Leverage, Excess Leverage and Future Stock Returns

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Abstract

We examine the relation between leverage and future stock returns while simultaneously considering the dynamic nature of firm's leverage. Using Graham's (2000) "kink" measure as a proxy for excess leverage, we find supportive evidence that firm's leverage can be characterized by a partial adjustment model. Excess leverage predicts not only future changes in leverage, but also other fundamentals such as investment and profitability. The market does not seem to fully understand the information contained in excess leverage about future fundamentals (especially investments), and under-levered firms earn superior risk adjusted returns through unexpected growth. The anomalous finding by Penman, Richardson and Tuna (2007), that the relation between leverage and future returns is negative, is subsumed by the negative relation between excess leverage and future returns.

1. Introduction

The purpose of this study is to examine the relation between leverage and future returns while simultaneously considering the dynamic nature of the firm's leverage. Static asset pricing theories such as the CAPM or the APT predict that leverage affects expected returns on equity only through equity betas (loadings) on systematic factors. Controlling for the effects of leverage on equity factor risks, 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. However, having decomposed the book-to-market ratio into operating and leverage components, Penman, Richardson, and Tuna (2007) find a negative association between leverage and future returns suggesting a more complex relation than extant theory would predict.

We conjecture that relaxing the implicit assumption that capital structure is fixed may lead to a better understanding of the relation between leverage and future returns. Similar to Brennan and Schwartz (1984) and Myers (1984), we adopt the view that a firm's capital structure is dynamic. Specifically, it is plausible that leverage temporarily deviates from its optimum due to random shocks and the resulting distortion, or excess leverage, is not immediately resolved due to transactions costs. We consider a partial adjustment model that parsimoniously captures such a process (e.g., Fama and French, 2002, and Shyam-Sunder and Myers, 1999). The dynamic nature of capital structure suggests that the firm's current excess leverage may not only be predictive of future changes in leverage *per se*, but may also contain information about other inter-related fundamentals such as future investment and profitability that, in turn, impact on the risks and payoffs that determine firm value. If the market fully recognizes the dynamic nature of capital structure and the information contained in excess leverage, then we should observe that current excess leverage predicts future changes in fundamentals but not future returns. However, if the market fails to fully recognize the information contained in excess leverage, then we should find that excess leverage can not only predict future changes in fundamentals but also future stock returns.

Similar to Fama and French (2002) and Shyam-Sunder and Myers (1999), we test the partial adjustment model by examining whether there is mean reversion in leverage. Unlike prior research that uses cross-sectional regressions to estimate excess leverage, we adopt the "kink" measure developed by Graham (2000) as our empirical proxy. The kink is defined as the ratio of the maximum interest that could be deducted for tax purposes before expected marginal benefits begin to decline, to actual interest incurred.[1] 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, tax benefits are arguably a principle consideration in leverage decisions. Second, in estimating marginal tax benefits, the kink is based on the most detailed empirically-based forecasts in the literature for firms' future pre-tax earnings, suggesting that the kink may implicitly mitigate the inherent noise due to the lack of consideration of other factors that go into the determination of optimal leverage. Third, because the kink is based on an estimate that involves projections over multiple periods, it is sensitive to the persistence of earnings changes. These considerations strongly suggest that the kink may capture information about other fundamentals such as future investment and profitability. Fourth, Graham's

[1] We elaborate on how this measure is constructed in section 2.

analysis generated considerable controversy regarding whether firms, on average, have been employing appropriate levels of leverage. Accordingly, a detailed analysis of the properties of this measure is interesting on its own right.[2] While prior research examines whether Graham's kink-based analysis understates the cost of leverage in aggregate (e.g., Molina, 2005, and Almeida and Philippon, 2007), it is silent on the cross-sectional effects addressed in this study.

In support of the partial adjustment model of leverage, we find strong evidence that kinks revert toward a presumed optimum of one, implying that current kinks predict future changes in leverage. The elements that drive mean reversion for positive and negative excess leverage are different. The high kink (under-leveraged) firms tend to reduce their kink by increasing their debt, while the low kink firms tend to keep their debt constant with the increase in the kink for that group coming from delisting of over-leveraged firms as a consequence of financial distress. In addition to predicting future changes in leverage, the kink also contains information about future investments and profitability for high kink firms. While high kink firms generally exhibit an increase in investment and profitability in the next one to two years, the results for the low kink firms are contaminated by the survivorship bias as highly distressed firms tend to delist and disappear from the sample. The result on growth is consistent with the pecking order theory of capital structure (e.g., Myers 1984), where firms are more likely to expand when they have more financial slack.

Next, in cross-sectional regression tests, we find that high kinks predict positive future stock returns. This result suggests a link with Penman et al's (2007) anomalous

[2] Recent papers on this issue include Graham, Lang, and Shackelford (2004), Molina (2005), Almeida and Philippon (2007), Foley, Hartzell, Titman, and Twite (2007), van Binsbergen, Graham, and Yang (2008), and Blouin, Core and Guay (2008).

finding because the kink has a negative correlation with the observed financial leverage.[3] To examine the nature of this link, we regress future returns on the kink and financial leverage, while controlling for all the other varaibles employed by Penman et al (2007). In the sample period that overlaps with Penman et al, we confirm a negative correlation between leverage and future returns. However, we find that that once we control for excess leverage by including the kink, this correlation becomes insignificant. The implication is that the negative correlation can be attributed to excess leverage instead of leverage *per se*. We further find that the correlation between excess leverage and future returns persists over a longer sample period than that considered in Penman, et al. while the correlation between leverage as they measure it and future returns does not persist.

Our evidence on whether risk or market inefficiency can explain the positive correlation between high kinks and future returns is more consistent with an inefficiency explanation. Employing portfolio-based time series pricing tests, where we control for conventional risk factors (Fama and French, 1992; Carhart, 1997), we find positive Jensen's alphas for the high kink portfolios. To address the possibility that the result may be an artifact of distress risk premium (Almeida and Philippon, 2007), we augment the Carhart four-factor model with a distress risk factor mimicked by the return spread of high and low quality bonds, and find that the alphas for the high kink firms barely changed. We further observe that, contrary to Almeida and Philippon's (2007) conjecture, the high kink firms actually have lower loadings on the distress risk factor than low kink firms. These results are consistent with market inefficiency rather than inadequate controls for risk.

[3] A negative correlation between the kink and leverage is expected because excess leverage should be positively correlated with leverage.

To ascertain whether the return predicting power of the kink emanates from the market's failure to fully recognize the information contained in current excess leverage about future fundamentals, we conduct a Mishkin (1983) type test and regress future returns on the current kink both with and without controls for future changes in leverage, investments, and profitability. We found the coefficient on the kink decreases by nearly half when controlling for one year-ahead fundamentals; and it becomes indistinguishable from zero when we control for two years-ahead fundamentals. Both effects are primarily driven by the relation between firms' kinks and their future investments. Hence, our suggestion that the positive correlation between high kinks and future returns is largely due to the market's failure to fully recognize the information contained in excess leverage for future fundamentals is further reinforced.

Our study contributes to the literature in three major aspects. First, our findings are supportive of a partial adjustment model for leverage parameterized by a Graham's (2000) kink as a proxy for excess leverage. Adding the fact that the kink is derived from tax factors, these findings suggest that taxation may be a principal driver in firms' capital structure decisions. Second, because the kink largely subsumes the forecasting power of financial leverage in predicting future returns, our analysis suggests a plausible explanation for Penman et al's (2007) anomalous finding, and thus addresses a concern raised by other researchers (e.g., Piotroski, 2007). Our finding that the market does not appear to fully understand the information in excess leverage about future firm fundamentals adds to the body of literature that finds inefficiency in the market's interpretation of leverage information (Spiess and Affleck-Graves 1999, Dichev and Piotroski 2001). Third, our analysis contributes depth to the debate in the finance literature on the extent to which firms are under-levered. While Graham (2000) claims that under-leverage is large and prevalent, Graham, Lang and Shackelford (2004), Molina (2005), and Almeida and Philippon's (2007) counter that, factors such as non-debt tax shields, under-estimated probability of default, and a distress risk premium work against such a claim. Our results are consistent with the existence of both positive and negative excess leverage in the cross-section, although they are silent on the average magnitude of such excess leverage.

The remainder of this paper is organized as follows: Section 2 presents our sample, measurement issues and descriptive statistics. Section 3 is divided into three subsections. In subsection 3.1, we test a partial adjustment model for leverage; in subsection 3.2, we document positive relation between the kink and future stock returns, and show that this effect substantially subsumes the negative relation documented by Penman et al (2007); and in subsection 3.3, we conduct tests that attempt to disentangle whether the effect documented in section 3.2 is due to risk or market inefficiency. Section 4 concludes.

2. Research Design

2.1 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* #6), net income before extraordinary items (#18), shares outstanding

(#25), common equity (#60), and end-of-year price (#199). We further eliminate financial institutions (SIC codes 6000-6999), firms with non-positive book value of equity, book value of equity plus debt net of financial assets, or market value of equity plus debt net of financial assets. Last, we truncate for outlier balance sheet ratios at the 1st and 99th percentiles.[4] Our final sample consists of 78,418 firm-years. Table 1 summarizes our sample selection process.

(Insert Table 1 about here)

The kink is defined as follows:

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

where "Optimal" 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 debt used, the firm's tax benefit is:

$$\frac{[(1-\tau_p)-(1-\tau_c)(1-\tau_e)]}{(1-\tau_p)}$$

where τ_p is the personal tax rate on interest income, τ_e is the personal tax rate on equity income, and τ_c is the corporate tax rate. Among the three tax rates, only τ_c varies as the firm uses more or less debt. Graham (2000) estimates the firm's entire marginal corporate tax curve by simultaneously considering the uncertainty about 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 alternative minimum tax. His work is an expansion of Shevlin (1990).

[4] 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.

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 investment tax credit, the tax code is intrinsically dynamic. A firm's tax rate in any particular year potentially depends on its earnings in the prior three years and in the next eighteen years. To model the dynamic behavior of earnings before interest and taxes, Graham assumes a random walk model with drift:

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

where $\Delta EBIT_{it}$ is the first difference in earnings before interest and taxes, μ_i is the maximum of zero and firm *i*'s mean change in *EBIT*. The disturbance ε_{it} is assumed to have a zero mean normal distribution. For any firm *i* and year *t*, the means and variances are estimated using all firm *i*'s available data up to year $t-1$. $EBIT_{it}$ is measured before extraordinary items using *Compustat* data.

To estimate the before financing marginal tax rate, a forecast of $EBIT_{it}$ 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. Projected taxes in years t + 1 through t + 18 are discounted using the average corporate bond yield from Moody's; taxes from t - 3 through t - 1 are not compounded because tax refunds do not involve interest. The tax bill is calculated using the entire corporate tax schedule gathered from Commerce Clearing House publications. Next, $10,000 is added to 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 plus Preferred stock less Cash (*Compustat* #1). Debt equals the Current portion of long-term debt (#34) plus Long-term debt (#9). Preferred stock equals Preferred stock (#130) plus Preferred dividends in arrears (#242) less Preferred treasury stock (#227).

Market value of equity (MVE):

Price (#199) times Shares outstanding (#25).

Book value of equity (BVE):

Common equity (#60) plus Preferred treasury stock (#227) less Preferred dividends in arrears (#242).

Net operating assets (NOA):

Book value of equity plus Net debt.

The 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.

2.2 Descriptive Statistics

Table 2 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). Some differences are expected since the two samples cover different time periods. 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 0.559, the median is only 0.251, 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 suggests that 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 2 about Here)

Comparing the distribution quartiles of the book to market ratio (*BVE/MVE*) with those of the de-levered book to market ratio (*NOA*/*PNOA*), we find that the differences are quite small. The same is true when we when we examine the pair-wise correlations in Panel B. The correlation between *BVE/MVE* and *NOA/PNOA* is above 90% for both Pearson and Spearman measures.

Important in our later analysis, we note that the kink is negatively correlated with the financial leverage with a Spearman correlation of -0.309. 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 *BE*/*MVE* suggest that more highly-valued firms tend to have greater unused debt capacity.

3. Empirical analysis

3.1 Partial Adjustment Model

In this subsection, we test a partial adjustment model of leverage. Under this model, 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 3 presents some preliminary evidence of the mean reversion feature of the kink. We sort firms into quintiles based on the magnitude of the kink. 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.[5]

(Insert Table 3 About Here)

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 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 0.225 and 0.081 to 0.254 and 0.121, respectively. However, changes in leverage ratios for quintile portfolios 1 and 2 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 are increased for the sample. The constant sample in Panel B excludes firms that are

[5] 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.

delisted within the three-year horizon subsequent to measuring kinks and therefore excludes those firms that were unable to recover from financial distress.

It is possible 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 possibility. As presented in Panel C, we find significant increases in delisting for low kink firms: 21.2% of quintile portfolio 1 firms and 11% of quintile portfolio 2 firms delist within three years. This is in sharp contrast to high kink firms, whose delisting frequencies are only 2.6% for quintile portfolio 5 and 1.9% 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 more difficult to raise financing when the firm is in distress, than paying back debt or buying back equity when the firm has financial slack.

As noted earlier, Molina (2005) challenges Graham's (2000) claim that firms are on average under-levered by showing that the probability of distress can be severely under-estimated because firms face higher expected costs than Graham has estimated. However, the evidence in Panel C contradicts this argument in the cross-section. If the probability of financial distress can effectively offset the apparent under-leverage, we should observe that high (low) kink firms have high (low) frequency of delisting. What we found is just the opposite. As will be shown later, the notion that high (low) kink firms face low (high) distress risk is further supported by their quintile portfolio loadings on a distress risk factor.

To test the partial adjustment model directly, we follow Fama and French (2002) and test the following regression model:[6]

$$\begin{aligned}&\frac{\text{Debt}_{i,t+1}}{(\text{Debt}+BVE)_{i,t+1}}-\frac{\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}}\\&\quad=\alpha_{0,t}+\alpha_{1,t}\text{Kink}_{i,t}\frac{\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}}+\alpha_{2,t}\frac{\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}}+\alpha_{3,t}Z_{i,t}+\eta_{i,t}\end{aligned}, \quad (3)$$

where $\frac{\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}}$ is the measure of leverage for firm *i* in year *t*, $\text{Kink}_{i,t}\frac{\text{Debt}_{i,t}}{(\text{Debt}+BVE)_{i,t}}$ is "target leverage"[7], and $Z_{i,t}$ is a vector of control variables including contemporaneous and lagged growth in both (scaled) earnings and total assets:

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

These variables are included to account for temporary variations to the partial adjustment model 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. The magnitudes of these coefficients speak to the speed of adjustment, with large magnitudes indicating higher speed.

The regression results are presented in Table 4. 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 three variations of the change in leverage and both book value and market value of assets as deflators. The three specifications generated similar qualitative results insupport of the

[6] 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).
[7] Recognizing that interest expense is determined by the interest rate applied to debt this product reduces to the optimal level of debt scaled by debt plus equity.

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 generally larger than the coefficients on the target debt in absolute magnitudes, suggesting that the target debt may contain considerable noise. 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 4 About Here)

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. Moving to asset growth, we note that contemporaneous 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.

3.2 Predicting Future Returns

In the prior section, we have provided evidence consistent with a partial adjustment model of leverage. The model suggests that the firm's capital structure decision is intrinsically dynamic. The firm may be under or over levered temporarily due to shocks, and, because of transactions costs, it can only gradually address the distortion in leverage over time. In this dynamic setting, the firm's current (excess) leverage may contain information about the firm's future fundamentals. It is then an empirical question whether the market fully understands the information contained in the current excess leverage.

In this and the remaining sections, we examine the relation between excess leverage and future returns. We find a robust positive relation between the kink and future returns that substantially subsumes the negative relation between leverage and future returns documented by Penman et al (2007). In an effort to disentangle risk versus inefficiency explanations, we find further evidence inconsistent with a risk explanation, but consistent with the notion that the market fails to understand fully the information contained in current excess leverage about future firm fundamentals.

To begin, we estimate the relation between the kink and future returns using the following cross-sectional regression:

$$\begin{aligned} R_{i,t+1} = \gamma_{t,0} + \gamma_{t,1} D^{L}_{i,t} \times \text{Kink}_{i,t} + \gamma_{t,3} D^{H}_{i,t} \times \text{Kink}_{i,t} \\ + \gamma_{t,3} BVE_{i,t} / MVE_{i.t} + \gamma_{t,4} \log(MVE_{i,t}) + \gamma_{t,5} \text{Beta}_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where

$R_{i,t+1} \equiv$ one year buy-and-hold return beginning at the start of the fourth month after firm *i*'s fiscal year end *t*,[8]

$D^{L}_{i,t} \equiv$ dummy variable equaling one for $\text{Kink}_{i,t} \leq 1$ and zero otherwise,

$D^{H}_{i,t} \equiv$ dummy variable equaling one for $\text{Kink}_{i,t} > 1$ and zero otherwise.

We estimate equation (4) in each year and present the average estimates and the associated t-statistics using the Fama and MacBeth (1973) method. We allow for the possibility that positive and negative excess leverage firms have differential relations

[8] 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.

with future returns by including dummy variables that classify firms according whether the kink is greater than one. This choice is motivated by our finding in the prior section that high/low excess leverage firms may face differential transactions costs when they adjust their leverage over time. We control for size, book to market and beta, which are firm characteristics commonly thought to predict future returns based on either theory or empirical analysis.

Table 5 presents the results of regressions based on equation (4). The results for Model 1 are broadly consistent with the findings in the prior literature. While the book to market ratio significantly predicts future returns with a coefficient estimate of 0.079 (t value of3.894), neither size nor firm beta have any return prediction power. The result on size differs from that documented by Fama and French (1992) because our data cover a more recent sample period (Horowitz, Loughran and Savin, 2000). Adding the kink variable to the regression equation in Model 2, we find that for high kink firms the kink has a positive coefficient of 0.007 with a t value of 3.265, and for low kink firms the coefficient is negative but insignificant. The coefficients on the control variables are slightly changed due to the correlation between the kink and these variables. Combining this evidence with the positive correlation between the kink and future returns as documented in Table 2, we conclude that the kink captures information relevant to future returns.

(Insert Table 5 About Here)

3.3 Revisiting Penman et al's (2007)Decomposition

As mentioned earlier, Penman et al (2007) also examine the relation between financial leverage and future returns, and find a negative relation. Given that the kink and leverage are negatively correlated with a correlation coefficient of -0.309, our result and Penman et al's are quite possibly related. To investigate relation between the two, we conduct a joint regression analysis including both the kink and Penman et al variables as controls. In particular, we consider the following specification:

$$\begin{aligned} R_{i,t+1} = \lambda_{t,0} + \lambda_{t,1} D_{i,t}^{L} \times \text{Kink}_{i,t} + \lambda_{t,2} D_{i,t}^{H} \times \text{Kink}_{i,t} + \lambda_{t,3}\, ND_{i,t} / MVE_{i,t} \\ + \lambda_{t,4}\, NOA_{i,t} / PNOA_{i,t} + \lambda_{t,5} \log(MVE_{i,t}) + \lambda_{t,6} \text{Beta}_{i,t} + \upsilon_{i,t} \end{aligned} \quad (3)$$

where $ND_{i,t}/MVE_{i,t}$ is financial leverage and $NOA_{i,t}/PNOA_{i,t}$ is the de-levered book to market ratio.

Since our sample and Penman et al's (2007) sample cover different time periods, our analysis initially focuses on a sub-period common to both samples, from 1980 to 2001. The results are presented in Panel A of Table 6. Model 1 is the Penman, et al specification, where we confirm a significant negative partial correlation between leverage and future returns; the average coefficient on financial leverage, $ND_{i,t}/MVE_{i,t}$, is -0.025 with a t value of -2.765. Since net debt is composed of debt, preferred stock, and negative cash, and it is possible that these three components have differential relations, in Model 2, we decompose net debt into these components and include them individually in the regressions. The result indicates that the return prediction power is primarily driven by $\text{Debt}_{i,t}/MVE_{i,t}$ and $\text{Cash}_{i,t}/MVE_{i,t}$; the average coefficient on $\text{Preferred Stock}_{i,t}/MVE_{i,t}$ is insignificant.

(Insert Table 6 About Here)

Moving to Models 3 and 4, where we add the kink variable to Models 1 and 2, respectively, we find that the kink variable is consistently significant with an average coefficient estimate of 0.009 and t values above 3.3. This suggests that financial leverage or its components do not subsume the information in the kink about future returns. However, comparing coefficient estimates for Model 3 with those for Model 1, we find that the average coefficient on leverage, $ND_{i,t}/MVE_{i,t}$, decreases about 30% and the t value decreases from 2.765 to 1.673, the latter being insignificant at conventional levels. Comparing this result with the change in coefficient estimates from Model 2 to Model 4, we find this change in primarily driven by the decrease in the coefficient of $\text{Debt}_{i,t}/MVE_{i,t}$.

Adding a more recent subsample, from 2002 to 2006, to the analysis, we notice two significant changes (Panel B). First, financial leverage as measured by $ND_{i,t}/MVE_{i,t}$ is no longer significant in the return prediction regression (Model 1). The reason for this change is that $\text{Debt}_{i,t}/MVE_{i,t}$ is no longer significant while $\text{Cash}_{i,t}/MVE_{i,t}$ continues to be significant with a t value of 2.797 (Model 2). Second, the kink is significant and positive in both Model 3 and Model 4, with an average coefficient estimate of 0.007 and similar t values.

In sum, the results in Table 6 show that the positive relation between the kink and future returns is a more robust phenomenon than the negative relation between financial leverage and future returns. While the former is significant in all sample periods examined, the latter ceases to be significant in a more recent period. Moreover, in the earlier sample period where financial leverage significantly predicts future returns, the inclusion of the kink effectively renders the average coefficient on financial leverage insignificant. Although it is not the focus of this paper, our finding that $\text{Cash}_{i,t}/MVE_{i,t}$ can consistently predict future returns is unexpected and warrants future research.

Because the kink is expected to be correlated with a number of firm characteristics, we conduct a series of additional tests to ensure that the effect we document is novel. Bates, Kahle and Stulz (2007) find that R&D intensive firms tend to have high cash holdings, a form of negative leverage. To control for this relation, we use ratios of R&D expense to sales to proxy for a firm's R&D intensity. Foley, Hartzell, Titman and Twite (2007) find that firms with profitable foreign subsidiaries tend to hold cash in order to defer repatriation taxes. We use the percentage of foreign sales to total sales as a proxy for this incentive.[9] Lastly, 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* #40/(#40 + #25)) as in Huson, Scott and Wier (2001). In un-tabulated results, we find no change in the average coefficient estimate for the kink in association between these variables and returns when we append them to the regression specification (4). This suggests that the relation between the kink and returns is not due to the kink serving as a proxy for a firm's R&D intensity, exposure to international risk, or employee stock option plans.[10]

3.4 Controlling for Risk

In the prior section, we have established that the kink can predict future returns in cross-sectional regressions inclusive of various firm characteristics for which the kink

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

[10] We do find that the percentage of foreign sales and the percentage of shares reserved for conversion have explanatory power in regressions of Kink and of *ND*/*MVE* on the control variables in (3). The percentage of foreign sales is positively associated with Kink and negatively associated with *ND*/*MVE*, consistent with Foley, Hartzell, Titman and Twite (2007). The percentage of shares reserved for conversion has a significant negative association with Kink and a significant positive association with *ND*/*MVE*, suggesting that it is a poor proxy for employee stock option plans.

may be thought to be a proxy. An immediate question is whether the ability of the kink to predict future returns is due to the kink capturing a priced risk or market inefficiency. To address this question, we employ two sets of tests. In the first set, we use time series factor regressions similar to Fama and French (1993) to examine whether abnormal returns remain after controlling for common risk factors, as well as a new credit risk factor. In the second set, we examine whether the positive relation between the kink and future returns can be explained by the market's incomplete reactions to information contained in the kink about a firm's future fundamentals.

Turning to the first set of tests, at the end of March for each year, we form equally weighted quintile portfolios based on the value of the kink as of the fiscal year end. [11] The portfolios are kept constant until the end of March in the next year. We then run time series regressions with monthly frequency using the Carhart's (1997) four factor model:

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

where

$R_{p,t} \equiv$ excess return for month t on a portfolio of firms p, measured as the difference between portfolio return and the return on one month treasury bill,

$\text{Market}_t \equiv$ excess return for the market portfolio in month t,

$SMB_t \equiv$ return for month t on a factor mimicking portfolio for size,

$HML_t \equiv$ return for month t on a factor mimicking portfolio for book-to-market, and

[11] Because kinks take on discrete values, we are unable to form exact quintiles. Portfolio 1 contains 16,426 firm-years for kinks of 0, Portfolio 2 contains 9,134 firm-years for kinks between 20% and 80%, Portfolio 3 contains 18,231 firm-years for kinks between 100% and 200% (i.e., near optimal leverage), Portfolio 4 contains 12,904 firm-years for kinks between 300% and 500%, and Portfolio 5 contains 15,723 firm-years for kinks between 600% and 800% (the maximum).

$UMD_t \equiv$ return for month t on a factor mimicking portfolio for momentum.

The data on the factor portfolios are obtained from Ken French via WRDS. Of interest are estimates of (Jensen's) alpha, α_p, that measures abnormal returns unexplained by the factor risks.

The results are presented in Panel A of Table 7. Consistent with the earlier cross-sectional regression results, we find significant positive alphas for the high kink firms and insignificant alphas for the low kink firms. Judging from t values, the alpha for quintile portfolio 5 is quite large (t-statistic of 4.791) and those for quintile portfolios 3 and 4 are on the borderline of significance, with t values close to two. The magnitude of alpha for quintile portfolio 5 is also economically significant; its monthly value of 4 basis points annualizes to about 5% per year.

(Insert Table 7 About Here)

Next, we consider whether abnormal returns for the high kink firms are driven by risk not reflected by the factors in equation (5). In particular, Almeida and Philippon (2007) argue that financial distress may constitute a priced risk for which the risk premium may be large enough to offset the tax benefits of using debt. This occurs because firms are more likely to experience financial distress during periods of low consumption, making it relatively costly to risk-averse investors. Almeida and Philippon's (2007) argument suggests that debt should be relatively attractive to firms that perform well in periods of economy-wide financial distress and vice versa. If so, the high returns of high kink firms could be due to their exposure to financial distress risk that also explains why the firms have little debt.

To entertain this possibility, we augment equation (5) by an additional distress risk factor mimicked by a hedge portfolio that is long in BAA rated bonds and short in AAA rated bonds.[12] The results in Panel B show that the distress risk factor cannot explain away the positive Jensen's alphas for the high kink firms. The coefficient estimates for quintile portfolios 4 and 5 are unchanged, and the significance level for quintile portfolio 5 alpha remains high with a t value of 3.393. In addition, the portfolio loadings on the distress risk factor decrease monotonically from low to high kink firms, suggesting that the kink is inversely correlated with distress risk. This evidence is opposite to Almeida and Philippon's (2007) conjecture that distress risk explains firms' apparently conservative use of debt, but consistent with our finding in Table 3 that low kink firms are more likely to experience financial distress and become delisted from stock exchanges.

3.5 Case for Market Inefficiency

Inasmuch as the risk explanation does not seem to fit the data, we turn our attention to finding whether the return prediction result is driven by possible market inefficiencies. Given that firms make dynamic capital structure decisions, the firm's current excess leverage could be a state variable that carries information about the firm's future financial and investment policies. Market inefficiency will arise if the market does not fully understand such information. As we have shown in the prior section, firm's current kink can help to predict the future changes in leverage. We now expand this test and examine whether the firm's current leverage can also help to predict the future changes in profitability and asset growth, major drivers of equity value.

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[12] 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).

Specifically, for changes in profitability measured by average earnings changes, $(\text{Earnings}_{i,t+k} - \text{Earnings}_{i,t+k-1}) / k$, for firm i starting from year t, relative to assets, $\text{Assets}_{i,t}$, we have

$$\begin{aligned}\frac{\text{Earnings}_{i,t+k} - \text{Earnings}_{i,t+k-1}}{k \times \text{Assets}_{i,t}} &= \delta_{t,0} + \delta_{t,1} D_{i,t}^{L} \times \text{Kink}_{i,t} + \delta_{t,2} D_{i,t}^{H} \times \text{Kink}_{i,t} \\ &+ \delta_{t,3} \frac{BVE_{i,t}}{MVE_{i,t}} + \delta_{t,4} \frac{\text{Earnings}_{i,t} - \text{Earnings}_{i,t-1}}{\text{Assets}_{i,t-1}} + \varepsilon_{i,t}\end{aligned} \tag{6}$$

A similar regression can be defined for asset growth, $(\text{Assets}_{i,t+k} - \text{Assets}_{i,t+k-1}) / k$.

Table 8 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 earnings change in the preceding calendar year. Across the two columns representing one and two year future time horizons, the average coefficient estimate on the change in earnings is significantly negative, consistent with mean reversion in profitability. Supporting the idea that book to market ratio is inversely related to growth in earnings, we find that the average coefficient estimate on book to market is -0.013 a t value of -4.487 when the dependent variable is the next year's change in earnings. However, this effect diminishes to zero over a two year horizon. The kink's relation with future earnings growth is more complex. Out one year in the future, the coefficient on the low kink firms is significantly negative at -0.006 with a t value of -2.192; however, the coefficient on the high kink firms is not significant. Out two years in the future the significance levels reverse; the average coefficient estimate on the kink is now insignificant for the low kink firms and significantly positive for the high kink firms.

The significant coefficient for the high kink firms at two-year horizon is of particular interest recalling that we only find significant abnormal returns for the high kink firms.

In 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 for the high kink firms is significantly positive at the one year horizon, although the estimate for the two year horizon is insignificant.

(Insert Table 8 About Here)

The evidence in Tables 8 and 3 suggests that the kink contains significant amount of information about future changes in leverage, profitability and asset growth. This information is positive for high kink firms at one year or two year horizons. A plausible explanation is that the high kink firms are generally the ones that are more profitable and have substantial financial slack that translates into an ability to increase leverage and growth in the future years. The increase in leverage for under-levered firms increases firm value because the firm can enjoy more tax savings by using debt. Although the increase in profitability and asset growth do not seem to be synchronous in future years, their joint effect is consistent with an increase in total profits being positively correlated with the kink for high kink firms. In turn, this suggests that the positive partial correlation between the kink and future returns is likely driven by the market's failure to fully understand the information in the kink about the future fundamentals.

To test the above conjecture, we conduct a Mishkin (1983) type analysis employing the following regression model:

$$\begin{aligned} R_{i,t+1} = \lambda_{t,0} + \lambda_{t,1} D^{L}_{i,t} \times \text{Kink}_{i,t} + \lambda_{t,2} D^{H}_{i,t} \times \text{Kink}_{i,t} + \lambda_{t,3} \Delta\text{Debt}_{i,t+1} / \left(\text{Debt} + BVE\right)_{i,t} \\ + \lambda_{t,4} \Delta EBI_{i,t+1} / \text{Assets}_{i,t} + \lambda_{t,5} \Delta\text{Assets}_{i,t+1} / \text{Assets}_{i,t} \\ + \lambda_{t,6} BVE_{i,t} / MVE_{i,t} + \lambda_{t,7} \log(MVE_{i,t}) + \lambda_{t,8} \text{Beta}_{i,t} + \upsilon_{i,t} \qquad (7) \end{aligned}$$

where $\Delta\text{Debt}_{i,t+1}$, $\Delta EBI_{i,t}$, and $\Delta\text{Assets}_{i,t+1}$ are the first differences in debt, earnings before interest but after tax, and total assets, respectively. If one reason for the kink's ability to predict future returns is that the market fails to understand the information in the kink about future leverage, profitability, or asset growth, then, controlling for realized future as in equation (7), the average coefficient estimate on the kink should decrease compared with a regression without these controls.

The results are presented in Panel A of Table 9. In Model 1, we replicate the result that the kink is positively related for future returns. In Models 3, 4, and 5, we introduce next year's change in leverage, change in profitability, and asset growth one by one to the regression equation. Model 2 shows that the results on the kink are not affected by the inclusion of the future change in leverage in the regression. In Model 3, the inclusion of future change in profitability changes the coefficient estimate on the kink slightly, from 0.007 with a t value of 3.617 to 0.006 with a t value of 3.503. The most notable effect is observed when controlling for future asset growth as in Model 4. The coefficient estimate on the kink for high kink firms is decreased to 0.004 with a t value of 2.156, representing a 43% drop. This suggests that 43% of the positive relation between the kink and future returns is due to the market's failure in understanding the information in the kink about next year's asset growth. The result in Model 5 further demonstrates the importance of asset growth when we control for all three future changes simultaneously.

The coefficient estimates on the kink for high kink firms barely change from those in Model 4.

(Insert Table 9 About Here)

Recall from Tables 3 and 8 we find that kink contains information about future fundamentals at one and two year horizons. Considering that market prices may change not only to due to realized changes in fundamentals, but also due to changes in expectations about future changes in fundamentals, in Panel B, we repeat the analysis by including two year out asset growth, and changes in leverage and profitability as controls. Requiring the firms to have control data for two years ahead introduced a more significant survivorship bias and reduced our sample from 63,733 as in Panel A to 58,138 as in Panel B. As shown in Model 1, the effect of the kink for the high kink firms is diminished somewhat, with the average coefficient estimate standing at 0.004 with a t value of 1.890. However, the survivorship bias is unlikely to have much impact on inferences since we compare the relative magnitudes of the coefficients when controlling and not controlling for future fundamentals. In this relative sense, the results in Panel B are even stronger than those in Panel A. The inclusion of future asset growth effectively eliminates the positive relation between the kink and future returns, and the average coefficient estimate on the kink for high kink firms is insignificant at 0.001 with a t value of 0.544 in Model 4 and 0.001 with a t value of 0.426 in Model 5.

4. Conclusion

Under a partial adjustment model of leverage, at any point in time a firm may exhibit under or over leverage due to random shocks and the distortion in leverage is 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 financial and investment decisions and related profitability. 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 market inefficiencies when the market does not fully understand the information contained in excess leverage about future fundamentals.

Using Graham's kink as a proxy for excess leverage, we find evidence consistent with a partial adjustment model of leverage. In particular, excess leverage has a negative association with future changes in leverage. Furthermore, excess leverage contains information about the firm's future asset growth and changes in profitability. Different mechanisms are at work for high and low kink firms. The high kink firms are more profitable, have more financial slack, and their kinks are positively associated with future asset growth, changes in profitability, and leverage. The low kink firms are less profitable and face a higher likelihood of financial distress. The analysis on these firms is compromised by a survivorship bias in that many low kink firms encounter financial distress, become delisted from exchanges, and disappear from the sample.

In cross-sectional regressions, we find that the kink can positively predict future returns while controlling for conventional risk proxies such as size, book to market, and beta. This effect substantially subsumes the negative relation between financial leverage and future returns as documented by Penman et al (2007). We find that the correlation between excess leverage and future returns persists over a longer sample period than that considered in Penman, et al. (2007), while the correlation between leverage as they measure it and future returns does not persist. Furthermore, in the sample period that overlaps with Penman et al (2007), we find that the negative relation between leverage and future returns gives way to the positive relation between the kink and future returns.

Our results on whether risk or market inefficiency can explain the kink's return prediction power are more consistent with the latter. In calendar time time-series regressions a la Carhart (1997), we find significantly positive alphas for the high kink firms, suggesting that the cross-sectional regression results are primarily driven by these firms. Further analyses show that distress risk as suggested by Almeida and Philippon's (2007) cannot explain this finding because the alphas do not change much when we add a distress risk factor to the time series model. Moreover, the kinks are negatively correlated with the loadings on the distress factor which runs opposite to the distress risk explanation. On the other hand, our results from a Mishkin (1983) type analysis are quite strong. In particular, we find that the kink's positive relation with future returns can be substantially explained by the kink's relation with future fundamentals, primarily asset growth, consistent with the notion that the market may be inefficient with respect to impounding information available from the kinks about the future changes in firm fundamentals into current prices.

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Table 1
Sample Selection

Our sample includes 144,051 firm/year observations from a dataset provided by John Graham. We eliminate firms without a matching CUSIP in *Compustat*. We then eliminate firms whose *Compustat* GVKEY does not have a unique match to a *CRSP* PERMNO in the *CRSP*/*Compustat* merged database. We require that firm/years have a return observation in *CRSP* in the fourth month following the fiscal year end, data to compute net operating assets (NOA), market value of net operating assets ($PNOA$), net debt (ND), market value of equity (MVE), book value of equity (BVE) and CAPM Beta. We also eliminate financial firms as identified by an SIC code between 6000 and 6999, firms with non-positive book value of equity (BVE), non-positive enterprise value (EV), and firms that are not identified as US ordinary common shares (*CRSP* share code of 10 or 11). We truncate the sample to remove firm/years with values of BVE/MVE, $NOA/PNOA$, ND/MVE and $BVE/MVE - NOA/PNOA$ that are above the 99th percentile or below the 1st percentile of the 76,335 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	-16,887
No or non-unique match to CRSP	-8,325
Missing data	-19,786
Base sample	99,053
Financial firms	-12,314
Non-positive enterprise or book value	-4,094
Not US ordinary common shares	-6,310
Full sample	76,335
Outliers	-3,917
Truncated full sample	72,418

Table 2
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. Net debt (*ND*) equals Debt plus Preferred stock less Cash (*Compustat* #1). Debt equals the current portion of long-term debt (#34) plus long-term debt (#9). Preferred stock equals Preferred stock (#130) plus Preferred dividends in arrears (#242) less Preferred treasury stock (#227). Market value of equity (*MVE*) equals Price (#199) times Shares outstanding (#25). Book value of equity (*BVE*) equals Common equity (#60) plus Preferred treasury stock (#227) less Preferred dividends in arrears (#242). Net operating assets (*NOA*) equals Book value of equity plus Net debt. The Market value of net operating assets (*PNOA*) equals Market value of equity plus Net debt. 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. Panel B presents the Pearson and Spearman correlations between these variables.

Panel A: Descriptive Statistics

Variable	N	Mean	Standard deviation	Percentiles 1%	25%	50%	75%	99%
Buy-and-hold return	72,418	0.167	0.976	-0.860	-0.227	0.056	0.377	2.808
Kink	72,418	2.795	2.879	0.000	0.200	2.000	5.000	8.000
ND/*MVE*	72,418	0.439	0.847	-0.488	-0.034	0.165	0.607	4.099
Debt/*MVE*	72,418	0.559	0.853	0.000	0.054	0.251	0.693	4.344
Cash/*MVE*	72,418	0.137	0.208	0.000	0.026	0.075	0.177	0.827
Preferred stock/*MVE*	72,418	0.018	0.103	0.000	0.000	0.000	0.000	0.416
BVE/*MVE*	72,418	0.693	0.501	0.068	0.338	0.568	0.905	2.481
NOA/*PNOA*	72,418	0.692	0.409	0.042	0.379	0.660	0.939	1.917
log(*MVE*)	72,418	4.637	2.162	0.295	3.059	4.470	6.106	10.017
Beta	72,418	1.107	0.799	-0.464	0.557	1.021	1.560	3.336

Panel B: Correlation Matrix
Spearman correlation above diagonal/Pearson below

	Buy-and-hold return	Kink	*ND*/*MVE*	Debt/*MVE*	Cash/*MVE*	Preferred/*MVE*	*BVE*/*MVE*	*NOA*/*PNOA*	log *MVE*	Beta
Buy-and-hold return		0.106 ***	0.010 ***	0.032 ***	0.052 ***	0.008 **	0.116 ***	0.101 ***	0.082 ***	-0.066 ***
Kink	0.011 ***		-0.299 ***	-0.323 ***	-0.014 ***	-0.096 ***	-0.140 ***	-0.221 ***	0.397 ***	0.049 ***
ND/*MVE*	0.004 *	-0.309 ***		0.924 ***	-0.305 ***	0.267 ***	0.336 ***	0.547 ***	-0.083 ***	-0.167 ***
Debt/*MVE*	0.012 ***	-0.307 ***	0.965 ***		-0.054 ***	0.233 ***	0.465 ***	0.650 ***	-0.140 ***	-0.170 ***
Cash/*MVE*	0.037 ***	-0.040 ***	0.032 ***	0.265 ***		-0.017 ***	0.279 ***	0.151 ***	-0.192 ***	0.059 ***
Preferred stock/*MVE*	0.009 **	-0.083 ***	0.291 ***	0.190 ***	0.091 ***		0.066 ***	0.128 ***	0.076 ***	-0.055 ***
BVE/*MVE*	0.061 ***	-0.206 ***	0.393 ***	0.444 ***	0.260 ***	0.083 ***		0.933 ***	-0.336 ***	-0.233 ***
NOA/*PNOA*	0.052 ***	-0.271 ***	0.393 ***	0.433 ***	0.222 ***	0.097 ***	0.913 ***		-0.332 ***	-0.265 ***
log(*MVE*)	-0.017 ***	0.331 ***	-0.152 ***	-0.189 ***	-0.176 ***	-0.046 ***	-0.366 ***	-0.353 ***		0.213 ***
Beta	-0.006	0.067 ***	-0.118 ***	-0.109 ***	0.019 ***	-0.032 ***	-0.208 ***	-0.250 ***	0.174 ***	

Significance levels: 10% *, 5% **, 1% ***

Table 3
Changes in Kinks

This table presents Kink, leverage and listing status changes for the sample of firm/years described in Table 1. We report t-statistics in *italics* below the changes in kink and leverage. We compute the t-statistics from annual estimates as in Fama and MacBeth (1973) and use a Newey-West correction for two lags of serial correlation. 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 includes Kinks from 1 to 2, Group 4 includes Kinks from 3 to 5 and Group 5 includes Kinks of 6 to 8. Panel A presents the 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 2 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	0.699	0.882	1.066	1.066
					5.140
2	0.479	1.121	1.194	1.334	0.855
					6.380
3	1.651	1.694	1.722	1.745	0.094
					0.850
4	3.749	3.293	3.146	3.067	-0.682
					-6.850
5 (High)	7.607	6.419	5.944	5.591	-2.016
					-25.270

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)	0.243	0.245	0.245	0.254	0.012
					0.820
2	0.365	0.360	0.355	0.350	-0.016
					-0.730
3	0.363	0.365	0.364	0.363	-0.001
					-0.040
4	0.225	0.238	0.248	0.254	0.029
					1.960
5 (High)	0.081	0.097	0.110	0.121	0.041
					4.500

Panel C: Changes in Listing Status

Kink	Delisting within		
group	Year *t*+1	Year *t*+2	Year *t*+3
1 (Low)	0.076	0.150	0.212
2	0.030	0.071	0.110
3	0.011	0.028	0.047
4	0.005	0.011	0.019
5 (High)	0.011	0.019	0.026

Table 4
Testing the 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 column 2 scales 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 (#18) plus Interest expense (#15). The sample for the regressions includes the 52,454 firm-year observations with available data and positive debt and interest expense from our full sample of 72,418 firm years. Table 2 provides variable definitions.

	$\Delta\left(\frac{\text{Debt}_t}{(\text{Debt}+BVE)_t}\right)$	$\Delta\left(\frac{\text{Debt}_t}{(\text{Debt}+MVE)_t}\right)$	$\frac{\Delta\text{Debt}_t}{(\text{Debt}+MVE)_t}$
Target Debt_t	0.046 ***	0.041 ***	0.023 ***
	14.005	*19.890*	*12.392*
Debt_{t-1}	-0.537 ***	-0.153 ***	-0.068 ***
	-8.485	*-17.214*	*-5.887*
$\Delta\text{Earnings}_t/\text{Assets}_t$	-0.218 ***	-0.221 ***	-0.385 ***
	-7.142	*-11.544*	*-12.534*
$\Delta\text{Earnings}_{t-1}/\text{Assets}_t$	-0.107 ***	-0.101 ***	-0.204 ***
	-6.745	*-8.603*	*-8.967*
$\Delta\text{Assets}_t/\text{Assets}_t$	0.027 *	0.086 ***	0.560 ***
	1.858	*16.176*	*22.626*
$\Delta\text{Assets}_{t-1}/\text{Assets}_t$	-0.033 ***	-0.010 *	-0.041 **
	-4.019	*-1.879*	*-2.627*
Constant	0.166 ***	0.021 ***	-0.011 **
	7.417	*5.869*	*-2.153*
Average R^2	0.542	0.198	0.445
Observations	58,454	58,454	58,454
Years	27	27	27

Table 5
Relation Between Kink and Buy-and-Hold 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 2. Table 2 also defines the regressors Kink, Book-to-market (*BVE* /*MVE*), Market value of equity (*MVE*) and Beta.

	Model 1		Model 2	
$\text{Kink}_t \le 1$			-0.018	
			-1.160	
$\text{Kink}_t > 1$			0.007	***
			3.265	
BVE_t / MVE_t	0.079	***	0.085	***
	3.894		*4.239*	
$\log(MVE_t)$	-0.008		-0.013	
	-0.859		*-1.398*	
Beta_t	0.000		0.003	
	-0.014		*0.102*	
Constant	0.164	**	0.157	**
	2.506		*2.376*	
Average R^2	0.031		0.034	
Observations	72,418		72,418	
Years	27		27	

Significance levels: 10% *, 5% **, 1% ***

Table 6
Relation Between Kink, Net Debt and Buy-and-Hold 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 2. Table 2 also defines the regressors Kink, Market value of equity (MVE), Net debt (*ND*), Debt, Preferred Stock, Net operating assets (*NOA*), Market value of net operating assets (*PNOA*) and Beta.

Panel A: Overlapping years with Penman, Richardson and Tuna (2007) (1980 - 2001)

	Model 1	Model 2	Model 3	Model 4
$\text{Kink}_t \leq 1$			-0.009	-0.010
			-0.558	*-0.622*
$\text{Kink}_t > 1$			0.009 ***	0.009 ***
			3.366	*3.315*
ND_t/MVE_t	-0.025 **		-0.017	
	-2.765		*-1.673*	
Debt_t/MVE_t		-0.025 ***		-0.017 *
		-2.840		*-1.722*
$\text{Preferred stock}_t/MVE_t$		0.005		0.016
		0.108		*0.337*
Cash_t/MVE_t		0.139 **		0.127 **
		2.660		*2.367*
$NOA_t/PNOA_t$	0.092 ***	0.082 ***	0.101 ***	0.091 ***
	3.488	*2.845*	*3.678*	*3.038*
$\log(MVE_t)$	-0.003	-0.002	-0.008	-0.007
	-0.312	*-0.165*	*-0.865*	*-0.721*
Beta_t	-0.003	-0.005	0.001	-0.001
	-0.110	*-0.206*	*0.045*	*-0.049*
Constant	0.109	0.095	0.089	0.076
	1.559	*1.424*	*1.213*	*1.083*
Average R^2	0.030	0.033	0.034	0.037
Observations	65,023	65,023	65,023	65,023
Years	22	22	22	22

Table 6 (Continued)
Relation Between Kink, Net Debt and Buy-and-Hold Returns

Panel B: Full sample (1980 - 2006)

	Model 1	Model 2	Model 3	Model 4
$\text{Kink}_t \leq 1$			-0.014	-0.014
			-0.983	*-1.014*
$\text{Kink}_t > 1$			0.007 ***	0.007 ***
			3.070	*2.984*
ND_t / MVE_t	-0.004		0.003	
	-0.281		*0.235*	
Debt_t / MVE_t		-0.004		0.003
		-0.263		*0.218*
$\text{Preferred stock}_t / MVE_t$		0.046		0.056
		0.918		*1.132*
Cash_t / MVE_t		0.113 **		0.102 **
		2.485		*2.214*
$NOA_t / PNOA_t$	0.087 ***	0.078 ***	0.094 ***	0.084 ***
	3.365	*2.797*	*3.540*	*2.969*
$\log(MVE_t)$	-0.010	-0.009	-0.014	-0.013
	-1.030	*-0.896*	*-1.552*	*-1.423*
Beta_t	0.001	-0.003	0.004	0.001
	0.020	*-0.119*	*0.158*	*0.024*
Constant	0.171 **	0.158 **	0.157 **	0.144 **
	2.423	*2.317*	*2.168*	*2.065*
Average R^2	0.034	0.035	0.037	0.038
Observations	72,418	72,418	72,418	72,418
Years	27	27	27	27

Table 7
Calendar Time Portfolio Regressions

The dependent variable in this table is the monthly excess return of the corresponding Kink portfolio. Each March 31 from 1981 to 2005, firms with fiscal year ends during the prior calendar 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 BAA-AAA 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.

Panel A: Four-factor model

Kink group	Constant	Market	*SMB*	*HML*	*UMD*	N	Adjusted R^2
1 (Low)	0.002	0.853	1.181	0.051	-0.227	300	0.731
	1.029	15.377	17.035	0.618	-4.563		
2	0.001	0.939	0.927	0.386	-0.212	300	0.831
	0.547	26.525	20.948	7.260	-6.697		
3	0.002	0.971	0.703	0.427	-0.156	300	0.913
	1.916	43.589	25.251	12.773	-7.811		
4	0.002	0.995	0.570	0.332	-0.148	300	0.917
	2.109	45.889	21.030	10.198	-7.634		
5 (High)	0.004	0.984	0.637	0.048	-0.207	300	0.938
	4.791	47.447	24.579	1.526	-11.161		

Panel B: Five-factor model

Kink group	Constant	Market	*SMB*	*HML*	*UMD*	BAA-AAA	N	Adjusted R^2
1 (Low)	-0.002	0.859	1.163	0.046	-0.225	0.408	300	0.733
	-0.646	15.534	16.676	0.559	-4.556	1.927		
2	-0.002	0.943	0.917	0.383	-0.212	0.235	300	0.832
	-0.851	26.671	20.570	7.225	-6.694	1.737		
3	0.000	0.973	0.696	0.425	-0.155	0.144	300	0.913
	0.146	43.751	24.845	12.752	-7.810	1.690		
4	0.002	0.995	0.569	0.332	-0.148	0.020	300	0.916
	1.305	45.753	20.756	10.168	-7.617	0.244		
5 (High)	0.004	0.984	0.638	0.048	-0.207	-0.015	300	0.938
	3.493	47.279	24.324	1.529	-11.145	-0.189		

Table 8
Relation Between Kink and Future 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 in Panel A is the change in Earnings (*Compustat* item #18 + #15) deflated by year t Assets (#6), (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 × Assets$_t$). Table 2 defines Book-to-market (*BVE/MVE*). The sample in each regression includes firm/year observations with available data from the sample of 73,418 described in Table 1.

Panel A: Cumulative earnings changes

	$t+1$ vs. t		$t+2$ vs. t	
Kink$_t$ ≤ 1	-0.006	**	-0.002	
	-2.192		*-0.705*	
Kink$_t$ > 1	0.000		0.001	*
	0.794		*1.971*	
BVE_t/MVE_t	-0.013	***	0.000	
	-4.487		*-0.145*	
Change in Earnings	-0.163	***	-0.089	***
(Earnings$_t$ - Earnings$_{t-1}$)/Assets$_{t-1}$	*-8.730*		*-7.568*	
Constant	0.014	***	0.004	
	3.778		*1.333*	
Average R^2	0.038		0.026	
Observations	63,733		56,618	
Years	26		25	

Panel B: Cumulative asset growth ((Assets$_{t+k}$ - Assets$_t$)/(k × Assets$_t$)

	$t+1$ vs. t		$t+2$ vs. t	
Kink$_t$ ≤ 1	-0.013		-0.032	***
	-1.130		*-3.423*	
Kink$_t$ > 1	0.003	*	0.000	
	2.057		*-0.103*	
BVE_t/MVE_t	-0.164	***	-0.164	***
	-15.673		*-12.788*	
Change in Assets	0.113	***	0.099	***
(Assets$_t$ - Assets$_{t-1}$)/Assets$_{t-1}$	*3.754*		*4.214*	
Constant	0.234	***	0.263	***
	16.322		*15.341*	
Average R^2	0.046		0.044	
Observations	63,733		56,618	
Years	26		25	

Table 9

What can explain the return predicting power of the kink?

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 2. Table 2 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 #18) plus Interest expense (#15). Assets are Compustat item #6. The samples in Panels A and B include the 63,733 and 58,138 firm/year observations, respectively, with available data from the sample of 73,418 described in Table 1.

Panel A: Controlling for one year ahead fundamentals

	Model 1	Model 2	Model 3	Model 4	Model 5
$Kink_t \le 1$	-0.033 *	-0.034 *	-0.026	-0.038 **	-0.031 *
	-1.718	*-1.740*	*-1.390*	*-2.063*	*-1.744*
$Kink_t > 1$	0.007 ***	0.007 ***	0.006 ***	0.004 **	0.004 **
	3.620	*3.617*	*3.503*	*2.156*	*2.294*
Change in debt		-0.029	-0.019	-0.446 ***	-0.385 ***
$(Debt_{t+1}-Debt_t)/(Debt + BVE)_t$		*-1.458*	*-0.894*	*-6.918*	*-6.543*
Change in Earnings			1.079 ***		0.945 ***
$(Earnings_{t+1}-Earnings_t)/Assets_t$			*11.341*		*13.575*
Change in Assets				0.443 ***	0.387 ***
$(Assets_{t+1}-Assets_t)/Assets_t$				*7.414*	*7.412*
BVE_t/MVE_t	0.088 ***	0.088 ***	0.105 ***	0.140 ***	0.149 ***
	3.865	*3.799*	*4.756*	*6.251*	*7.022*
$\log(MVE_t)$	-0.017 *	-0.017 *	-0.015	-0.014	-0.012
	-1.814	*-1.801*	*-1.582*	*-1.526*	*-1.357*
$Beta_t$	-0.003	-0.003	-0.001	-0.007	-0.006
	-0.098	*-0.092*	*-0.023*	*-0.293*	*-0.231*
Constant	0.184 **	0.184 **	0.152 **	0.110 *	0.092
	2.746	*2.711*	*2.309*	*1.815*	*1.536*
Average R^2	0.037	0.038	0.089	0.082	0.122
Observations	63,733	63,733	63,733	63,733	63,733
Years	26	26	26	26	26

Table 9 (Continued)
What can explain the return predicting power of the kink?

Panel B: Controlling for two year ahead fundamnetals

	Model 1	Model 2	Model 3	Model 4	Model 5
$Kink_t \leq 1$	-0.051 **	-0.048 **	-0.043 *	-0.049 **	-0.045 **
	-2.416	*-2.304*	*-2.060*	*-2.519*	*-2.255*
$Kink_t > 1$	0.004 *	0.004 *	0.004	0.001	0.001
	1.890	*1.905*	*1.618*	*0.544*	*0.426*
Two-year change in debt		0.062 ***	0.055 **	-0.277 ***	-0.247 ***
$(Debt_{t+2}\text{-}Debt_t)/(Debt + BVE)_t$		*3.254*	*2.701*	*-7.268*	*-7.377*
Two-year change in Earnings			0.711 ***		0.568 ***
$(Earnings_{t+2}\text{-}Earnings_t)/Assets_t$			*8.832*		*8.543*
Two-year change in Assets				0.306 ***	0.276 ***
$(Assets_{t+2}\text{-}Assets_t)/Assets_t$				*8.327*	*7.886*
BVE_t/MVE_t	0.075 ***	0.084 ***	0.083 ***	0.159 ***	0.150 ***
	3.322	*3.856*	*3.694*	*7.339*	*7.080*
$\log(MVE_t)$	-0.025 **	-0.024 **	-0.023 **	-0.014	-0.014
	-2.409	*-2.342*	*-2.288*	*-1.498*	*-1.534*
$Beta_t$	0.006	0.006	0.008	-0.002	-0.001
	0.203	*0.201*	*0.262*	*-0.063*	*-0.042*
Constant	0.233 ***	0.214 ***	0.203 ***	0.077	0.083
	3.231	*3.022*	*2.877*	*1.278*	*1.367*
Average R^2	0.036	0.040	0.089	0.122	0.151
Observations	58,138	58,138	58,138	58,138	58,138
Years	25	25	25	25	25