Leverage, Excess Leverage, and Future Returns*

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Abstract

We examine the cross-sectional relation between leverage and future returns while considering the dynamic nature of capital structure and potentially delayed market reactions. Prior studies find a negative relation between leverage and returns that contradicts standard finance theory. We decompose leverage into target and excess components and find that excess leverage drives this negative relation. We also find that excess leverage predicts firm fundamentals, and that the negative relation between excess leverage and future returns can be explained by investors' failure to react promptly to the information in excess leverage about the firm's probability of distress and future asset growth.

Under static asset pricing theories such as the CAPM or the APT, financial leverage has a straight-forward effect on stocks' expected returns through betas on systematic factors. Controlling for the effects of leverage on factor sensitivities, one should find no relation between leverage and expected returns; controlling only for asset risk, the relation between leverage and expected returns should be positive because debt can magnify exposure to systematic risks. Notwithstanding the simplicity of these predictions, prior empirical studies find the opposite relation. In particular, Penman, Richardson, and Tuna (2007) document a negative association between leverage and future returns, after controlling for conventional risk proxies. A parallel literature on the pricing of distress risk (e.g., Dichev (1998), Griffin and Lemmon (2002), Vassalou and Xing (2004), Campbell, Hilscher, and Szilagyi (2008), Chava and Purnanandam (2009)) also in general finds that distress intensity is negatively related with future returns.[1]

The purpose of this study is to examine plausible mechanisms that may explain the puzzling negative relation between leverage and future returns. The novelty of our analysis lies in that we relax the implicit assumption of a fixed capital structure, and that we consider both risk and market mispricing mechanisms.

Similar in spirit to Brennan and Schwartz (1984) and Myers (1984), we adopt the view that a firm's capital structure is dynamic. Specifically, leverage temporarily deviates from its optimum due to random shocks and firms do not immediately resolve the resulting distortion, or excess leverage, because of transactions costs. Under this approach, the target and excess components of leverage have very different economic implications for the firm. One can view target leverage as having long-term effects on returns similar to that specified in static asset pricing models that hold capital structure fixed. Excess leverage has a more complex relation with returns since it reflects a shock to the firm's long-run debt capacity and/or to actual

[1] These two phenomena are related because leverage is positively correlated with financial distress.

leverage, and thus may carry important information about the firm's fundamentals. The relation between future returns and current leverage encompasses its relations with both target and excess leverage. The latter relation crucially depends on whether the market understands and impounds in price the information content in excess leverage with respect to changes in the firm's fundamentals, or whether it only does so with a delay as demonstrated in several well-known stock market anomalies (e.g., Bernard and Thomas (1990), Jegadeesh and Titman (1993), Sloan (1996), and Hirshleifer (2001)).

Our empirical evidence strongly suggests that the market does not quickly adjust prices for the information content of excess leverage. After decomposing leverage into target and excess components, we find that the negative relation between leverage and future returns is mainly driven by excess leverage, while, consistent with theory, target leverage does not play a role.[2] In addition, we find that excess leverage indeed carries information about the firm's future fundamentals. In particular, firms with high (low) excess leverage are more (less) likely to become distressed, tend to reduce (increase) leverage, and grow slower (faster) in subsequent periods. A Mishkin (1983) type rational expectations analysis suggests that the negative relation between excess leverage and future returns can be explained by the market's failure to react promptly to the information in excess leverage about the firm's probability of distress and future asset growth. Overall, our results suggest that the relation between excess leverage and future returns is akin to the under-reaction story of the post-earnings-announcement drift (Bernard and Thomas (1990)): while the positive (negative) excess leverage are generated by negative (positive) shocks to the firm, the market does not fully reflect that information until a later date.

Prior studies have offered risk-based explanations for the negative relation between returns and leverage. George and Hwang (2009) argue that leverage may be negatively correlated

[2] We control for equity beta.

with future returns because high (low) leverage firms are less (more) exposed to systematic distress risk. This could be true because firms facing high (low) distress costs endogenously choose low (high) financial leverage. Under their model setup, the reduced financial leverage partially offsets the firm's distress costs and the net effect is that firms with high (low) *ex ante* distress costs will have low (high) probability of distress, but high (low) exposure to systematic distress risk. Our evidence is inconsistent with risk-based predictions implying that such explanations are, at best, incomplete. We find that excess leverage positively predicts the probability of distress, and, at the same time, firms with high (low) excess leverage are more (less) exposed to a systematic distress factor, mimicked by the hedge return of a corporate bond portfolio that is long in BAA rated bonds and short in AAA bonds.

We use Graham's (2000) kink as our empirical proxy for excess leverage. The kink is a ratio where the numerator is the maximum interest that could be deducted for tax purposes before expected marginal benefits begin to decline. The denominator is actual interest incurred so that one can interpret the kink as the ratio of a firm's debt capacity to its actual debt.[3] To the extent that optimal leverage is likely to be in the region where marginal tax benefits begin to decline as argued by Graham (2000), the kink can be viewed as a proxy for one minus excess leverage deflated by actual leverage.

We adopt the kink measure for several reasons. First, since the power of our tests depends on how precisely we measure firm specific values of excess leverage, the ideal proxy should reflect detailed firm information. The kink does so because it is based on firm specific forecasts of future earnings and their volatility.[4] The simulation process also considers the entire

[3] We elaborate on how this measure is constructed in Section I.
[4] Blouin, Core and Guay (2009) suggest that Graham's (2000) assumed earnings process may cause a bias in the estimated marginal tax rates, and as a result, may over-estimate the optimal debt level for US firms. This is less a concern for our study because we are mainly concerned about cross-sectional differences, not the average effect.

spectrum of the US tax code, including progressive rates and complications such as loss carry-forwards and carry-backs, investment tax credits and the alternative minimum tax. Second, the kink is sensitive to financial distress because its numerator reflects the reduction of tax benefits due to the risk of operating losses. Third, the value of tax benefits is a major factor in capital structure (Scott (1976)). Fourth, inasmuch as the kink depends on earnings levels and volatility, both of which are associated with credit ratings (Kaplan and Urwitz (1979)), the kink reflects not only the tax benefits of debt but also factors associated with credit ratings that, along with earnings volatility, CFOs identify as important determinants of their debt policy decisions (Graham and Harvey (2001)).

The kink exhibits properties of excess leverage in both univariate and multivariate tests. In a univariate test, the kink shows strong mean reversion tendencies, implying that current kinks predict future changes in leverage or debt capacity. The elements driving reversion for positive and negative excess leverage are different. The high kink (under-levered) firms tend to reduce their kink by increasing debt, while the low kink (over-levered) firms display less tendency to decrease their debt. The increase in the average kink for the low kink group arises from a combination of performance-based delisting and an improvement in the debt capacity of surviving firms. The kink also performs well in a formal partial adjustment specification similar to that used by Fama and French (2002). Regressing future changes in leverage on target leverage (derived from the kink) and current leverage while controlling for contemporary changes in growth and profitability, we find a significant positive coefficient on the target leverage and a significant negative coefficient on the actual leverage. This result is similar to Fama and French's (2002) results, where they estimate the target leverage using a regression-based approach, in lieu of the kink.

Noise in the measurement will tend to bias our tests against finding any significant results.

Our study contributes to the literature in three major respects. First, we find evidence that excess leverage accounts for the negative relation between leverage and future returns. Second, our finding that this relation is driven by the association between excess leverage and future asset growth and financial distress has implications for market efficiency. Accordingly, our dynamic framework provides a plausible explanation for prior findings of a negative relation between future returns and financial leverage, which remains a puzzle under a static setting. Third, our findings are supportive of a partial adjustment model for leverage parameterized by a Graham's (2000) kink as a proxy for excess leverage.

The rest of the paper is organized as follows. In the next section, we describe the sample and the mechanics of the kink's measurement. Section II presents our examination of Graham's (2000) kink as a measure of excess leverage. In Section III, we present the main results of our study. We conclude in Section IV.

I. Data and Descriptive Statistics

A. Sample Selection and Key Variables

We obtained kink data for 144,051 firm-year observations spanning 1980 through 2006 from John Graham. Firm-years with CUSIPs that do not appear in *Compustat*, do not have a unique match in the *CRSP/Compustat* merged database, or do not have SIC and share codes in *CRSP* are eliminated. We also require there be no missing data for assets (*Compustat AT*), net income before extraordinary items (*IB*), shares outstanding (*CSHO*), common equity (*CEQ*), and end-of-year price (*PRCC_F*). We further eliminate financial institutions (SIC codes 6000-6999), firms with non-positive book value of equity, non-positive book value of equity plus debt net of financial assets, or non-positive market value of equity plus debt net of financial assets. Last, we truncate for outlier balance sheet ratios at the 1st and 99th percentiles.[5] Our final sample consists of 72,325 firm-years. Our estimation of a partial adjustment model of leverage uses the subsample of 60,779 firm-years with positive debt and required data. Table I summarizes our sample selection process.

(Insert Table I about here)

The kink is defined as follows:

$$\text{Kink} \equiv \frac{\text{Interest}^*}{\text{Actual interest}}, \tag{1}$$

where Interest^* is the point at which the firm's tax benefit function starts to slope down as the firm uses more debt. For each dollar of interest payments, the firm's tax benefit equals the difference between the after-tax value of interest payments to investors and the after-tax value of equity payments to investors. Firms may deduct interest from taxable income so that the corporate tax rate does not impact investors' after-tax value of interest payments, whereas corporate taxes reduce the after-tax value of equity payments to investors. The corporate tax rate varies as the firm uses more or less debt.

A firm's marginal tax rate is defined as the present value of taxes owed on an extra dollar of income. Due to the presence of net operating loss carry-backs and carry-forwards, as well as the investment tax credit, the tax code is intrinsically dynamic. If a corporation has a tax loss, it can only claim an immediate refund to the extent that it offsets taxes paid in the prior three years. It can carry forward any remaining loss for 18 years to offset future taxable income. As a result, the value of a tax deduction depends not only on its impact on current year taxes, but also on how it affects future taxable income and the firm's current stock of loss carry-forwards and tax

[5] These ratios include book-to-market, net debt-to-market, net operating assets-to-market value of net operating assets, and the difference between book-to-market and net operating assets-to-market value of net operating assets.

credits. Because of the asymmetric treatment of tax losses, tax deductions are more valuable to firms with a low risk of taxable losses due to, for example, high earnings levels.

In order to incorporate the effect of current interest deductions on future taxable income, Graham (2000) forecasts future earnings as in Shevlin (1990) and estimates the firm's entire marginal corporate tax curve by simultaneously considering uncertainty about the firm's future earnings, the progressivity of the statutory tax code, and various special provisions such as carry-forwards and carry-backs for net operating losses, the investment tax credit, and the alternative minimum tax. Graham forecasts future earnings assuming that earnings before interest and taxes (*EBIT*) follow a random walk with drift, where he estimates firm-specific drift μ_i and volatility σ_i based on *Compustat* data prior to the forecast period:

$$\Delta EBIT_{it} = \mu_i + \varepsilon_{it}, \tag{2}$$

and the disturbance ε_{it} is normally distributed with mean zero and standard deviation σ_i.

To estimate the before-financing marginal tax rate, a forecast of $EBIT_{i,t+k}$ for years $t + 1$ through $t + 18$ is obtained from equation (2) initialized by $EBIT_{it}$ based on random draws from the distribution of ε_{it}. Then, the present value of the tax bill from $t - 3$ (for carry-backs) to $t + 18$ (for carry-forwards) is calculated assuming the statutory tax rules are fixed at year t's specification. Next, \$10,000 is added to current year $EBIT_{it}$ and the present value of the tax bill is recalculated. The difference between the two tax bills (divided by \$10,000) represents a single estimate of the firm's marginal tax rate. The same procedure is then repeated 50 times to obtain 50 estimates. The 50 estimates are averaged to determine the expected marginal tax rate for a single firm-year. To estimate the marginal tax rate curve, point estimates of the marginal tax rates are calculated assuming the interest deduction is 0%, 20%, 40%, 60%, 80%, 100%, 120%, 140%, 160%, 200%, 300%, 400%, 500%, 600%, 700% and 800% of the actual interest paid.

Other key variables in our study are measured as follows:

Buy-and-hold return:	Compounded annual return from *CRSP* beginning at the start of the fourth month following the firm's fiscal year end. Following Shumway (1997) and Shumway and Warther (1999), we replace missing return observations with the return of the firm's *CRSP* size decile portfolio.
Net debt (ND):	Debt (*Compustat* Current portion of long-term debt *DLC* plus Long-term debt *DLTT*) plus Preferred stock (Preferred stock *PSTK* plus Preferred dividends in arrears *DVPA* less Preferred treasury stock *TSTKP*) less Cash (*CHE*).
Market value of equity (MVE):	Price (*PRCC_F*) times Shares outstanding (*CSHO*).
Book value of equity (BVE):	Common equity (*CEQ*) plus Preferred treasury stock (*TSTKP*) less Preferred dividends in arrears (*DVPA*).
Net operating assets (NOA):	Book value of equity plus Net debt.
Market value of net operating assets (PNOA):	Market value of equity plus Net debt.
Beta:	Estimated using the Eventus software from a market model using the most recent 255 trading days' data and the *CRSP* value-weighted index as a proxy for the market return.

B. Descriptive Statistics

Table II provides descriptive statistics for our sample. From Panel A, we observe that the mean and median kinks of 2.8 and 2.0, respectively, for our sample are somewhat higher than the corresponding values of 2.4 and 1.2 for Graham (2000), which spans a different time period. The fact that mean and median kinks are greater than one has been the basis for Graham's claim that firms are under leveraged on average. Financial leverage as measured by ratio of net debt to market value of equity (*ND*/*MVE)* displays large right skewness. While the mean *ND*/*MVE* is 0.435, the median is only 0.165, suggesting that some firms have very large amount of net debt compared with the market value of equity. The negative value for the 25th percentile of *ND*/*MVE* for our sample implies that at least 25% of the firms have cash holdings that exceed debt and preferred stock. Few firms in our sample have preferred stock and many have large cash holdings.

(Insert Table II about here)

Important in our later analysis, we note that the kink is negatively correlated with financial leverage (Pearson and Spearman correlations of -0.316 and -0.314, respectively). The negative correlation between kinks and *ND*/*MVE* is consistent with higher kinks being viewed as a measure of unused debt capacity (negative excess leverage). The positive correlation of kinks with log (*MVE*) and negative correlation with *BVE*/*MVE* suggest that more highly-valued firms tend to have greater unused debt capacity.

II. The Kink as a Proxy for Excess Leverage

In this section, we examine whether the kink exhibits properties of excess leverage. Our formal test is based on a partial adjustment model of leverage, where the target and excess leverage are derived from the kink. This model assumes that firms experience random shocks that distort their capital structure. Subsequent to such shocks, firms balance transaction costs associated with undoing distortions against benefits lost by allowing distortions to continue. A manifestation of the incomplete adjustments is that excess leverage is mean reverting.

Table III presents some preliminary evidence that the kink mean reverts. We sort firms into quintiles based on the magnitude of the kink.[6] Quintile 1 includes firm-years with a kink of zero, quintile 2 includes kinks from 0.2 to 0.8, quintile 3 includes kinks from 1 to 2, quintile 4 includes kinks from 3 to 5, and quintile 5 includes kinks from 6 to 8. Panel A depicts mean reversion in kinks out three years for a constant sample of firms that have data for all three years. Quintiles 1 and 2 show large increases in the kink from year t to year $t + 3$, while quintiles 4 and 5 show large decreases in the kink in the same time span. The cumulative changes over the three years for quintile portfolios 1, 2, 4, and 5 are all statistically significant under Fama and MacBeth (1973) type t-statistics with a Newey-West correction for serial correlation with two lags. Reversion is strongest for more extreme quintile portfolios, especially for high kinks. Quintile portfolio 3, which contains the firm-years with a kink between 1 and 2, shows no significant change in the kink over the next three years. This evidence is consistent with the notion that the kink is a proxy for excess leverage and the value for excess leverage is not significantly different from zero for the middle portfolio.[7] We note that, as a proxy for excess leverage, the kink may also contain considerable noise. One indication is that the kink has a high level of persistence – high (low) kink firms continue to have high (low) kinks three years in the future. This persistence is related to Lemmon, Roberts and Zender's (2008) finding that leverage has a large, stable component. We later demonstrate that the mean reverting component of the kink is the main driver for future returns.

(Insert Table III about here)

[6] The kinks are computed for discrete points, which precludes the use of literal quintiles.
[7] The inclusion of kinks greater than 1 reflects Graham's (2000) conjecture that optimal capital structures are likely to lie somewhat to the right of a kink of 1.

In an effort to better understand what may underlie mean reversion in kinks, we compare changes in the debt-to-market capitalization ratio for each kink portfolio out three years. As reported in Table III, Panel B, we find significant evidence that high kink firms increase leverage over the next three years. In particular, leverage ratios increase for quintile portfolios 4 and 5 from 0.221 and 0.081 to 0.249 and 0.121, respectively. However, changes in leverage ratios for quintile portfolios 1 through 3 are statistically insignificant.

For the low kink firms, a question arises as to why their kinks might increase in the future years while their leverage ratios remain stable. Because the kink may be viewed as a ratio of debt capacity to debt, the combination of the low kink firms' unchanged leverage and increased kink implies that the earnings available to support debt increased over time. The constant sample in Table III, Panel B excludes firms that delisted within the three-year horizon subsequent to measuring kinks and therefore excludes those firms that were unable to recover from financial distress.

A reasonable conjecture is that highly levered firms experience a higher frequency of financial distress and bankruptcy. As a result, the distressed firms are likely to be delisted from the exchanges and disappear from our sample as we extend the time horizon. The evidence is consistent with this conjecture. As presented in Table III, Panel C, we find significantly more delisting for low kink firms: 18.7% of quintile portfolio 1 firms and 9.4% of quintile portfolio 2 firms experience a performance-related delisting within three years. This is in sharp contrast to high kink firms, whose delisting frequencies are only 2.4% for quintile portfolio 5 and 1.7% for quintile portfolio 4. Upon reflection, the asymmetry in the adjustment of leverage ratios for firms with high (low) excess leverage should be expected because firms face differential transactions costs in adjusting toward an optimum. It is in general easier for a firm with high, stable earnings to borrow money than it is for a firm with low, volatile earnings to reduce its debt burden.

The delisting results in Table III, Panel C suggest that the kink is negatively correlated with distress risk. Over the future three years, firms in the lowest kink quintile are eight times more likely to be delisted for performance reasons than the firms in the highest kink quintile. This finding is inconsistent with Molina's (2005) conjecture that under-estimated probability of distress may be the counter-weight to balance the apparent excess leverage proxied by the kink. However, this finding can be consistent with George and Hwang's (2009) argument that firms with high (low) distress costs have high (low) exposure to systematic risk associated with distress. They argue that this relation causes firms with high exposure to distress costs to employ low levels of leverage to avoid those costs; in the net, these firms may actually experience less distress than firms with low exposure to systematic financial distress. In Section C, we directly test this hypothesis but find the opposite result. In other words, firms with low (high) kinks seem to face high (low) distress risk, both because they are more (less) likely to get into distress and because they are more (less) exposed to a systematic distress factor.

To test the partial adjustment model directly, we follow Fama and French (2002) and estimate the following regression model:[8]

$$\frac{\text{Debt}_{i,t+1}}{(\text{Debt}+BVE)_{i,t+1}} - \frac{\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}} = \alpha_{0,t} + \alpha_{1,t}\frac{\text{Kink}_{i,t}\times\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}} + \alpha_{2,t}\frac{\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}} + \alpha_{3,t}Z_{i,t} + \eta_{i,t}, \tag{3}$$

[8] Fama and French (2002) deflate by total assets (Liabilities plus Equity) when computing leverage; however, their measure of debt is total liabilities. Debt plus Equity is the proper deflator for leverage in our setting because we exclude operating liabilities from our measure of debt (Welch (2007)).

where $\text{Debt}_{i,t}/(\text{Debt} + BVE)_{i,t}$ is the measure of leverage for firm i in year t, $\text{Kink}_{i,t} \times \text{Debt}_{i,t}$ is "target debt"[9], and $Z_{i,t}$ is a vector of control variables including contemporaneous and lagged growth in both (scaled) earnings and total assets:

$$Z_{i,t} = \left\langle \frac{\Delta\text{Earnings}_{i,t+1}}{\text{Assets}_{i,t+1}}, \frac{\Delta\text{Earnings}_{i,t}}{\text{Assets}_{i,t}}, \frac{\Delta\text{Assets}_{i,t+1}}{\text{Assets}_{i,t+1}}, \frac{\Delta\text{Assets}_{i,t}}{\text{Assets}_{i,t}} \right\rangle. \quad (4)$$

As in Fama and French (2002), these variables are included to determine whether they cause deviations of leverage from its target and to increase the power of the test. The partial adjustment model predicts that $\alpha_{1,t}$ is positive and $\alpha_{2,t}$ is negative. These coefficients measure the speed of adjustment, with large magnitudes indicating higher speed.

The regression results are presented in Table IV. We estimate equation (3) using the Fama-Mcbeth (1973) procedure and present the average coefficients and the Fama-Mcbeth t-statistics. To ensure that the results are robust, we conduct the analysis using four variations of the change in leverage using both book value and market value of assets as deflators. The four specifications generate similar qualitative results in support of the partial adjustment model. In particular, in all specifications, the coefficients on target debt are significantly positive and the coefficients on the lagged debt are significantly negative. The coefficients on lagged debt are larger than the coefficients on the target debt in absolute magnitudes, suggesting that Kink × Debt is a noisy proxy for the target debt. Averaging the absolute values of the coefficients on the target debt and the lagged debt, our results suggest that between 5% and 30% of the excess leverage is resolved in the next year.

(Insert Table IV about here)

[9] Recognizing that interest expense is determined by the interest rate applied to debt, this product reduces to the optimal level of debt. Formally, current interest, which is the denominator of Kink, equals $r \times \text{Debt}$ where r is the firm's current interest rate. Target interest, which is the numerator of Kink, equals $r^* \times \text{Debt}^*$ so that $\text{Kink} \times \text{Debt} = \text{Debt}^* \times r^*/r$. This proxy for target debt is noisy to the extent that the interest rate r^* on target debt differs from the firm's current interest rate r.

The evidence on the control variables is consistent with Fama and French (2002). In particular, both contemporaneous and lagged earnings growth have a negative coefficient, suggesting that profitable firms tend to retain earnings and thus reduce leverage. Contemporaneous asset growth has a positive coefficient, but lagged growth has a negative coefficient. These signs suggest that the firm's current growth is financed more by debt than by equity, but this effect reverts to the mean after one year.

III. The Relation between Excess Leverage and Returns

A. Excess Leverage and Abnormal Returns

We adopt the specification in Penman, et al (2007) to estimate the relation between excess leverage and future returns. In particular, we estimate the following cross-sectional regression based on firm characteristics:

$$R_{i,t+1} = \gamma_{t,0} + \gamma_{t,1}\text{Kink}_{i,t} + \gamma_{t,2}\text{Controls}_{i,t} + \varepsilon_{i,t}, \quad (5)$$

where $R_{i,t+1}$ denotes the one year buy-and-hold return beginning at the start of the fourth month after firm *i*'s fiscal year-end *t*.[10]

We estimate equation (5) in each year and present the average estimates and the associated *t*-statistics using the Fama and MacBeth (1973) method. We control for size, enterprise book-to-market (net debt plus book value of equity divided by net debt plus market value of equity) and beta, which are firm characteristics commonly thought to predict future returns based on either theory or empirical analysis. In addition, we control for firms' research and development intensity because Bates, Kahle and Stulz (2009) find that R&D intensive firms

[10] We adjust for missing delisting returns as in Shumway (1997) and Shumway and Warther (1999) and replace missing returns in months subsequent to delisting with the firm's corresponding *CRSP* size matched portfolio using NYSE/AMEX/NASDAQ deciles.

tend to have high cash holdings, a form of negative leverage; we control for firms' proportions of foreign sales because Foley, Hartzell, Titman and Twite (2007) find that firms with profitable foreign subsidiaries tend to hold cash in order to defer repatriation taxes;[11] finally, we control for firms' stock option plans because Graham, Lang and Shackleford (2004) find that firms substitute the tax shield from employee stock option compensation for the tax shield from interest. Because data on stock option plans are limited for most of our sample period, we proxy for the extent of stock option plans using the percentage of a firm's shares that are reserved for conversion (*Compustat CSHRT*/(*CSHRT* + *CSHO*)) as in Huson, Scott and Wier (2001).

Table V presents the results of regressions for several models based on equation (5). The coefficients on enterprise book-to-market, size and beta are broadly consistent with prior literature. While the enterprise book-to-market ratio significantly predicts future returns with a coefficients ranging from 0.079 to 0.103 (all significant at the 1% level), neither size nor firm beta predict returns. The result on size differs from that documented by Fama and French (1992) because our data cover a more recent sample period (e.g., Horowitz, Loughran and Savin (2000)).

(Insert Table V about here)

Table V, Models 1 and 2 replicate the finding in Penman, et al (2007) that debt is negatively associated with future returns.[12] Model 3 adds the kink measure of (negative) excess leverage, which has a coefficient of 0.007 (significant at 1%). The coefficient on net debt is no longer significant in this specification, which suggests that excess leverage rather than leverage *per se* accounts for the negative relation between debt and returns. A similar result obtains in

[11] We compute firms' foreign sales from the *Compustat* segments database.

[12] The weaker association between net debt and returns is due to our sample period, which ends in 2006 whereas the sample in Penman, et al (2007) ends in 2001. Untabulated results show that estimating Model 1 in the 1980 to 2001 period that overlaps with the Penman, et al (2007) sample yields a coefficient on net debt of -0.025 (significant at 5%), which is comparable to that in Penman, et al (2007).

Model 4 where the kink has a coefficient of 0.007 (significant at 5%) while the coefficient on debt is insignificant. Model 2, which excludes the kink, and Model 4, which includes it, both show that Cash has a positive association with returns, (significant at 1% and 5%, respectively). Although not the focus of this paper, the fact that cash can consistently predict future returns is unexpected and warrants future research.

Table V, Model 5 adds controls for foreign sales, R&D intensity and stock option plans. We find that the coefficient on the kink is only marginally changed with a coefficient of 0.006 (significant at 5%). Cash and enterprise book-to-market continue to have a positive association with returns. Among the three added control variables, only the proportion of foreign sales is statistically significant with a coefficient of 0.105 (significant at 5%).

In order to directly add excess and target leverage into the regressions, we compute Target debt as Debt multiplied by the kink as in Table IV. Excess debt equals Debt – Target debt. These computations are only valid for the 65,878 observations with positive debt, which we use to estimate Models 6 and 7 of Table V. Model 6 replicates Model 5 with the reduced sample and obtains similar results. Model 7 replaces the Kink and Debt with Excess and Target debt. The coefficient on Excess debt is -0.021 (significant at 5%) while the coefficient on Target debt is insignificant, consistent with the other specifications in Table V.[13]

Based on the evidence in Table V, we conclude that excess leverage, as measured by the kink, captures information relevant to future returns. Debt levels are no longer associated with returns after controlling for excess leverage, suggesting that excess leverage drives the negative association between debt and returns. The relation holds after controlling for foreign sales and R&D, which may affect both debt policy and expected returns, and after controlling for shares

[13] Recall that the kink measures negative excess leverage so that a positive coefficient on the kink is analogous to a negative coefficient on excess leverage.

held for conversion, which represent non-debt tax shields. The next subsection investigates why excess leverage predicts returns.

B. The Relation between Excess Leverage and Future Fundamentals

This subsection examines whether the association between excess leverage and returns is due to an association between excess leverage and firms' future fundamentals. Given that firms make dynamic capital structure decisions, the firm's current excess leverage could be a state variable that carries information about the evolution of the firm's fundamentals. Market mispricing could arise if the investors do not fully understand such information. As we have shown in the prior sections, firms' current kinks can help to predict future changes in leverage. This subsection adds an examination of the association between excess leverage and the probability of future financial distress, future earnings changes, and future asset growth. We ultimately find that excess leverage is informative about future financial distress and asset growth. We show that this association accounts for its relation with returns, which suggests that prices fail to impound the information excess leverage provides about future fundamentals.

We estimate the association between excess leverage and the probability of future financial distress using Shumway's (2001) bankruptcy prediction model. In particular, we estimate Logit regressions of distress probability (whether the firms is delisted due to performance reasons in the next three years) on the kink, while controlling for profitability (net income divided by total assets), book leverage (total liability divided by total assets), firm size relative to the market, prior performance (abnormal returns in the last fiscal year), and stock volatility. The results are presented in Table VI.

(Insert Table VI about here)

Table VI, Model 1 presents the benchmark model where only control variables are included. The results are broadly consistent with Shumway (2001). All coefficients have the correct signs, and all but past abnormal market returns are statistically significant. Despite the high correlation between the kink and leverage, when we add the kink in Model 2, the coefficient on the kink is highly significant, with a coefficient of -0.198 (significant at 1%). The Pseudo R^2 also increases from 0.129 to 0.141. The negative coefficient confirms that high (low) kink firms are less (more) likely to become distressed in the next three years. Thus, excess leverage appears to have incremental value for predicting financial distress.

We now turn our attention to whether excess leverage predicts future profitability and/or asset growth. We conjecture that the kink should positively predict future profitability and asset growth because a high (low) kink could be driven by a positive (negative) shock to debt capacity or an increase (decrease) in financial slack. In order to measure the association between excess leverage and changes in profitability over the k years subsequent to measuring excess leverage, we estimate:

$$\frac{\text{Earnings}_{i,t+k} - \text{Earnings}_{i,t}}{k \times \text{Assets}_{i,t}} = \delta_{t,0} + \delta_{t,1}\text{Kink}_{i,t} + \delta_{t,2}\frac{BVE_{i,t}}{MVE_{i,t}} + \delta_{t,4}\frac{\Delta\text{Earnings}_{i,t}}{\text{Assets}_{i,t-1}} + \varepsilon_{i,t}. \qquad (6)$$

A similar regression can be defined for asset growth, $(\text{Assets}_{t+k} - \text{Assets}_t)/(k \times \text{Assets}_t)$.

Table VII presents the results of this analysis. In Panel A, we regress future average changes in earnings (before interest but after tax) for both one and two years in the future on the kink, book-to-market, and the preceding year's earnings change. Across the two columns representing one and two year time horizons, the average coefficient estimate on the change in earnings is significantly negative, consistent with mean reversion in profitability. Supporting the idea that the book-to-market ratio is inversely related to growth in earnings, we find that the average coefficient estimate on book-to-market is -0.018 (significant at 1%) when the dependent variable is the next year's change in earnings. However, this effect diminishes to -0.003 (significant at 10%) over a two year horizon. Excess leverage has an insignificant relation with future earnings changes.

(Insert Table VII about here)

In Table VII, Panel B, the dependent variable is cumulative asset growth. Similar to Panel A, book-to-market continues to have a significant negative average coefficient estimate at both one-year and two-year horizons. The average coefficient estimate on the change in assets is significantly positive, suggesting that firms experiencing profits from past investments invest more in the future. Important to our analysis, we find that the average coefficient estimate on the kink is significantly positive at the one year horizon (coefficient of 0.003, significant at the 5% level). The estimate for the two year horizon is insignificant, suggesting that firms with negative excess leverage (high kink) have high next year asset growth that tapers off in the subsequent year.

We have found that the kink contains a significant amount of information about distress probability, and future changes in leverage and asset growth. Moreover, the signs of the coefficients seem to affect equity value in the same direction: high (low) kink firms are more (less) likely to avoid financial distress and increase leverage and growth. If the market fails to fully appreciate these implications, one could find a delayed reaction in the future.

To test for a delayed market reaction to information contained in excess leverage, we conduct a Mishkin (1983) type analysis employing the following regression model:

$$R_{i,t+1} = \lambda_{t,0} + \lambda_{t,1}\text{Kink}_{i,t} + \lambda_{t,2}\frac{BVE_{i,t}}{MVE_{i,t}} + \lambda_{t,3}\log(MVE_{i,t}) + \lambda_{t,4}\text{Beta}_{i,t} + \lambda_{t,5}\text{Controls}_{i,t} + \upsilon_{i,t}, \quad (7)$$

where the control variable is the future realized fundamentals. Without the control variable, equation (7) is reduced to equation (5), where only size, beta and the book-to-market ratio are included as controls in the cross-sectional regressions. The addition of the controls will cause the coefficient on the kink to fall, if the return prediction power of the kink is partially derived from the market's failure to understand the relation between the kink and that particular control. Similar analysis has been employed by Abarbanell and Bernard (1992), and Brous and Shane (2001) in their examination of the post-earnings announcement drift.

The results are presented in Table VIII. In Model 1, we replicate the result that the kink is positively related to future returns. In Models 2, 3, 4, and 5, we introduce next year's change in leverage, next year's change in profitability, next year's asset growth, and the performance related delisting in the next three years, one by one to the regression equation. Model 6 includes all of these controls.

Table VIII, Models 2 and 3 demonstrate that the relation between future returns and the kink is not affected by the inclusion of the future change in leverage or the future change in earnings. A much more notable effect is observed when we control for future asset growth as in Model 4. The coefficient estimate on the kink for high kink firms is decreased from 0.006 (significant at 1%) to 0.004 (significant at 10%), representing a 33% drop. This suggests that 33% of the positive relation between the kink and future returns could be due to the market's failure to understand the information in the kink about next year's asset growth.

(Insert Table VIII about here)

We find a similar result in Table VIII, Model 5 when we control for the performance related delisting in the next three years, as in Table VI. The coefficient on the kink declines to 0.003 and ceases to be statistically significant. Finally, when we control for the four future fundamental variables simultaneously in Model 6, the coefficient on the kink drops to 0.002, with a t-statistic of 0.960. This suggests that about 66% of the positive association between the kink and future returns is due to the association between the kink and future fundamentals - in particular, future asset growth and financial distress.

C. *Distress Risk as an Explanation for the Relation between Returns and Leverage*

The previous subsection provides evidence that the negative association between leverage and returns stems from the ability of excess leverage to predict future financial distress and asset growth, which investors fail to impound in prices. In this section, we test whether the abnormal returns can be explained by firms' exposure to systematic distress risk. This test helps to differentiate the risk-based explanation proposed by George and Hwang (2009) and the behavioral explanation suggested in Section B.

We estimate time series regressions of portfolio returns on conventional risk factors, augmented by an additional factor that proxies for distress risk. In particular, we consider the following model:

$$R_{p,t} = \alpha_p + \beta_{p,1}\text{Market}_t + \beta_{p,2}SMB_t + \beta_{p,3}HML_t + \beta_{p,4}UMD_t + \beta_{p,5}FDR_t + \eta_{p,t}, \qquad (8)$$

where $R_{p,t}$ denotes the excess return for month t on a portfolio p of firms, measured as the difference between portfolio return and the one month treasury bill return. Market_t denotes the excess return for the market portfolio in month t. SMB_t denotes the month t return on a factor mimicking portfolio for size, HML_t denotes the month t return on a factor mimicking portfolio for book-to-market, and UMD_t denotes the month t return on a factor mimicking portfolio for momentum. The data on these factor portfolios are obtained from Ken French via WRDS.

The first four risk factors are due to Carhart (1997). The additional financial distress risk factor, *FDR*, is mimicked by a hedge portfolio that is long in BAA rated bonds and short in AAA rated bonds.[14] The portfolios are rebalanced once a year, at the end of March, based on the quintile ranks of the kink as of the fiscal year end.[15]

The results in Table IX show that the differential exposure to distress risk factor cannot explain the relation between the kink and future returns. Contrary to the distress risk prediction, we find that low kink firms, which have high excess leverage, have high exposure to the distress factor, and the exposure decreases monotonically as we move from low to high kink portfolios. A similar, nearly monotonic, pattern is found for exposure to the *SMB* factor. Portfolios do not exhibit recognizable patterns in their exposures to the remaining factors such as market and *UMD*, though portfolios in the middle quintiles have higher exposure to *HML* than the extreme quintiles. Overall, the results are inconsistent with the suggestion that the kink is a proxy for systematic distress risk. Rather, high kink firms appear to be less risky than low kink firms by having low exposure to risk factors.

(Insert Table IX about here)

Another interesting finding in Table IX is that the regression intercepts increase monotonically from quintile 1 to quintile 5. The spread between quintile 5 and quintile 1 is about 7% on an annualized basis. This suggests that the kink is positively correlated with superior stock performance after controlling for conventional risk factors. While the predictability of future returns could be an artifact of omitted risk factors, the analysis in the previous subsection suggests that it is more likely due to market inefficiency. Specifically, the relation appears to

[14] We obtained yields from Federal Reserve H-15 reports and convert to returns using the log-linear approximate relation between returns and yields as defined in Campbell, Lo, and MacKinlay (1997).

[15] Because kinks take on discrete values, we are unable to form exact quintiles. Portfolio 1 contains 15,698 firm-years for kinks of 0, Portfolio 2 contains 9,180 firm-years for kinks between 20% and 80%, Portfolio 3 contains 18,365 firm-years for kinks between 100% and 200% (i.e., near optimal leverage), Portfolio 4 contains 13,110 firm-years for kinks between 300% and 500%, and Portfolio 5 contains 15,972 firm-years for kinks between 600% and 800% (the maximum).

stem from the market's failure to price the low distress risk and high asset growth of high kink firms.

IV. Conclusion

Prior studies have found an apparently anomalous negative relation between leverage and future stock returns. Under a partial adjustment model of leverage, at any point in time a firm may exhibit under or over leverage due to random shocks with the distortion in leverage only gradually resolved over time because of transactions costs. In this dynamic model of leverage, the firm's current excess leverage becomes a state variable that carries information about the firm's future fundamentals such as changes in leverage, asset growth, as well as the probability of financial distress. It follows that leverage may impact future returns not only through the conventional "leverage effect" where risk is magnified by the use of debt, but also through possible market inefficiencies when the market does not fully react to the information contained in excess leverage about future fundamentals.

We find that excess leverage contains significant information about the firm's future asset growth and probability of financial distress. However, the market does not seem to fully understand the link between excess leverage and future fundamentals. We find that Graham's (2000) kink, a measure of negative excess leverage, positively predicts future returns, a phenomenon primarily driven by the market's delayed reaction to the information in the kink about future asset growth and financial distress. Because of the positive correlation between excess leverage and leverage, leverage is negatively correlated with future returns in the absence of controls for excess leverage. When both leverage and excess leverage are considered simultaneously, returns are only associated with excess leverage.

We find that Graham's kink measure exhibits properties of excess leverage in the context of a partial adjustment model. Neither the omission of distress costs nor a distress risk factor appears to explain the relation between the kink and returns. Contrary to the distress cost explanation, high (low) kink firms are found to have lower (higher) probability of financial distress, and lower (higher) exposure to a distress risk factor. Other potential explanations related to stock options as a tax shield, foreign repatriation taxes, and R&D intensity are also not supported by cross-sectional analysis of the relation between the kink and future returns.

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Table I: Sample Selection

Our sample includes 144,051 firm/year observations from a dataset provided by John Graham. After eliminating firm-years that fail to satisfy our data requirements, we truncate the sample to remove firm/years with values of *BVE*/*MVE*, *NOA*/*PNOA*, *ND*/*MVE* and *BVE*/*MVE* - *NOA*/*PNOA* above the 99th percentile or below the 1st percentile of the 76,249 pre-truncation sample. We describe the computation of these variables in the caption of Table 2.

Total firm-years in kink data (1980 - 2006)	144,051
No match in *Compustat* [a]	-20,053
No or non-unique match to *CRSP* [b]	-19,974
Missing *CRSP* company data[c]	-1,638
Base sample	102,386
Missing data[d]	-3,904
Financial firms[e]	-12,246
Non-positive enterprise or book value[f]	-3,862
Not US ordinary common shares[g]	-6,125
Full sample	76,249
Outliers	-3,924
Truncated full sample	72,325
Non-positive debt	-7,502
Missing prior years' data for computing target leverage[h]	-4,044
Sample for estimates of partial adjustment model	60,779

a) We attempted to match to *Compustat* using GVKEY, then CUSIP, then CNUM

b) We match to *CRSP* using the *CRSP*/*Compustat* merged database link file.

c) We require a record in the *CRSP* stocknames file at the fiscal-year-end.

d) At least one month of returns starting the fourth month after the fiscal-year-end, non-missing market value, sales, market model beta and SIC code, positive sales

e) SIC codes beginning with 6

f) Positive *BVE*, *NOA*, *PNOA*

g) We require a *CRSP* share code of 10 or 11

h) We require current and prior year debt, market value, book value, assets, change in assets, earnings from continuing operations and change in earnings from continuing operations.

Table II: Descriptive Statistics

Panel A presents descriptive statistics. We compute the buy-and-hold return as the compounded annual return from CRSP beginning at the start of the fourth month following the firm's fiscal year end. We replace missing return observations with the return of the firm's *CRSP* size decile portfolio. The Kink is estimated as in Graham (2000) and equals the ratio of the interest expense at which the present value of tax deductions begin to decline to the firm's actual interest expense. Market value of equity (*Compustat MVE*) equals Price (*PRCC_F*) times Shares outstanding (*CSHO*). Book value of equity (*BVE*) equals Common equity (*CEQ*) plus Preferred treasury stock (*TSTKP*) less Preferred dividends in arrears (*DVPA*). Beta is estimated using the Eventus software from a market model using the most recent 255 trading days' data and the *CRSP* value-weighted index as a proxy for the market return. Debt equals the current portion of long-term debt (*DLC*) plus long-term debt (*DLTT*). Net debt (*ND*) equals Debt plus Preferred stock (*PSTK*) plus Preferred dividends in arrears (*DVPA*) less Preferred treasury stock (*TSTKP*) less Cash (*CHE*). Performance related delisting is an indicator variable that equals 1 if the firm delists within 3 years of the fourth month following the fiscal-year-end (same beginning month as returns) with a *CRSP* delisting code of 500 or between 520 and 584. We compute the percent foreign sales using the *Compustat* segments database. R&D /Sales is *XRD*/*SALE*. Percent of shares held for conversion equals Common shares reserved for conversion (*CSHRT*)/(Common shares reserved for conversion plus Shares outstanding). Panel B presents Pearson and Spearman correlations . ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Descriptive Statistics

			Standard	Percentiles				
Variable	N	Mean	deviation	1%	25%	50%	75%	99%
Buy-and-hold return	72,325	0.160	0.770	-0.850	-0.227	0.054	0.373	2.733
Kink	72,325	2.839	2.883	0.000	0.200	2.000	5.000	8.000
log(*MVE*)	72,325	4.700	2.175	0.325	3.111	4.533	6.180	10.115
BVE/*MVE*	72,325	0.690	0.496	0.071	0.339	0.566	0.900	2.462
Beta	72,325	1.107	0.790	-0.433	0.560	1.022	1.559	3.319
Debt/(Debt + *MVE*)	72,325	0.252	0.223	0.000	0.052	0.200	0.407	0.811
ND/*MVE*	72,325	0.435	0.837	-0.482	-0.034	0.165	0.603	4.051
Performance related delisting	72,325	0.071	0.257	0.000	0.000	0.000	0.000	1.000
% Foreign sales	72,325	0.057	0.148	0.000	0.000	0.000	0.000	0.679
R&D/Sales	72,325	0.323	18.767	0.000	0.000	0.000	0.031	1.280
% shares held for conversion	72,325	0.070	0.104	0.000	0.000	0.022	0.106	0.466

Panel B: Correlation Matrix

Spearman correlation above diagonal/Pearson below

	Buy-and-hold return	Kink	log *MVE*	*BVE*/*MVE*	Beta	Debt/(Debt+*MVE*)	*ND*/*MVE*	Perf. rel. delisting	% For. Sales	R&D/Sales	% Shrs. for Conversion
Buy-and-hold return		0.094***	0.064***	0.114***	-0.066***	0.031***	0.010**	-0.242***	0.033***	-0.013***	-0.022***
Kink	0.010***		0.325***	-0.214***	0.071***	-0.341***	-0.314***	-0.224***	0.167***	0.063***	-0.123***
log(*MVE*)	-0.032***	0.389***		-0.374***	0.215***	-0.146***	-0.088***	-0.270***	0.358***	0.037***	-0.275***
BVE/*MVE*	0.079***	-0.156***	-0.347***		-0.233***	0.465***	0.337***	0.006	-0.124***	-0.211***	0.042***
Beta	-0.022***	0.053***	0.176***	-0.208***		-0.172***	-0.171***	-0.030***	0.076***	0.240***	0.133***
Debt/(Debt + *MVE*)	0.019***	-0.419***	-0.183***	0.492***	-0.166***		0.925***	0.095***	-0.088***	-0.334***	0.067***
ND/*MVE*	0.008**	-0.316***	-0.159***	0.398***	-0.121***	0.859***		0.094***	-0.081***	-0.347***	0.042***
Performance related delisting	-0.165***	-0.175***	-0.269***	0.042***	-0.022***	0.115***	0.133***		-0.098***	-0.029***	0.026***
% Foreign sales	0.014***	0.130***	0.318***	-0.114***	0.089***	-0.098***	-0.082***	-0.073***		0.217***	-0.186***
R&D/Sales	-0.001	-0.003	-0.001	-0.013***	0.017***	-0.015***	-0.012***	0.003	-0.005		0.076***
% shares held for conversion	-0.022***	-0.158***	-0.255***	0.023***	0.086***	0.112***	0.101***	0.064***	-0.129***	0.005	

Table III: Changes in Kinks, Leverage and Listing Status

This table presents Kink, leverage and listing status changes for the sample of firm/years described in Table I. Fama and MacBeth (1973) *t*-statistics with a Newey-West correction for two lags appear in *italics* below the changes in kink and leverage. Firm/years are grouped by the Kink measured at the end of the fiscal year. Group 1 includes firm/years with a Kink of zero, Group 2 includes Kinks from 0.2 to 0.8, Group 3 ranges from 1 to 2, Group 4 ranges from 3 to 5 and Group 5 ranges from 6 to 8. Panel A presents changes in Kink. Panel B presents changes in leverage as measured by Debt divided by Debt plus Market value of equity. Panel C summarizes the percentage of firms that delist for performance-related reasons (delisting codes of 500 or between 520 and 584). Table II provides variable definitions.

Panel A: Changes in Kink

Kink	Average kink				Change from
group	Current (*t*)	Year *t* +1	Year *t* +2	Year *t* +3	*t* to *t* +3
1 (Low)	0.000	0.715	0.895	1.087	1.087
					5.230
2	0.477	1.133	1.210	1.359	0.882
					6.420
3	1.649	1.703	1.735	1.763	0.114
					0.990
4	3.748	3.307	3.170	3.094	-0.654
					-5.970
5 (High)	7.610	6.425	5.965	5.615	-1.995
					-24.500

Panel B: Changes in Leverage

Kink	Average leverage				Change from
group	Current (*t*)	Year *t* +1	Year *t* +2	Year *t* +3	*t* to *t* +3
1 (Low)	0.250	0.251	0.252	0.260	0.010
					0.720
2	0.361	0.355	0.349	0.344	-0.017
					-0.860
3	0.357	0.358	0.357	0.356	-0.002
					-0.100
4	0.221	0.233	0.243	0.249	0.028
					1.920
5 (High)	0.081	0.096	0.109	0.121	0.039
					4.420

Panel C: Changes in Listing Status

Kink	Delisting within		
group	Year *t* +1	Year *t* +2	Year *t* +3
1 (Low)	0.061	0.131	0.187
2	0.023	0.060	0.094
3	0.008	0.023	0.041
4	0.004	0.010	0.017
5 (High)	0.009	0.017	0.024

Table IV: Partial Adjustment Model

This table presents regressions estimated from annual cross-sectional regressions using the Fama and MacBeth (1973) procedure with Fama and MacBeth *t*-statistics listed in *italics* below the coefficient estimates. The dependent variables are different measures of the change in leverage. Columns 1 and 3 scale by Debt + Book value of equity (*BVE*) and columns 2 and 4 scale by Debt plus Market value of equity (*MVE*). Target debt equals the Kink at year *t* multiplied by year *t* Debt. Both target debt and prior year debt, $Debt_{t-1}$ are scaled by Debt + *BVE* in columns 1 and 3 and by Debt + *MVE* in column 2. Earnings equal Net income before extraordinary items (*Compustat IB*) plus Interest expense (*XINT*). The sample for the regressions includes the 60,779 firm-year observations with available data and positive debt and interest expense from our full sample of 72,325 firm years. Table II provides variable definitions. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

	$\Delta\left(\frac{Debt_t}{(Debt+BVE)_t}\right)$	$\Delta\left(\frac{Debt_t}{(Debt+MVE)_t}\right)$	$\frac{\Delta Debt_t}{(Debt+BVE)_t}$	$\frac{\Delta Debt_t}{(Debt+MVE)_t}$
Target $Debt_t$	0.045 ***	0.042 ***	0.025 ***	0.035 ***
	14.516	*20.387*	*11.555*	*14.946*
$Debt_{t-1}$	-0.474 ***	-0.157 ***	-0.082 ***	-0.070 ***
	-8.524	*-17.397*	*-7.310*	*-8.752*
$\Delta Earnings_t / Assets_t$	-0.235 ***	-0.223 ***	-0.394 ***	-0.258 ***
	-8.576	*-12.156*	*-13.493*	*-9.503*
$\Delta Earnings_{t-1} / Assets_t$	-0.106 ***	-0.102 ***	-0.200 ***	-0.132 ***
	-7.084	*-9.152*	*-9.562*	*-8.920*
$\Delta Assets_t / Assets_t$	0.035 ***	0.087 ***	0.556 ***	0.378 ***
	3.048	*15.160*	*22.990*	*19.477*
$\Delta Assets_{t-1} / Assets_t$	-0.038 ***	-0.011 **	-0.054 ***	-0.019
	-5.452	*-2.217*	*-3.315*	*-1.106*
Constant	0.140 ***	0.021 ***	-0.007	-0.012 ***
	7.310	*6.142*	*-1.309*	*-3.125*
Average R^2	0.478	0.205	0.450	0.372
Observations	60,779	60,779	60,779	60,779
Years	27	27	27	27

Table V: Leverage and Future Returns

This table presents regressions estimated from annual cross-sectional regressions using the Fama and MacBeth (1973) procedure with Fama and MacBeth *t*-statistics listed in italics below the coefficient estimates. The dependent variable is the Buy-and-hold return as defined in Table II. Excess debt equals Debt × (1 – Kink) and Target debt equals Debt × Kink. Table II defines the remaining independent variables. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
$Kink_t$			0.007 ***	0.007 **	0.006 **	0.006 **	
			2.806	*2.733*	*2.572*	*2.351*	
Excess $debt_t$ /MVE_t							-0.021 **
							-2.693
Target $debt_t$ /MVE_t							-0.013
							-1.441
ND_t /MVE_t	-0.018 *		-0.013				
	-1.979		*-1.262*				
$Debt_t$ /MVE_t		-0.019 **		-0.014	-0.012	-0.013	
		-2.124		*-1.419*	*-1.311*	*-1.375*	
Preferred $stock_t$ /MVE_t		0.043		0.054	0.057	0.072	0.054
		0.879		*1.109*	*1.168*	*1.534*	*1.153*
$Cash_t$ /MVE_t		0.131 ***		0.121 **	0.116 **	0.097 ***	0.106 ***
		2.955		*2.681*	*2.696*	*2.793*	*3.117*
NOA_t /$PNOA_t$	0.089 ***	0.079 ***	0.094 ***	0.084 ***	0.084 ***	0.103 ***	0.093 ***
	3.708	*3.047*	*3.732*	*3.102*	*3.204*	*4.134*	*4.067*
log(MVE_t)	-0.009	-0.008	-0.013	-0.011	-0.013	-0.012	-0.011
	-0.965	*-0.819*	*-1.448*	*-1.311*	*-1.485*	*-1.399*	*-1.189*
$Beta_t$	-0.005	-0.009	-0.002	-0.005	-0.007	-0.008	-0.009
	-0.230	*-0.396*	*-0.094*	*-0.253*	*-0.322*	*-0.413*	*-0.464*
% Foreign $Sales_t$					0.105 **	0.108 **	0.115 ***
					2.477	*2.629*	*2.885*
R&D/$Sales_t$					0.009	0.012	0.007
					1.149	*0.893*	*0.578*
% Shares held					-0.218	-0.222	-0.240
for $Conversion_t$					*-1.159*	*-1.148*	*-1.228*
Constant	0.163 **	0.150 **	0.148 **	0.136 *	0.142 **	0.126 *	0.146 **
	2.352	*2.247*	*2.095*	*1.994*	*2.141*	*1.916*	*2.282*
Average R^2	0.033	0.035	0.036	0.038	0.041	0.042	0.040
Observations	72,325	72,325	72,325	72,325	72,325	65,878	65,878
Years	27	27	27	27	27	27	27

Table VI: The Kink in a Bankruptcy Prediction Model

This table estimates a bankruptcy prediction model as in Shumway (2001). The dependent variable in the logit regressions, defined in Table II, is an indicator that equals one when the firm has a performance-related delisting within the next three years and zero otherwise. Firms are included in the regression sample until the first year in which the indicator variable equals one, after which they are omitted. The standard errors are adjusted by multiplying the standard covariance matrix by the average number of observations per firm. Table II defines the independent variables Market value of equity (*MVE*) and Kink. Other dependent variables are Net income (*Compustat* item *NI*), Assets (*AT*) and Total liabilities (*LT*). Total market value is the total value of securities on the NYSE and AMEX stock exchanges. Abnormal return is the firm's buy-and-hold return during the fiscal year less the buy-and-hold return of the value-weighted NYSE/AMEX market index. Volatility is the standard deviation of the residuals from regressing the firm's monthly returns on the return of the NYSE/AMEX value-weighted index. The area under the Receiver Operating Characteristic (ROC) curve is a measure of the model's diagnostic value that ranges from 0.5 for uninformative models to 1.0 for perfectly informative models. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

	Model 1	Model 2
Net income$_t$ /Assets$_t$	-0.726 **	-0.607 **
	-2.425	*-2.019*
Liabilities$_t$ /Assets$_t$	1.751 ***	1.330 ***
	4.354	*3.252*
MVE $_t$ /Total market value$_t$	-0.518 ***	-0.455 ***
	-9.245	*-7.822*
Abnormal return$_t$	-0.152	-0.134
	-1.109	*-0.997*
Volatility$_t$	1.914 ***	1.772 **
	2.614	*2.400*
Kink$_t$		-0.198 ***
		-3.718
Constant	-11.052 ***	-9.763 ***
	-16.013	*-12.940*
Pseudo R^2	0.129	0.141
Area under ROC curve	0.815	0.822
Observations	67,549	67,549
Average Years/Firm	8.1	8.1

Table VII: Information in the kink about future earnings and asset growth

This table presents regressions estimated the Fama and MacBeth (1973) procedure with Fama and MacBeth *t*-statistics listed in italics below the coefficient estimates. The dependent variable in Panel A is the change in Earnings (*Compustat* item *OIADP*) deflated by year *t* Assets (*AT*), (Earnings_{t+k} - Earnings_{t+k-1})/Assets_t. The dependent variable in Panel B is the average annual change in Earnings deflated by year *t* Assets, (Earnings_{t+k} - Earnings_t)/($k \times \text{Assets}_t$). Table II defines Book-to-market (*BVE*/*MVE*). The sample in each regression includes firm/year observations with available data from the sample of 72,325 described in Table I. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Cumulative earnings changes (Earnings_{t+k} - Earnings_t)/($k \times \text{Assets}_t$)

	t + 1 vs. t		t + 2 vs. t	
Kink_t	0.000		0.000	
	0.362		*1.412*	
BVE_t/MVE_t	-0.018	***	-0.003	*
	-6.460		*-1.973*	
Change in Earnings	-0.181	***	-0.112	***
(Earnings_t - Earnings_{t-1})/Assets_{t-1}	*-9.878*		*-12.407*	
Constant	0.018	***	0.008	***
	6.144		*3.142*	
Average R^2	0.045		0.035	
Observations	65,618		58,800	
Years	27		26	

Panel B: Cumulative asset growth ((Assets_{t+k} - Assets_t)/($k \times \text{Assets}_t$)

	t + 1 vs. t		t + 2 vs. t	
Kink_t	0.003	**	0.000	
	2.293		*0.390*	
BVE_t/MVE_t	-0.163	***	-0.166	***
	-16.477		*-14.344*	
Change in Assets	0.154	***	0.126	***
(Assets_t - Assets_{t-1})/Assets_{t-1}	*7.471*		*6.126*	
Constant	0.226	***	0.257	***
	17.099		*16.983*	
Average R^2	0.051		0.044	
Observations	65,618		58,800	
Years	27		26	

Table VIII: Relation between Kink and Returns Controlling for Fundamentals

This table presents regressions estimated from annual cross-sectional regressions using the Fama and MacBeth (1973) procedure with Fama and MacBeth *t*-statistics listed in *italics* below the coefficient estimates. The dependent variable is the Buy-and-hold return as defined in Table II. Table II also defines the regressors Kink, Debt, Book-to-market (*BVE*/*MVE*), Market value of equity (*MVE*) and Beta. Earnings equal Net income before extraordinary items (*Compustat IB*) plus Interest expense (*XINT*). Assets are *Compustat* item *AT*. The sample includes the 65,618 firm/year observations with available data from the sample of 72,325 described in Table I. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
$Kink_t$	0.006 ***	0.006 ***	0.006 ***	0.004 *	0.003	0.002
	2.921	*2.911*	*2.919*	*1.789*	*1.528*	*0.960*
Change in debt		-0.040	-0.025	-0.503 ***	-0.021	-0.370 ***
$(Debt_{t+1}-Debt_t)/(Debt + BVE)_t$		*-1.371*	*-1.002*	*-8.424*	*-0.739*	*-7.622*
Change in Earnings			1.172 ***			1.010 ***
$(Earnings_{t+1}-Earnings_t)/Assets_t$			*10.652*			*11.120*
Change in Assets				0.384 ***		0.297 ***
$(Assets_{t+1}-Assets_t)/Assets_t$				*8.243*		*8.056*
Performance-related delisting					-0.486 ***	-0.367 ***
within 3 years					*-13.918*	*-13.632*
BVE_t/MVE_t	0.069 ***	0.068 ***	0.091 ***	0.127 ***	0.061 ***	0.129 ***
	3.142	*3.066*	*4.449*	*6.251*	*2.811*	*6.881*
$\log(MVE_t)$	-0.017 *	-0.017 *	-0.014	-0.014	-0.028 ***	-0.020 **
	-1.868	*-1.854*	*-1.587*	*-1.531*	*-2.972*	*-2.308*
$Beta_t$	-0.002	-0.002	0.000	-0.008	0.002	-0.001
	-0.082	*-0.086*	*0.018*	*-0.327*	*0.066*	*-0.044*
Constant	0.182 ***	0.182 **	0.143 **	0.101 *	0.269 ***	0.153 **
	2.789	*2.767*	*2.246*	*1.712*	*3.955*	*2.551*
Average R^2	0.035	0.036	0.096	0.075	0.061	0.137
Observations	65,618	65,618	65,618	65,618	65,618	65,618
Years	27	27	27	27	27	27

Table IX: The kink and distress risk

The dependent variable in this table is the monthly excess return of the corresponding Kink portfolio. Each June 30 from 1981 to 2007, firms with fiscal year ends from April of the prior year to March of the current year are grouped into equally weighted portfolios based on their Kink as of the fiscal year end. Table 3 describes the Kink groups. The risk free rate is the one month US Treasury rate as provided by Kenneth French via Wharton Research Data Services (WRDS). The factor mimicking portfolios Market, Size (*SMB*), Book-to-Market (*HML*) and Momentum (*UMD*) are also provided by Kenneth French via WRDS. The Financial Distress Risk (*FDR*) returns mimic a portfolio that has a long position in BAA bonds and a short position in AAA bonds. We obtain monthly bond yield data from the Federal Reserve's H15 report via WRDS and convert yields to returns using the approximate log-linear relation described in Campbell, Lo and MacKinlay (1997). The table reports *t*-statistics below the coefficient estimates.

Kink group	Constant	Market	*SMB*	*HML*	*UMD*	*FDR*	N	Adjusted R^2
1 (Low)	-0.002	0.872	1.120	0.065	-0.200	0.425	324	0.745
	-0.658	17.458	17.385	0.852	-4.454	2.148		
2	-0.001	0.947	0.899	0.379	-0.211	0.224	324	0.830
	-0.532	27.931	20.561	7.358	-6.938	1.669		
3	0.000	0.971	0.691	0.436	-0.136	0.129	324	0.916
	0.308	46.856	25.870	13.874	-7.275	1.571		
4	0.002	0.985	0.577	0.305	-0.149	0.027	324	0.922
	1.346	49.064	22.289	10.025	-8.231	0.342		
5 (High)	0.004	0.978	0.656	0.044	-0.204	-0.070	324	0.936
	3.812	48.758	25.349	1.462	-11.341	-0.881		