	0.06	0.09
Avg.	3485	0.02	0.06	0.02	0.04

Appendix Table 2: **Mapping of interest coverage ratios to credit ratings:** The link is based on Damodaran (2017).

For large manufacturing firms			**For smaller and riskier firms**		
if interest coverage ratio is			if interest coverage ratio is		
greater than	up to	Rating is	greater than	up to	Rating is
-100000	0,20	D	-100000	0,50	D
0,2	0,65	C	0,5	0,80	C
0,65	0,80	CC	0,8	1,25	CC
0,8	1,25	CCC	1,25	1,50	CCC
1,25	1,50	B-	1,5	2,00	B-
1,5	1,75	B	2	2,50	B
1,75	2,00	B+	2,5	3,00	B+
2	2,50	BB	3	3,50	BB
2,5	3,00	BBB	3,5	4,50	BBB
3	4,25	A-	4,5	6,00	A-
4,25	5,50	A	6	7,50	A
5,5	6,50	A+	7,5	9,50	A+
6,5	8,50	AA	9,5	12,50	AA
8,5	100000	AAA	12,5	100000	AAA

Appendix Table 3: Robustness: Strict LDRs and equity valuations

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+2}}{A_t} + \gamma BL_{t-1} + \delta LDR_t^S + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A).The compact notation dX_t (dX_{t+2}) to denote the one year lag and two year lead change for the three variables $prof$, rd and $capex$. Finally, BL is the book leverage ratio and LDR^S is a dummy variable equal to one in case the firm simultaneously issues net equity and retires net debt for at least 5% of assets. Results are displayed for the full sample of firms using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). IIn addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	-0.557	-0.988**	-0.225*	-1.748**	-2.280**	3.726**
	(0.239)	(0.105)	(0.221)	(0.198)	(0.431)	(0.482)
$R\&D$	4.923**	4.267**	4.381**	2.818**	3.272**	4.572**
	(0.170)	(0.071)	(0.131)	(0.310)	(0.591)	(0.670)
$Capex$	1.822**	1.889**	2.310**	1.967**	1.864**	0.021
	(0.063)	(0.022)	(0.041)	(0.211)	(0.185)	(0.164)
BL	-0.824**	-0.898**	-0.488**	-0.053	-0.889**	-1.048**
	(0.056)	(0.039)	(0.032)	(0.042)	(0.080)	(0.101)
LDR	0.575**	0.567**	0.385**	0.352**	0.423**	0.427**
	(0.083)	(0.045)	(0.049)	(0.070)	(0.076)	(0.101)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDRs	2,389	2,389	2,389	765	981	643
R^2	0.26	0.30	0.14	0.27	0.36	0.24
N	118,239	118,239	118,239	39,019	39,019	40,201

Appendix Table 4: Robustness: Broad LDRs and equity valuations

The table presents estimates of the correlation between strict LDRs and equity valuations and is based on

$$\frac{V_t^L - A_t}{A_t} = \alpha + \beta_1 Prof_t + \beta_2 RD_t + \beta_3 Capex_t + \eta \frac{dX_t}{A_t} + \phi \frac{dX_{t+2}}{A_t} + \gamma NBL_{t-1} + \delta LDR_t^B + \epsilon$$

where V^L is the market value of the firm, A is the book value of assets and $Prof$, RD, $Capex$ denote the ratios of $prof$, rd and $capex$ to book assets (A). The compact notation dX_t (dX_{t+2}) to denote the one year lag and two year lead change for the three variables $prof$, rd and $capex$. Finally, NBL is the net book leverage and LDR^B is a dummy variable equal to one in case the firm simultaneously issues net equity and uses a combination of net debt retirement and cash hoarding for at least 5% of assets. Results are displayed for the full sample of firms using cross-sectional Fama-MacBeth regressions (column 1), OLS regression (column 2) and when accounting for firm fixed effects (column 3). In addition, the table displays results of Fama-MacBeth regressions for three subsamples consisting of firms: small (column 4), medium (column 5) and large firms (column 6). The categorization is based using the tercile cutoff values of the distribution of the market value of equity for the full sample of firms. All variables are winsorized at the 1(99) percent level or must lie between zero and one (leverage). Variable definitions are in Appendix table 1 in the paper. *, ** indicate significance at the 5% and 1% level, respectively. Total sample of 14,321 firms and 147,256 firm-years.

	Full Sample			Subsamples		
				Small	Medium	Large
	FMB	OLS	FE	FMB	FMB	FMB
	(1)	(2)	(3)	(4)	(5)	(6)
$Prof$	-0.308	-0.605**	-0.088	-1.659**	-2.058**	3.735**
	(0.242)	(0.108)	(0.221)	(0.186)	(0.377)	(0.372)
$R\&D$	4.357**	3.458**	4.287**	2.709**	2.975**	3.548**
	(0.152)	(0.070)	(0.129)	(0.299)	(0.542)	(0.588)
$Capex$	2.137**	2.117**	2.526**	2.021**	2.189**	0.609**
	(0.043)	(0.017)	(0.030)	(0.212)	(0.190)	(0.142)
BL	-0.856**	-0.886**	-0.682**	-0.219**	-0.808**	-1.260**
	(0.056)	(0.027)	(0.024)	(0.042)	(0.069)	(0.079)
LDR	0.866**	0.993**	0.782**	0.529**	0.779**	0.674**
	(0.085)	(0.045)	(0.049)	(0.062)	(0.061)	(0.071)
ΔX_t	yes	yes	yes	yes	yes	yes
ΔX_{t+1}	yes	yes	yes	yes	yes	yes
Year fixed effects	no	yes	yes	no	no	no
LDRs	7,344	7,344	7,344	1,649	3,342	2,353
R^2	0.30	0.33	0.17	0.28	0.38	0.33
N	118,239	118,239	118,239	39,019	39,019	40,201