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Why are Firms Using Interest Rate Swaps to Time the Yield Curve?*

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ABSTRACT:

This paper explores why managers are timing the interest rate market. We ask whether the documented sensitivity of interest rate swap usage to the term structure is a function of managers trying to meet earnings forecasts, of managers attempting to boost near-term results prior to raising external capital, or of managers simply trying to increase their compensation. Using a very large, hand-collected dataset of swap activity, our empirical findings suggest that swap usage and the choice of interest rate exposure are primarily driven by a desire to meet consensus earnings forecasts and to raise managerial pay.

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1. Introduction

There is growing evidence that firms are primarily using interest rate swaps not for hedging purposes, as is traditionally thought, but to reduce their short-term interest costs. For example, at the end of Wal-Mart's 2001 fiscal year, during which the yield curve was inverted on average (specifically, the average 1-year Treasury yield was higher than the average 10-year Treasury yield by 9.5 basis points), Wal-Mart had swapped only 3.9% of its debt from a fixed to a floating interest rate exposure, resulting in an overall floating debt exposure of 18.7%. During the 2002 fiscal year, the average Treasury yield spread (the 10-year Treasury yield minus the 1-year Treasury yield) had risen to 1.75%, and Wal-Mart commensurately increased its pay-floating interest rate swaps to 17.3% of its debt, bringing 25.3% of its debt to a floating exposure. Finally, during the 2003 fiscal year, the Treasury yield spread had risen further, to an average of 2.59%, and Wal-Mart again increased its pay-floating interest rate swaps—to 32.6% of total debt, leaving 40.8% of its debt with a floating exposure. At the culmination of these swap activities, Wal-Mart noted in its 2003 annual report that "interest costs on debt and capital leases … as a percentage of net sales [decreased] 0.17% when compared to fiscal 2002." In fact, its interest expense fell by $269 million (18.5%) even though its total debt increased by $3.5 billion (16.1%), and they exceeded their consensus analyst earnings forecast by three cents per share.[1]

However, by the end of Wal-Mart's 2005 fiscal year, short-term interest rates had risen considerably relative to 2003, consistent with the steep yield curve of 2003. This higher interest rate environment resulted in Wal-Mart issuing an earnings warning stating that it "expects interest expenses to rise as much as $500 million this year, due in part to higher interest rates . . . that could hurt earnings by eight cents a share" (Wall Street Journal, Feb. 22, 2006). So if all Wal-Mart did was boost earnings in its 2003 fiscal year at the cost of lower earnings in 2005, why did they bother? That is the question we explore in this paper.

Of course, Wal-Mart is not the only non-financial firm using interest rate swaps to time the interest rate market, consistent with recent survey, anecdotal, and empirical

[1] On a per share basis, the $269 million decline in interest expense amounts to savings of six cents per share. Also, had Wal-Mart not adjusted its swap usage during their 2002 fiscal year, they would have missed their consensus analyst earnings forecast for that year by one cent per share.

evidence. The Wharton survey of financial risk management (see Bodnar, Hayt, and Marston (1998)) indicates that one of the key factors determining both the timing and the magnitude of non-financial firms' interest rate derivatives usage is their apparent desire to reduce interest costs (at least in the short-term) through interest rate timing activities. Tufano (1995) examines the interest rate risk management policy of General Motors and documents that one of the key objectives in its risk management policy is to "actively manage . . . shifts in the shape of the yield curve to reduce GM's overall cost of funds." Faulkender (2005) uncovers this effect empirically for the chemical sector and reports that it is the *slope* of the yield curve at the time of the debt issue and not the estimated interest rate exposure of the firm's cash flows that primarily determines whether firms use interest rate swaps to alter the interest rate exposure of their debt. As the yield curve steepens, he finds that firms are more likely to swap their fixed-rate debt to a floating exposure and less likely to swap their floating-rate debt to a fixed exposure because this strategy reduces interest costs, at least in the short term.

In response to this fairly widespread evidence that firms' interest rate derivative usage is apparently sensitive to the yield curve, the question we posit in this paper is: *why are firms doing this?* Faulkender (2005) argues that the answer is probably managerial myopia and/or pure interest rate speculation, rather than hedging considerations. In this paper, we test this hypothesis. We identify firm and managerial characteristics that are correlated with myopic and/or speculative tendencies and examine whether they help to explain differences in yield spread sensitivity.

The first potential explanation is that some managers desire to move earnings forward in an attempt to meet analysts' earnings forecasts, similar to the effects of earnings management via discretionary accruals usage. Observe that as the term structure widens, the difference in the near term between interest costs from floating-rate debt and interest costs from a fixed-rate exposure rises, implying that current earnings will increase with more floating-rate debt. Thus, swapping some debt to a floating rate exposure in this environment increases the firm's chances of hitting its current period earnings forecast. This should not, however, create value. If swaps are priced consistent with the expectations hypothesis, the expected (risk-adjusted) interest costs would be the same over the life of the swap. Therefore, the swap merely changes *when* the firm is expected to make interest payments, reducing them in the short-run but, in expectation, increasing them in the future. There is also no reason to believe that an interest rate swap in a steep term structure environment is a particularly inexpensive way of moving cash flow from the future to the present since there is likely to be less credit risk associated with a debt instrument that moves cash flow forward. The benefit of the interest rate swap is that the current period cash flow would appear on the income statement rather than the balance sheet, as would be the case with a debt instrument.

The earnings management literature (see Healy and Wahlen (1998) for example) points to two primary reasons that firms may manage their earnings: (1) capital market motivations and (2) contracting motivations. For instance, if managers expect to raise capital in the near future, they may want to inflate current earnings in an attempt to improve the pricing on their forthcoming issue. Likewise, if firms perceive that missing an earnings forecast is particularly costly (consistent with the survey evidence of Graham, Harvey, and Rajgopal (2005)), they may alter their mix of fixed- and floating-rate debt based upon the slope of the yield curve to improve earnings when they believe they may fall short of analysts' forecasts. Still other hypotheses that follow from this literature are that if managers have bonuses that are tied to earnings, if they have stock options that are soon vesting, or if for another reason their time horizon is short, they may also want to move earnings forward.[2]

An alternative explanation for firms' sensitivity to the yield curve is that firms think such a strategy does create value, following the extensive evidence that the expectations hypothesis does not hold in practice. That is, when the yield curve is steep, short-term interest rates do not rise as high as the expectations hypothesis would forecast (for example, see Fama and Bliss (1987) and Campbell and Shiller (1991)). Managers may, therefore, believe that they can alter their use of floating-rate debt to *permanently* raise earnings by behaving as if the expectations hypothesis will not hold over the life of the swap. Consistent with this idea, Baker, Greenwood, and Wurgler (2003) document that firms have created value by successfully timing the maturity choices of their

[2] Consistent with this notion, Bergstresser and Philippon (2006) document that as managerial compensation is more comprised of stock and stock options, the use of discretionary accruals increases. Similarly, Bergstresser, Desai, and Rauh (2005) document that pension assumptions are more likely to be manipulated prior to issuing equity and when firms "are near critical earnings thresholds."

corporate debt issues. However, Butler, Grullon, and Weston (2006) challenge these findings, and a debate about how successful managers are at timing bond markets has emerged in the literature. We do not specifically test whether swap market timing would have been successful over the time period we examine since interest rate realizations over a ten-year period are too short to evaluate the long-term value creation associated with a potential trading strategy. Instead, we argue that this behavior should be interpreted as speculation for the following reason: It is difficult to believe that (i) the corporate treasury departments of non-financial firms are the marginal trader in the interest rate swap market, (ii) they are better able to absorb interest rate risk, or (iii) they are better informed than the marginal trader. Consequently, it seems reasonable to conclude that these treasury departments are not the agents in the economy that should receive any abnormal rents associated with trading in interest rate securities.[3] However, we do argue that if managers receive some of the benefits through their performance-based compensation that are generated from profitably betting that the expectations hypothesis will not hold, they may be more likely to look to their treasury departments as profit centers, and they will become more likely to time their interest rate swap activities in such a manner.

Note that we do not consider these behaviors to be mutually exclusive: some firms' managers may use interest rate swaps to manipulate earnings, while others may use them to increase their compensation due to the structure of their pay. In fact, it may be that firms are using interest rate swaps to manipulate earnings because doing so would also increase their compensation.

To investigate the potential reasons why firms may use interest rate swaps differentially across time, we hand-collect swap activity and the fixed/floating structure of outstanding debt obligations for 1,854 firms in the ExecuComp database over the period 1993 - 2003. We generate measures for whether or not they raised external funds in the subsequent fiscal year, for how close the firm was to its earnings forecast, and for various measures of managerial compensation. We then observe the interaction between

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[3] Brown, Crabb, and Haushalter (2005) find no evidence of better financial performance by gold mining firms that "selectively hedge." If gold mining firms cannot effectively time the gold market, it is difficult to believe that non-financial firms *are* able to effectively time the interest rate market.

these measures and the yield spread in an attempt to uncover the factors that tend to make managers' interest rate swap usage more sensitive to the yield curve.

Our findings suggest that two key factors in the timing of interest rate swap usage are earnings manipulation and the structure of executive compensation. Managers are more likely to use swaps to move interest expense into the future when their earnings are closer to the consensus analyst earnings forecast. Similarly, we find that interest rate swap timing appears to be a partial substitute for discretionary accruals, which are arguably the typical means by which earnings management occurs. In addition, as managers' compensation increases with gains in their firm's equity value and with increases in equity volatility, they are more likely both to increase their use of pay-floating swaps (and decrease their use of pay-fixed swaps) and to increase the percentage of their debt that has a floating rate exposure as the term structure steepens. Finally, when managers have higher dollar values of options vesting, there is greater yield spread sensitivity in the firm's swap usage and in the percentage of debt that has a floating interest rate exposure. We confront these results with numerous alternative specifications and find them to be quite robust. Overall, we conclude that a large proportion of firms are using interest rate swaps *both* to manipulate earnings and to increase managerial pay.

The rest of this paper is organized as follows. Section 2 reviews the relevant literature to further motivate our testable hypotheses, and then provides a description of our empirical methodology. Section 3 provides details of the firms we examine, the sources of various data items, and the summary statistics. We discuss the empirical results and the robustness checks in Section 4. Section 5 concludes. Detailed discussion of the data collection process is relegated to the Appendix.

2. Empirical Strategy

While early work examining derivatives use focused almost entirely on potential hedging benefits (Nance, Smith, and Smithson (1993), Geczy, Minton, and Schrand (1997), and Graham and Rogers (2002), for instance), more recent work has questioned the size of potential hedging benefits (Guay and Kothari (2003)) and more examinations of alternative reasons for non-financial firms to use derivatives have emerged. As mentioned above, among work specifically examining interest rate derivatives, survey evidence (Bodnar, Hayt, and Marston (1998)), anecdotal evidence (Tufano (1995)), and empirical evidence (Faulkender (2005)) all point towards timing considerations as a key determinant of swap usage. Since our objective is to explain which firms engage in such interest rate swap timing and when, it is important to first review earlier work linking derivatives to related firm and managerial characteristics.

Tufano (1996) is among the first to examine the impact of executive compensation on firms' derivative usage, finding that the structure of top management compensation at gold-mining firms is strongly related to the prevalence of hedging gold price risk. Top managers who have a greater proportion of their firm-related wealth in the form of stock (stock options) were more (less) likely to be employed by firms that managed gold price risk. Following Tufano's (1996) work, Petersen and Thiagarajan (2000) examine two specific gold firms (American Barrick and Homestake Mining) and find that compensation structure affects both derivative use and their discretionary accounting decisions. They argue that differences in compensation structure between these two firms lead to different corporate objectives and therefore systematically different practices towards risk management.

Moving to interest rate derivatives and compensation, Geczy, Minton, and Schrand (2005) examine how differences in compensation structure for both CEOs and CFOs affect whether the executives in these firms incorporate a rate view in their use of derivatives. Using survey data, they find that firms where the CFO receives more of the benefit from generating additional shareholder wealth (i.e., she has a high delta) and is rewarded for additional risk-taking (i.e., she has a high vega) are more likely to incorporate their view on movements of interest rates when using derivatives. Chava and Purnanandam (2004) examine cross-sectional variation in the final interest rate exposure of firms' debt for Compustat firms with fiscal years ending between October 1996 and September 1997, with some augmentation from 1999-2000. They find that higher CFO delta is associated with less floating-rate debt, whereas higher CFO vega is associated with more floating-rate debt.

Our contribution comes from the fact that because we have ten years of panel data, we can examine how *realized* interest rate swap decisions (as opposed to what is stated in a survey) vary with changes in the interest rate environment as well as changes in firm and manager characteristics. Such a data structure enables us to disentangle cross-sectional factors from time series effects that are potentially present in previous work. For instance, floating rate swap usage has been previously found to be greater when the slope of the term structure is high and it has also been shown that large firms are more likely to have fixed rate debt available to be swapped to floating. Therefore cross-sectional tests in a steep term structure environment may very well conclude that large firms are more likely to use swaps even though the same tests done in a flat term structure environment would likely find that it is small firms that are more likely to use interest rate swaps. Such will be the case for any firm or managerial characteristic that may vary in the time series with the term structure of interest rates. We therefore view our work as an important contribution to the literature because we are able to separate out any time series components that may be present in the cross-sectional work cited above.[4]

Recall that our primary objective in this paper is to better understand managerial decision making by determining which firm and managerial characteristics are associated with greater sensitivity of swap usage and floating-rate debt to the slope of the term structure. Before we test the different alternatives, we begin with a replication of Faulkender (2005) on this extended sample at each fiscal year end rather than for solely those firm-years when the firm raised new debt. While that paper argues that it is the ending exposure of the debt that truly determines the interest rate exposure of the firm's debt, it finds (Table VIII) that it is predominantly the swap activity (as opposed to the initial interest rate exposure) that is affected by the yield spread. So, our baseline specifications examine swap usage for the subset of firms that use interest rate swaps at least once during the sample period. Chava and Purnanandam (2004) fail to find firm swap usage to be sensitive to the term structure in their larger cross-section of firms, so it is important to first establish the baseline sensitivity outside the chemical sector before estimating differences in sensitivity across different firm and manager characteristics.

We take the percentage of the firm's debt at the end of the corresponding fiscal year that is swapped to floating, less the percentage swapped to fixed, and regress it on the average term structure during the fiscal year. Note that our dependent variable will be positive for those firms increasing their floating-rate debt and negative for those firms

[4] Beber and Fabbri (2006) similarly examine the role compensation plays in the timing of currency markets by 231 S&P 500 firms between 1996 and 2001.

increasing their fixed-rate debt. We also include a number of control variables that capture other factors that may impact both the firm's decision of the direction to swap and the dollar amount swapped. Specifically, we run the following regression:

$$\text{(Net Floating Swaps / Debt)}_{it} = \alpha + \beta\text{*(Yield Spread)} + \gamma\text{*(Control Variables)} + \varepsilon_{it} \quad (1)$$

One of the important control variables is the percentage of the firm's outstanding debt that is issued with a floating exposure. If all of a firm's debt was issued at floating, there is no need to swap to floating, so we need to control for whether there is fixed-rate debt available to be swapped to floating. To verify that the results are robust to the initial interest rate exposure of the debt, we also include specifications for the entire sample (not just those that used swaps over the sample period), where the dependent variable is the percentage of the firm's debt that ends floating, after incorporating the use of swaps:

$$\text{(Floating-Rate Debt / Debt)}_{it} = \alpha + \beta\text{*(Yield Spread)} + \gamma\text{*(Control Variables)} + \varepsilon_{it} \quad (2)$$

In the next section, we provide the details of how these variables are measured and discuss the specific control variables that we include.

The baseline specifications are initially estimated using OLS; we then add firm fixed effects to the specification. Following Petersen (2006), all regression results include standard errors that are adjusted for both heteroskedasticity (White (1984)) and clustering within firms. When we examine the differences in sensitivity associated with various firm and managerial characteristics, all of the tests are conducted with firm fixed effects. While the results do not vary significantly when the dependent variable is the percentage of debt that is swapped to floating, the results do differ across OLS and firm fixed effects specifications for the percentage of debt that ends up with a floating rate exposure. The major difference in these specifications is that the firm fixed effects regressions allow firms to have different average floating rate exposures and essentially test for how different variables affect deviations from that average firm level. Specifically, there are factors that we have not controlled for that yield different default interest rate exposures that are not completely unwound in the swaps market. If these factors – such as the mix of debt coming from different sources or the preferred interest rate exposure for hedging purposes – vary across firms but are relatively constant during the sample period for the specific firm, such differences would generate additional noise that would bias us against finding any sensitivity to interest rates in an OLS specification.

Turning to our methodology for identifying which factors influence interest rate timing, we interact our proxies for these hypothesized factors with the yield curve. If firms are trying to manipulate financial market pricing prior to the raising of capital, then the firms that raise debt or equity should be more likely to reduce their short-term interest expense, and therefore have swap positions in the fiscal year prior to the raising of funds that are *more* sensitive to interest rate movements than those firms that do not raise capital. To test this hypothesis, we code the firm fiscal years that are followed by a large change in the amount of outstanding debt or equity (defined as larger than 5% of current market value) and interact these indicator variables with the yield spread. We estimate the following regression for the subset of firms that use interest rate swaps at least once during the sample period:

$$\text{(Net Floating Swaps / Debt)}_{it} = \alpha + \beta_1\text{*(Yield Spread)} + \beta_2\text{*(Yield Spread)*}(I_{\text{Raise Funds}}) + \beta_3\text{*}(I_{\text{Raise Funds}}) + \gamma\text{*(Control Variables)} + \varepsilon_{it} \quad (3)$$

where $I_{\text{Raise Funds}}$ is an indicator variable that takes the value of one if the firm raises debt (or equity in a second specification) in the next fiscal year, and zero otherwise. If the coefficient corresponding to the interaction term (β_2) is positive and statistically significant, then the magnitude of that coefficient represents the *incremental* increase in the firm's swap usage sensitivity to the term structure, above and beyond the sensitivity estimated for the average firm in the sample, as captured by the coefficient β_1.

In a similar vein, we examine if firms are adjusting their interest rate swaps as a function of the slope of the term structure in an attempt to reach their earnings forecast. We test this by running four regressions similar to equation (3), replacing the indicator function with variables that identify those firms whose earnings realization is close to the forecast (under three different definitions), generating results that would be similarly interpreted. Additionally, we examine whether firms view accruals and interest rate timing as substitutes by interacting an estimate of the firm's discretionary accruals with the yield spread. A finding that this coefficient is significantly negative would suggest that firms with high levels of accruals are less sensitive to movements in the term structure. To ease the economic interpretation of the estimated coefficient, our measure of discretionary accruals used in the regressions has been differenced with the sample mean of discretionary accruals and then divided by the sample standard deviation.

Finally, managers may be more sensitive to movements in interest rates when deciding to use interest rate swaps to reduce current interest expense if they have stock-based incentive contracts that encourage them to speculate on movements in interest rates or to heavily focus on both short-term earnings and stock price realizations. Similar to the methodology used for discretionary accruals, we separately interact the executive's delta of her stock and stock option portfolio or the executive's vega of her stock option portfolio with the yield spread.[5] If more high-powered incentive contracts do indeed induce greater sensitivity to the term structure, we would expect that the coefficient corresponding to these interaction terms would be significantly positive. We also interact the dollar value of vesting options with the term structure since this is when the manager may have a greater incentive to elevate earnings in the short-run, in an effort to increase the value of the stock (and therefore the value of their options). If this effect is present, we would expect the estimated coefficient corresponding to the interaction term between the swap spread and options vesting to be significantly positive.

All of these tests are then repeated using the entire sample and examining the percentage of debt that ends up floating after the incorporation of swaps, as done in baseline equation (2), to illustrate that the results are robust to this alternative measure of the interest rate exposure choice of firms. Firms may choose not to use interest rate swaps because they are not timing the interest rate market, because they are unable to access the interest rate swap market, or because they are able to arrive at their optimal interest rate exposure without the use of interest rate swaps. Since we are unable to determine why they do not use swaps, it is important to verify that our results also hold for the broader sample of firms by looking at their final interest rate exposure.

3. Data

3.1. Constructing the Raw Data Sample

We start with the sample of nonfinancial firms contained in Compustat's ExecuComp database covering the period from 1993 to 2003 and augment it with hand-collected data on interest rate swap usage by each firm in our sample. The ExecuComp

[5] As we will further define later, an executive's delta represents the dollar change in her effective stock ownership position (via her direct stock ownership and her stock option holdings) for a 1% increase in the firm's stock price, whereas her vega represents the dollar change in her stock option portfolio for a 1% increase in the firm's equity volatility.

set of firms is ideal for our study since we are interested in the effects of managerial characteristics (which this dataset provides) as well as the fact that this subset of publicly traded firms are larger in size and therefore will account for most of the dollar volume of interest rate swaps used by non-financial firms. The choice of the sample period is governed by the availability of 10-Ks in EDGAR, which are available from 1993 onwards, and the fact that starting in 1993, firms were required to report individual compensation items for the "top 5" executives owing to the Compensation Disclosure Act of 1993.

Specifically, we use 10-Ks in the EDGAR database to record 1) the amount of floating-rate long-term debt and 2) the notional amounts and directions of interest rate swaps outstanding at the end of each fiscal year. Using these hand-collected data, we calculate the net floating swap amount, which is defined as the pay-floating-receive-fixed notional amount minus the pay-fixed-receive-floating notional amount. We then combine the underlying floating-rate debt amount with the swap usage to estimate the amount of the firm's debt that is floating after accounting for interest rate swap effects. Dividing both variables by the amount of debt outstanding at the end of the fiscal year, we get the net percentage of the firm's debt that is swapped to floating (taking values between –1 (all debt swapped to fixed) and 1 (all debt swapped to floating)) and the percentage of floating-rate debt after interest rate swap effects (taking values between 0 and 1). The details on how these variables are calculated are available in the Appendix. Overall, after dropping observations that a) do not have any debt, b) do not have 10-Ks filed with Edgar, or c) do not provide enough information in their 10-Ks to determine the amount of floating-rate long-term debt and the notional amounts of outstanding interest rate swaps, we are left with 11,261 firm-year observations.

Our first set of explanatory variables control for the debt structure of the firm, specifically the leverage ratio, maturity structure, and source of debt funds. Using balance sheet data obtained from Compustat (data numbers given in parentheses), we calculate the market leverage ratio of the firm as the total debt (long-term debt (9) plus debt in current liabilities (34)) divided by the market value of the firm (defined as book assets (6) minus book equity (11) plus the product of the share price at the end of the fiscal year (199) and the number of shares outstanding (54)). We also calculate the percentage of debt that has more than five years to maturity by taking the long-term debt (9) of the firm and subtracting the debt that matures in years two through five (91 to 94) and then dividing that difference by the firm's total debt. Following Faulkender and Petersen (2006), we define a binary variable indicating whether the firm has a debt or commercial paper rating to capture whether the firm has access to the public debt market.

Our primary measure of the interest rate environment is the swap yield spread, defined as the average difference between the 5-year swap rate and 6-month LIBOR over the fiscal year, calculated using data from Datastream. Most floating-rate commercial loans are tied to 6-month LIBOR so to qualify for hedge accounting treatment, their interest rate swap would also have to be tied to 6-month LIBOR. This difference therefore represents the actual difference in interest rates that the firm would face were they to access the swap market. As an alternative, using interest rate data from the Federal Reserve Board we also calculate the Treasury yield spread, defined as the average spread of 10-year Treasury bonds over 1-year Treasury bonds during the fiscal year. Similar results are obtained using both of these yield spread measures. We also control for changes in the credit markets using a measure of the credit spread, defined as the average difference between Moody's Baa and Aaa rated debt over the fiscal year, and a measure of the swap spread, defined as the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year.

Our analysis also controls for changes in the macroeconomy that may affect the firm's choice of interest rate exposure and the source of funds. Using the Flow of Funds Accounts of the United States data published by the Federal Reserve Board, we construct a measure of the economy-wide percentage of floating-rate debt, defined as the ratio of commercial paper and bank loan liabilities over the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporations (table L.102 of the Flow of Funds Accounts of the United States). This variable is meant to capture changes in lending sources over time that may impact a firm's initial interest rate exposure.

3.2. Potential Determinants of Interest Rate Sensitivity

In what follows, we describe both the motivation and our procedure for measuring items that may help explain why some managers are apparently more sensitive to changes in the yield curve than others.

3.2.1. Firms that Raise External Funds

Recall that we hypothesize that firms that raise new external capital that may benefit from timing the interest rate market to improve earnings as firms may believe better earnings will reduce the firm's cost of funds. Whether the firm raised either debt or equity during the next fiscal year is calculated by looking at their debt issuances (108) net of their debt repurchases (114) and equity issuances (111) net of repurchases (115). We code the firm as having raised capital if issuances exceed repurchases by at least five percent of the market value of the firm's assets.

3.2.2. Earnings Manipulation

Following numerous papers in the accounting literature (such as Burgshahler and Dichev, 1997, Kasznik and McNichols, 2002, Bartov, Givoly, and Hayn, 2002, and Matsumoto, 2002), we use I/B/E/S data to construct an indicator variable that is set to one when realized earnings per share are equal to, or higher by no more than one cent, the mean of the final earnings forecast of the fiscal year, and to zero otherwise. The idea is that firms that barely made their earnings forecast are the firms that would most likely have benefited from reducing their interest expense via swaps. We then repeat this construction using a five-cent cutoff since, as we demonstrate in the next section, the impact from swapping debt to a floating exposure may have more than a one cent per share effect, especially when the term structure is rather steep. In addition, recognize that while firms can potentially manage earnings by manipulating their accruals after the end of the fiscal year, interest expense will only be affected by swaps in place *during* the fiscal year. Therefore, firms will not know precisely how far their earnings will be from forecast at the time they consider entering into a swap. However, we believe that firms are likely to know if they are going to miss or make the forecast by a substantial amount, so it is those firms that are close to the forecast that are likely to gain from swapping to floating (or reduce the amount swapped to fixed) as the yield spread increases. For this reason, we use a wider range than that typically examined in the accounting literature.

For our third measure of potential earnings manipulation, we code the variable equal to one if the firm made its earnings forecast that fiscal year but would have missed its forecast if their swap usage had been equal to the amount used in the previous fiscal year, and zero otherwise.[6] The idea here is that we identify the firms that appear to have benefited from using interest rates swaps to meet their earnings forecast and see if their usage of interest rate swaps has a different sensitivity to interest rates than those firms that would have met/missed their forecast regardless of whether they had changed their use of interest rate swaps. For our floating-rate debt regressions, we construct a similar measure, but use the previous year's floating-rate debt percentage.

As a final check of earnings manipulation, we estimate the discretionary accruals taken during the corresponding fiscal year. We argue that if firms can achieve their earnings forecast by adopting discretionary accounting accrual adjustments, they may use fewer swaps to time interest rates. Similarly, if the firm is able to improve earnings sufficiently using interest rate swaps, they may need to use discretionary accruals less, or possibly even unwind previous period accruals. Since the swap usage and change in accruals are estimated for the same period, we cannot determine the direction of the causation, merely a contemporaneous correlation. Following previous studies in the accounting literature, we estimate nondiscretionary accruals using a modified version of the Jones (1991) model, as specified by Dechow et al (1995). To improve the statistical reliability of the estimated values, we use data covering the period from 1984 to 2004.

3.2.3. Managerial Compensation Measures

Turning lastly to the compensation variables of interest, we rely on the ExecuComp database for detailed disclosure of cash, stock, and stock option compensation for each of the firm's top five executives. This list naturally includes the CEO, but for a large percentage of firms it also includes the firm's CFO, who arguably plays the key role in a firm's interest-rate swap usage.[7] Such detailed disclosure, in particular for the stock option holdings, will also allow us to delve a bit further than

[6] Specifically, we combine the change in swap usage with the average swap yield spread during the year to estimate how much the firm saved in interest rate expense, assuming that swap usage was adjusted at the beginning of the fiscal year (as a robustness check we perform similar calculations assuming that swap usage is adjusted half-way through the fiscal year and one quarter before the end of the fiscal year and get very similar results). We then use marginal tax rates from John Graham and divide by the number of shares outstanding at the end of the fiscal year to get the after-tax effect on earnings per share.

[7] In identifying both the CEO and CFO of each firm (where available), we use the *annual title* field in ExecuComp to insure that we extract the fullest sample possible. Many CFOs, in particular, have multiple titles, or their titles are spelled out in relatively obscure ways. Therefore, we sorted on all available job titles within the dataset, and carried out a word search for the keywords of 'chief finance' or "CFO". A similar method was undertaken for the CEOs.

Tufano (1996) could, owing to the fact that only aggregate option holdings were disclosed for the management teams heading up the gold-mining firms.

For each CFO and CEO, we first measure the combined sensitivity of his stock and stock option portfolios to changes in the firm's stock price (defined as delta), and the sensitivity of the stock option portfolio to the underlying stock return volatility (defined as vega). Our interpretation is that stock-based pay – including both direct shareholdings and stock options – is the most sensitive component of an executive's compensation package to near-term changes in stock price, whereas stock options are also quite sensitive to near-term changes in stock volatility.

In estimating the delta and vega of both the CFO's and CEO's stock option portfolios, we rely on the empirical method of Core and Guay (2002). ExecuComp offers detailed parameters for newly-issued stock options, including the time to maturity, exercise price, and the number of options granted. Coupling these data with estimates from CRSP of the firm's average annual stock return volatility and dividend yield over the previous five years, the firm's stock price at fiscal year-end, and prevailing Treasury yields for maturities matching the life of the option, one can readily value the new stock option grants using Black-Scholes at the end of each firm's fiscal year. Such a straightforward calculation for previously-issued stock options is not readily available in ExecuComp. It is at this point that we rely on the methodology of Core and Guay (1999), who provide a 'one-year approximation method' for inferring the relevant Black-Scholes parameters of the average exercise price and time to maturity of both the executive's exercisable and unexercisable options that had been previously issued.[8] With these parameters in hand, and the aforementioned estimates of volatility, dividend yield, the firm's prevailing market price at fiscal year-end, and Treasury yields, we can estimate the Black-Scholes value of all previously-issued stock options and combine them with the value of the newly-granted options to get an estimate of the executives entire stock option portfolio. It is on the basis of this entire option portfolio that we estimate a particular executive's sensitivity to a 1% change in the stock price and return volatility (vega).[9] For

[8] We wish to thank John Core and Wayne Guay for graciously sharing their own delta and vega estimation programs to ensure that our work was accurate.

[9] In unreported regressions, we instead use the percentage of the manager's firm-related wealth that is in the form of stock options. Specifically, we divide the value of the manager's stock options by the sum of the

our estimates of each executive's *total* sensitivity to stock price movements, we also include the executive's direct shareholdings.

As our final compensation measure, we create a measure named *CFO Options (CEO Options)*, which is the dollar value of the CFO's stock options recently vesting and is estimated as the change in the dollar value of in-the-money exercisable options (we calculate the yearly change in INMONEX from ExecuComp). For purposes of calibrating the importance of these values to different executives, we also scale CFO Options by the CFO's total compensation for the year (TDC1).

3.3. Description of the Resulting Data Sample

Summary statistics for all of our variables over the entire sample can be found in Table 1. For the mean (median) firm-year in our sample, 41.6% (33.3%) of the outstanding debt has a floating interest rate exposure. The average swap is equivalent to 6.8% of the firm's debt, but since some firms swap to floating while others swap to fixed, a net average of 3.4% of the firm-year's debt is swapped to a fixed interest rate exposure, leaving the average firm-year with 38.3% of their debt floating. While the mean swap amount appears relatively small, observe that the standard deviation of swap usage is 17.8%, indicating that there is a fair amount of variability across firms in the direction and amount of swap usage. Because we are interested in explaining swap usage, many of our specifications will only look at those firms that use interest rate swaps at least once during the sample period. The summary statistics for this subsample appear in panel B of Table 1. Notice that the number of observations is reduced by nearly 45% and that the average size swap has correspondingly increased to 12.3% of the firm's debt. In fact, in untabulated statistics, when we limit our analysis to the 2,999 firm-years in which a swap was used, the average swap corresponds to 25.7% of the outstanding debt. As these statistics suggest, *when* firms use swaps, the magnitude of their usage can be rather large.

Average 1-year Treasury rates over this time period fluctuated widely, ranging from a low of 1.5% to a high of 6.2%. The spread between yields on 5-year swaps and LIBOR averaged 1.1%, ranging from 0.1% to 2.7%. The standard deviation of the spread over this ten-year period was 74 basis points, and therefore in most of the economic

value of his options, the value of his stock, and the value of his salary and bonus. The estimated results from this measure are statistically and economically weaker than when we use delta and vega. These results are available upon request.

interpretations of our findings we will look at one percentage point changes in the yield spread to correspond to just above this one standard deviation movement. Consistent with other studies that rely on the ExecuComp dataset, these firms are larger than the average Compustat firm, and more than half of the observations are firm-years in which there was public debt outstanding. Comparing the entire sample (panel A) with the subsample of swap users (panel B), we see that swap users appear to be larger firms and more likely to have access to public debt markets, but are otherwise very similar.

Given the sample statistics on swap usage and the variability of the interest rate environment over the sample period, we can see that interest rate timing can have a significant effect on earnings in the short-run, enabling firms to generate the types of benefits that we seek to document. As shown in Table 1, the average swap yield spread during the period is 1.1%. Considering only the subsample of firm-years when a swap was used, recall that the average swap is equivalent to 25.7% of the firm's debt outstanding. The average firm-year has just over $1 billion in debt outstanding and nearly 111 million shares outstanding (both figures coming from untabulated results). These figures suggest that the average swap from fixed to floating increases earnings per share (EPS) by 2.5 cents on a pre-tax basis. As another example, for those firm fiscal years ending in 2002, a time period when the yield curve was rather steep (an average spread of 2.5%), the *average* swap position (conditional on having swaps outstanding) at the end of those fiscal years was 28.9% of debt. This level of swap activity corresponds to an EPS difference of 6.5 cents before taxes. Thus, the economic impact of this strategy can have significant effects on earnings in the short-run.

Moving on to our variables that proxy for potential myopic/speculative incentives, we see that there is also a fair amount of variability across firm-year observations. 16.1% (5.8%) of the firms raise external debt (equity), representing at least five percent of the firm's market value in the next fiscal year, while 20.1% (43.6%) of the firm-years correspond to periods where the firm either just met their consensus earnings forecast or beat it by no more than one cent (five cents). Looking at an alternative measure of earnings manipulation, note that 3.3% (5.7%) of the firm-years in the full sample (swap users sub-sample) correspond to periods in which changes in swap activity appear to have enabled the firm to meet its earnings forecast. For our compensation variables, we see that a one percent increase in shareholder value increases CFO (CEO) compensation by $56,000 ($584,000) and that a 1% increase in share volatility increases CFO (CEO) compensation by $18,000 ($64,000). In the average year, CFOs have $634,000 in options vesting, which on average represents 52.9% of their annual compensation. There are sizable standard deviations in all of these variables, so we should have sufficient power to estimate the statistical and economic significance of the impacts of these characteristics on term structure sensitivity.

We also provide, in Table 2, three panels of correlations for a number of our variables. We can see from the top panel that swap usage is positively correlated with the spread between long- and short-term debt, but that the correlation with the final floating debt percentage is negative. As discussed in the multivariate findings, this univariate outcome is sensitive to other factors affecting the source and maturity of debt during the sample period. The second panel suggests that there is a little correlation between firm swap activities and whether firms raised funds or whether their realized EPS was close to their earnings forecast. Finally, the third panel shows a high correlation among the different compensation variables, but they appear basically uncorrelated with firm swap activities. Recall that we will be interested in how swap activity relates to the term structure as it is interacted with these variables, and not so much whether these characteristics are related to swap activity and the floating structure of firm debt.

4. Empirical Results

Our first task with this larger dataset is to verify the results of Faulkender (2005) that a key determinant of swap activity and the overall proportion of floating-rate debt is the difference between short- and long-term interest rates. We then test for differences in this interest rate sensitivity of swap usage as a function of the firm and managerial characteristics we discussed above. These tests are then repeated with the variable of interest being the portion of the firm's debt ending with a floating rate exposure. We then provide the results of several robustness checks to demonstrate the stability of our findings.

4.1. Baseline Specifications

As seen in the first three columns of Table 3, when we examine the differences in the percentage of debt that is swapped to floating at the end of the fiscal year, we confirm that an important driver in the decision of how much of the firm's debt to swap is the average slope of the term structure during the fiscal year.[10] Regardless of whether we look at the OLS results (column 1) or the firm fixed effects results (column 2), we see that for a one percent increase (100 basis points) in the difference between the 5-year swap rate and LIBOR (recall that a single standard deviation move is 74 basis points), an additional 3.38% to 3.91% of the average firm-year's debt is swapped to floating.[11] Using the Treasury yield spread (column 3), we see that a one percent increase in the difference between the 10-year and 1-year Treasury rates equals approximately a 5.12% increase in the percentage of debt that is swapped to floating. When one considers that the average sized swap (absolute value) for the firm-years in these regressions is 12.3% of the firm's debt, these results support the conclusion that the term structure of interest rates has a significant effect on the magnitude of swap usage by non-financial firms.

Not surprisingly, a number of other control variables are consistently significant in explaining swap usage. The percentage of outstanding debt that was issued with a floating interest rate exposure is negatively associated with the use of pay-floating interest rate swaps. This is to be expected because if firms already have most of their debt in a floating rate exposure, they are more likely to enter into pay-fixed interest rate swaps (which by construction, correspond to negative floating-rate swaps). It is the firms that have most of their debt issued with a fixed-rate exposure that are most likely to use pay-floating interest rate swaps. In addition, we find that leverage is statistically significant in both of the fixed effects regressions, indicating that when firms are above their average leverage level, they are more likely to swap to floating. Other variables appear to play a much less significant role, consistent with the interest rate environment being among the strongest determinants of the use of interest rate swaps.

[10] One potential explanation for the difference in these findings relative to Chava and Purnanandam (2004) is that we are looking at the contemporaneous interest rate environment whereas they use a weighted average term spread based on the time of issuance. While firms are likely to evaluate their interest rate exposure at the time of issuance (consistent with Faulkender (2005)), our results suggest that firms continue to modify their interest rate exposure after issuance as interest rates change.

[11] While our explanation of the results will discuss the percent swapped to floating, recall that this is a net swap figure so the estimate can also be interpreted as the reduction in the percent of debt that is swapped to fixed. We do not distinguish between firms with fixed-rate debt increasing the amount swapped to floating from firms with floating-rate debt reducing the portion of debt swapped to fixed.

We turn now to the factors that determine the percentage of a firm's debt that ends with a floating interest rate exposure. As seen in the results in columns 4 to 6 of Table 3, the swap yield spread is statistically insignificant in the OLS specification (column 4), but both the swap and the Treasury yield spread are significant in the firm fixed effects regressions (columns 5 and 6). As discussed above, this is consistent with the interest rate spread having limited power in determining the average level of the firm's floating rate exposure, but is important in explaining deviations from the average exposure.[12] Economically, the estimated coefficients from the fixed effects regressions suggest that a one percent move (100 basis points) in the spread corresponds to an additional 1.2% to 1.7% of the firm's debt having a floating rate exposure.

Even more than in the swaps regressions, a number of other factors explain the firm's final interest rate exposure. Since we already have estimated how firms use swaps to achieve their final exposure, many of these other factors essentially explain the interest rate exposure of the underlying debt. First, we see that firms with more long-term debt and those that have access to the public debt markets tend to have a greater proportion of their debt with a fixed interest rate exposure.[13] Additionally, as more of the aggregate debt issued in the economy is from sources normally associated with lending at floating rates, a larger portion of a firm's debt has a floating interest rate exposure. Thus, as macroeconomic conditions change such that firms increase their borrowing from banks, their transactions in the swap market do not sufficiently offset the natural floating interest rate exposure of bank debt and we see firms ending up with more of their debt having a floating exposure. We also see that the coefficient on leverage is statistically significant

[12] In unreported regressions, we use tobit specifications with and without random effects, recognizing that there are some firm-years in the sample with zero floating-rate debt and others with all of their debt having a floating exposure. While 14.9% of the sample have zero floating-rate debt and 7.5% have 100% of their debt floating, the tobit specification without random effects generates results similar to the reported OLS results and the specification with random effects generates results that are statistically and economically similar to what we report using firm fixed effects.

[13] In unreported regressions, we find that our estimated coefficients on the Treasury yield spread and the swap yield spread are particularly sensitive to including the percentage of debt that has a long-term maturity. In the period from 2000 to 2003, we saw the level of both long- and short-term interest rates fall to historically low levels, but the spread was actually rather high relative to the rest of the sample period. So, later in the sample, firms were moving away from short-term floating-rate debt towards long-term fixed-rate debt, even though the interest rate spread was rather high. This can be seen in the Federal Reserve Flow of Funds report L.102 (Nonfarm Nonfinancial Corporate Business). Over the period 2000-2003, aggregate commercial paper outstanding among these firms fell from $278.4 billion to just $85.9 billion. The strong statistical significance of the coefficient corresponding to maturity demonstrates that this change in debt maturity is an important factor affecting the fixed/floating mix.

in all three specifications and that the sign changes on the basis of whether we use an OLS or firm fixed effects specification. Such results suggest that highly levered firms are more likely to have fixed-rate debt, but that once we control for the average leverage of the firm (through the fixed effect), leverage levels above the firm's average correspond to greater use of floating-rate debt.

4.2. Differences in Sensitivity of Swap Usage to Yield Spread

Having established the sensitivity of swap usage and floating-rate debt to changes in the term structure for this larger dataset, we now focus on our main question: *how does that sensitivity vary across firm-year characteristics?*

4.2.1. Raising External Capital

Our first hypothesis is that firms may want to increase earnings in the fiscal year before they raise external funds by increasing their use of pay-floating swaps and overall floating-rate debt as the term structure becomes steeper. This would suggest that the firm-years prior to the raising of external capital should be more sensitive to movements in the spread between long- and short-term rates than those firms that do not raise external funds.

Examining the results of such an empirical test (see columns 1 and 2 of Table 4), we find that the estimated coefficients suggest that firms that raise debt or equity in the next fiscal year are not significantly more sensitive to movements in the yield spread than are firms that do not raise additional funds. However, notice that the indicator variable corresponding to whether the firm raised external capital is positive in both specifications and statistically significant in the debt specification. This result suggests that regardless of the spread between fixed and floating interest rates, firms swap more of their debt to floating in anticipation of raising external debt. Considering that the swap yield spread was positive over the entire sample period, this finding is consistent with firms going with the *lower cost* interest rate exposure regardless of how big the difference is between fixed and floating interest rates.

4.2.2. Earnings Manipulation

Examining our second hypothesis, that firms that meet or just slightly exceed their earnings forecast are more sensitive to movements in the term structure, we find more striking results. Given the asymmetric reaction of the market to earnings announcements around the forecasted values, the accounting literature suggests that firms reporting at or just above forecast are the ones most likely to have manipulated earnings. When we estimate the incremental sensitivity of swap usage to the term structure for those firms that had earnings per share realizations equal to or up to one cent above the consensus forecast (column 3 of Table 4), we find that these firms are not more sensitive to the interest rate environment than those not coded as close to their forecast. However, when we broaden the set of firms close to forecast by including those beating the consensus forecast by up to five cents (column 4 of Table 4), we estimate a significantly positive coefficient. Firms that miss their consensus forecast or exceed it by more than five cents increase their net use of pay-floating swaps by 2.39% of debt for a one percent increase (100 basis points) in the swap yield spread, whereas those that meet their forecast by five cents or less have an estimated sensitivity to the yield spread of 4.57% (= 2.39 + 2.18), a difference that is statistically significant at better than one percent. Relative to the average swap position of 12.69% of the firm's debt (absolute value) for the observations in this regression, this doubling in the sensitivity of swap usage to the term structure corresponds to a 36.0% (= 4.57% / 12.69%) average change in the use of swaps for a one percent change in the yield spread by firms that are close to the consensus analyst forecast relative to 18.8% for those that are not.

These results are consistent with our hypothesis that firms are more likely to use interest rate swaps when it helps them avoid missing analyst earnings forecasts. The difference in the results for the varying cutoffs may suggest that the economic effect on earnings per share of using interest rate swaps can exceed one cent per share. Alternatively, it seems reasonable that since firms have to commit to a swap decision *before* they know the earnings realization, those firms that think they will be close to forecast (where close need not be limited to within one cent per share) are more likely to take the interest cost reduction obtained via a swap. Under either interpretation, when the range was too narrow, firms that may have still benefited from interest rate swaps in making their forecast were categorized as not potentially benefiting, leading to the insignificant difference. The wider range includes more firms that may potentially benefit (and apparently do), improving the statistical significance of the coefficient.[14]

Looking at the results for one of our alternative measures of earnings relative to analyst forecast, we find that those firms for which interest rate swaps enabled them to meet their forecast have swap usage that is significantly more sensitive (at better than one percent) to movements in the term structure (column 5 of Table 4). Economically, the firms that did not need to adjust their swap usage to meet their earnings forecast increase their use of swaps by 2.85% of their total debt outstanding for a one percent increase in the yield spread. However, for the firm-years in which the change in their use of interest rate swaps allowed the firm to meet their forecast (that they would have missed, absent the change), we observe an increase in the percentage of total debt swapped to floating by 8.25% (= 2.85% + 5.40%) for that same one percent increase in the yield spread.[15] Note also the significant increase in R^2 from 14.6% in the baseline regression (column 2 of Table 3) to 17.1% when our alternative measure of earnings manipulation is included (column 5 of Table 4).[16] Such an increase in statistical power is consistent with our hypothesis that timing the swap market to meet current period earnings forecasts is a strong determinant of the variation in interest rate swap usage across firms.

For our final analysis of the influence of earnings manipulation, we examine the relationship between market timing in the interest rate swap market and discretionary accruals. We argue that if firms can manipulate earnings using discretionary accruals, they have less incentive to try to meet their short-term earnings target by altering the interest rate exposure of their debt. The results, contained in column 6 of Table 4, are consistent with this argument and suggest that firms with higher discretionary accruals have significantly lower swap usage than those firms that are reducing their use of discretionary accruals. Economically, firms that use interest rate swaps and have the

[14] In untabulated robustness checks, we find that the pivot point is at approximately three cents per share, which is just above the 2.5 cents per share effect on EPS of the average swap that we calculated above. At this level, the coefficient in the swaps regression is statistically significant whereas in the floating debt regression (the results of which are discussed in detail below), it is not. At four cents, both are significant. Results are available upon request.

[15] We have also examined this earnings management variable by re-calculating what the benefit would have been from adjusting its position 3 or 6 months before the end of the fiscal year rather than adjusting for the entire fiscal year. The results when using these alternative measures are very similar to our current results.

[16] When the baseline regression is estimated on the same set of observations as the regression of column 5 of Table 4, the R^2 is 14.7%.

sample mean level of discretionary accruals (-0.5% of the firm's assets at the end of the previous fiscal year) increase their use of interest rate swaps by 3.35% for a one percent increase in the yield spread. This compares to firm-years in which reported earnings were managed upwards by 7.8% of the previous year's book assets (a one standard deviation increase in discretionary accruals), for which we estimate an increase in their swap usage by only 2.27% for the same one percent increase in the yield spread.[17] We caution that while this specification assumes that swap usage is a function of the level of discretionary accruals, it is likely that the choices are made simultaneously or that the causation goes in the opposite direction (that greater swap usage reduces the need to increase discretionary accruals). Still, the findings appear consistent with firms viewing these two actions as substitutes for each other and as additional confirmation that short-term earnings considerations are affecting corporate debt policy.

4.2.3. Managerial Compensation

We turn now to the structure of the manager's compensation contract and its effect on the sensitivity of debt policy to the term structure. As seen in column 1 of Table 5, the interaction of the yield spread with the CFO's delta on swap usage also generates an estimated coefficient that is positive and statistically significant at better than one percent. This suggests that as the CFO receives more of the gains that arise from reductions in interest expense, the firm's use of swaps becomes more sensitive to the term structure. For the average firm that uses interest rate swaps with a CFO delta at the sample mean ($56,000), a one percent increase in the swap spread corresponds to a 3.90% net increase in the use of pay-floating swaps. However, for an otherwise similar firm in which the CFO delta is one standard deviation ($95,000) above the mean, such a firm on average increases the net usage of pay-floating swaps by 5.33% (= 3.90% + 1.43%) for that same one percent increase in the swap spread, a 37% increase in sensitivity. Since the average swap position in the sample is equivalent to 12.3% of the firm's debt, for a firm in which the CFO's delta is one standard deviation above the

[17] Recall that for our continuous variables with which we generate interaction terms, we standardize the variable to represent the number of standard deviations it is away from the variable's mean value for the entire sample. The coefficient estimates for the interaction terms thereby represent the difference in interest rate sensitivity of swap usage for a one standard deviation move in the corresponding variable.

mean, a 100 basis points increase in the swap yield spread corresponds to a 43% change in the average swap position.

Similarly strong results are uncovered when we examine the CFO vega, which measures the increase in compensation associated with a 1% increase in stock volatility. Statistically, the estimated coefficient is again significant at better than one percent, indicating that at firms where managers are induced to take risks via their compensation contracts, managers are significantly more likely to adjust their use of swaps to changes in the yield spread (column 2 of Table 5).[18] Economic significance also remains strong. For the average firm with a CFO vega at the mean ($18,000), a one percent increase in the yield spread is associated with a 4.26% increase in the percentage of debt swapped to floating, whereas for a CFO with a vega of $48,000 (the mean plus one standard deviation), that same one percent increase in the yield spread corresponds to a 5.39% increase in the percentage of debt swapped to floating, a 27% increase.[19] These results are consistent with our third hypothesis that compensation schemes that pay more when shareholders do well and/or that induce risk-taking appear to motivate managers to time interest rate markets.[20]

An alternative way to evaluate the role that compensation may have on interest rate timing is to look at swap usage around the time that stock options are vesting. As

[18] As shown in the correlation table, there is a reasonably high correlation between the deltas and vegas. As a result, when both terms are placed in the regression, the high degree of multicollinearity often generates insignificant coefficients for both variables. In some of the specifications, only the CFO delta interaction term is statistically significant while the CFO vega term is insignificant. While this suggests that the CFO delta is likely to have a stronger impact, we only display the results when they are estimated separately because of the lack of stability in the findings. The regression results from including both terms are available upon request.

[19] Because delta and vega are measured as the dollar value of the addition to managerial wealth from a 1% increase in the value (volatility for vega) of the firm's equity, there is a positive correlation between firm size and these measures (using the natural log of sales as the measure of size, the correlation with CFO delta is 0.30 and with CFO vega is 0.41). To ensure that our results are not driven by size but instead by compensation, we estimated specifications adding a term that allows the natural log of sales to interact with the yield spread. In all of these specifications, we found that the coefficient corresponding to the interaction with size was statistically insignificant and that the coefficients on the compensation interaction variables retained their statistical and economic significance. We also normalized delta and vega by CFO compensation and found estimated coefficients that are of similar economic magnitude but weaker statistical significance.

[20] In unreported regressions, we find that the manager's age does not impact the sensitivity of swap usage or the fixed / floating mix of debt to movements in interest rates, but that managerial tenure does have a significant impact. However, when we also include CFO delta or vega in the specification, the interaction of tenure with the yield spread is not statistically significant while the coefficient on the interaction between the spread and the compensation variables are significant (results available upon request).

noted by the positive coefficient on the interaction term found in column 3 of Table 5, we find that years with large vesting of options for the CFO correspond to greater sensitivity of swap usage to the yield spread, but it is not statistically significant.

We also evaluate the role of CEO compensation instead of for the CFO and present those results in columns 4 through 6 of Table 5. We initially focused on the CFO's compensation structure since, arguably, it is the CFO that plays a greater role in conducting interest rate swap transactions than would the CEO. However, we have compensation data for the CEO for more of the firm-years in the sample and there does appear to be a high correlation between the CEO and CFO pay characteristics (see Table 2). On the other hand, the correlation is not perfect and there have been recent studies (Geczy, Minton, and Schrand (2005), Chava and Purnanandam (2004)) that suggest that CFO compensation is a more important determinant than CEO compensation.

Looking at the results, we find that both the delta (column 4) and the vega (column 5) for the CEO are statistically significant at better than one percent and better than five percent in their respective specifications. Economically, for a firm where the CEO has the average delta ($579,000 increase in CEO wealth for a 1% gain in shareholder value), a one percent move in the yield spread corresponds to a 3.18% increase in the percentage of debt that is swapped to floating. For a firm-year where the CEO delta is one standard deviation above the mean for the sample ($2.167M for a 1% gain in shareholder wealth), the estimated sensitivity of swaps to the term structure is 4.44%, a 40% increase. Similarly, when we estimate the impact of vega, the sensitivity changes from 3.41% to 3.97%.

We also find that option vesting (column 6) generates a statistically significant increase in the sensitivity of swap usage to the term structure. Specifically, a CEO with options vesting equivalent to 95.9% of the CEO's total compensation (the mean) has a swap usage interest rate sensitivity of 3.69%, whereas an otherwise similar firm-year in which the manager has options vesting equivalent to 304% of annual compensation (a one standard deviation move even after truncating at the 99^{th} percentile), pay-floating swap usage increases by 5.96% for a one percent increase in the yield spread. Notice that the estimated coefficient on the interaction term for CEOs is similar in magnitude to the estimate for CFOs and that the number of observations in the regression has more than doubled. Arguably, the difference in these results comes from the additional power rather than CEO pay structure mattering more than CFO pay structure.

All of these results provide evidence in support of our hypothesis that adjustments to the mix of fixed- and floating-rate debt depend upon the effect they may have on managerial compensation. Firms appear to reduce interest expense to raise earnings when managerial compensation is highly sensitive to equity returns and equity volatility as well as around the time of large values of options vesting.

4.2.4. Combinations of Interaction Terms

Since we find that firms are using interest rate swaps to manipulate earnings in one set of specifications and that they are motivated by the form of their compensation contract in another set, we now put both measures in the same regression specification to determine whether both activities are jointly occurring or if one of the results is driven by a spurious correlation. The results of these tests, found in Table 6, indicate that *both* factors significantly impact firms' usage of interest rate swaps, with magnitudes that are very similar to those found when their effects were separately estimated. When the yield spread is interacted with our measure of whether using interest rate swaps helped firms make their earnings forecast and with CFO delta (column 1), we see that *both* interaction terms are similar in economic magnitude to the earlier results, the earnings manipulation measure is significant at better than one percent, while CFO delta is marginally significant (p-value = 11.1%). Similarly, when we jointly examine the sensitivity of swap usage to yield spreads resulting from the same earnings measure and CEO options vesting (column 2), we find that both coefficients retain their economic magnitude and are statistically significant at better than one and ten percent respectively.

Alternatively, when the yield spread is interacted with discretionary accruals and CFO delta, we estimate coefficients for both interaction terms that are economically large and statistically significant at better than one percent. Finally, jointly looking at the use of discretionary accruals and CEO options vesting, both coefficients are statistically significant at better than five percent and have economic magnitudes that are similar to those found in the stand alone specifications. Overall, the results suggest that the desire to meet earnings forecasts *and* the extent to which management has high-powered compensation contracts affect how firms manage their interest rate exposure.

4.3. Differences in Sensitivity of Floating-Rate Debt to Yield Spread

So far, our results have just been for those firms that use interest rate swaps and have focused on the swap component of arriving at the firm's desired interest rate exposure. However, firms can also achieve that exposure through their choice of the underlying debt instrument. Therefore, we now re-examine our results for all firms in the sample by looking at the final exposure firms achieve, regardless of whether they use interest rate swaps.

As seen by the results in Table 7, the differences in floating-rate debt sensitivity to the term structure due to external capital market access and earnings manipulation considerations are the same as those found for the use of interest rate swaps. Firms that raise debt or equity or that make their earnings forecast by within one cent are not significantly more sensitive to the yield spread. However, those that make their consensus forecast by within five cents, those for which their change in their fix / floating mix allowed them to make their earnings forecast, and those that use fewer discretionary accruals have a significantly higher sensitivity of their floating-rate debt percentage to the yield spread. One significant difference in the results is that those firms that raise *either* debt or equity in the following fiscal year have significantly more floating-rate debt, regardless of the steepness of the yield curve. These differences are both statistically significant at better than five percent and contrast with the swaps results in which only debt raisers had significantly more floating-rate swap usage. Also notice the economic magnitudes of these findings: in years before firms raise debt, they have 3.8% more floating-rate debt than their average level of floating-rate debt, and in the year before accessing equity markets, they have 4.7% more floating-rate debt.

When we look at the effect of the interactions of the compensation variables with the yield spread on overall floating-rate debt, located in Table 8, we again find very similar statistical and economic magnitudes. For a CFO delta that is one standard deviation above the mean, a one percent increase in the swap yield spread corresponds to a 3.55% increase in the percentage of the firm's debt that floats with interest rates relative to a 1.87% increase when the CFO delta is at the mean. This difference is a 90% increase in the sensitivity of the firm's debt structure to interest rates. While only significant at the ten percent level, we again find that when the CFO vega is higher, the overall percentage of debt that is floating is more sensitive to changes in the term structure, while the interaction term with CFO options vesting is again statistically insignificant.

Moving to the results for CEO compensation on the overall floating rate structure of firm debt, we also find similar results. CEO delta is statistically significant at better than five percent, but with a magnitude somewhat lower than that found for CFOs. We find that the vega interaction term is insignificant in this specification whereas the interaction term with CEO options vesting is statistically significantly positive, again probably due to the greater number of observations for CEOs than for CFOs. Overall, regardless of whether we look at swap usage specifically or at the ending interest rate exposure of debt, we find that earnings management and compensation considerations significantly affect the sensitivity of the firm's interest rate management to movements in the yield curve.

4.4. Changes in Interest Rate Swap Usage

All of our specifications that we have presented so far have focused on level effects. We looked at the level of the yield spread during the fiscal year to explain the level of swap usage or the level of floating-rate debt to estimate sensitivity. An alternative approach is to look at how *changes* in interest rates affect *changes* in either swap usage or the floating-rate debt percentage. Therefore, we re-run all of our regressions in a changes specification (that naturally no longer contains firm fixed effects) and provide those results in Table 9.

We first establish that changes in the term structure do indeed affect changes in swap usage (column 1), finding that a change in the slope of the term structure of one percent (100 basis points) corresponds to an increase in the use of floating-rate interest rate swaps by 1.85% for the sample of swap users. Moving to interaction terms (columns 2 and 3), consistent with our previous findings, instances in which swap usage made a difference in meeting the consensus earnings forecast and firm–years in which the CFO delta at the beginning of the fiscal year was large are firm-years that have greater yield spread sensitivity. Both estimated coefficients on these interaction terms are statistically significant at better than five percent and are of magnitudes similar to those found in the levels regressions. Likewise, when we examine changes in the percentage of debt that has a floating interest rate exposure, we find that the baseline specification (column 4) again shows that increases in the yield spread correspond to increases in the use of floating-rate debt. The results for the interaction terms (columns 5 and 6) also are unchanged, again suggesting that term structure sensitivity is higher when floating exposure changes help firms meet their earnings forecast and for CFOs with more performance sensitive compensation contracts.

5. Conclusion

Interest rate swap usage at non-financial firms has grown dramatically over the last fifteen years and it is important to understand how and why firms are using these securities. Our results confirm that they are being used to time the interest rate market and we find that the strongest determinants of the sensitivity of firms' swap usage to the term structure of interest rates is the compensation scheme of the firm's management and whether such activity helps the firm hit its consensus earnings forecast. While firms state that they are using swaps to hedge, and are complying with FASB standards to claim hedge accounting treatment, we provide evidence consistent with firms using swaps to manipulate earnings in order to meet market expectations and to improve managerial pay. We also find evidence that, prior to raising outside capital, managers are using interest rate swaps to increase earnings per share, regardless of the steepness of the term structure. Importantly, our results are not limited to a firm's use of interest rate swaps; we also find similar outcomes when we examine the portion of a firm's debt that has a floating interest rate exposure after the incorporation of swaps.

Although our focus has been on the use of interest rate swaps, we believe that our results speak to the broader question of what factors influence the managerial decision-making process, especially those affecting a firm's profits over time. Since interest rate swap usage is one of many ways that managers may move cash flow and earnings across time, we believe that our examination also contributes to the larger literature examining which factors drive such intertemporal tradeoffs. It is particularly interesting to find that analyst earnings forecasts and the structure of executive compensation may actually exacerbate the manager's focus on near-term outcomes and incentives to speculate on market movements. This is troublesome given that the purpose of performance-based compensation is to provide incentives to take actions that are in the long-term best interests of shareholders. While such a finding is by no means unique to our work, our uncovering of the relationship between interest rate swap usage and compensation characteristics is a reminder for compensation committees to carefully consider the full ramifications of the incentive-based pay packages they offer to management.

Appendix

We now discuss in more detail how interest rate swap and floating-rate long-term debt data were hand-collected and coded. Starting in 1990, the Statement of Financial Accounting Standards (SFAS) 105 required detailed disclosures about the amounts, nature, and terms of financial derivative instruments with off-balance-sheet risk of accounting loss, which include interest rate swaps.[21] Because of these reporting standards, we are generally able to determine whether a firm used any interest rate swaps during a fiscal year and if so, the notional amounts and directions of interest rate swaps outstanding at the end of the fiscal year. Since the variable we are ultimately interested in is *the net percentage of the firm's debt that is swapped to floating*, we record only debt-related interest rate swaps effective at the end of each fiscal year. Thus we exclude the notional amounts of 1) swaps reported as hedging non-debt items such as investments, preferred stock, operating leases, etc. and 2) forward-starting interest rate swaps. Some firms, in addition to plain interest rate swaps, report using combined currency interest rate swaps. Most of these do not modify the nature of the firm's interest rate exposure and hence are not included in our swap variables. However, those swaps that change both currency and interest rate exposure of the firm's debt are included.

To measure the amount of floating-rate long-term debt outstanding at the end of the fiscal year, we study interest rate risk discussions usually found in Item 7A "Quantitative and Qualitative Disclosures about Market Risk" and in the long-term debt footnote of the 10-K. We get our most precise estimates of floating-rate long-term debt for those firm-years that include a table reporting principal amounts of long-term debt obligations broken down by year of maturity and interest rate exposure. A sample table, taken from Black Hills Corporation's 2003 10-K is shown below. By examining individual debt instruments reported in the long-term debt footnote, we double-check that the firm's classification of its debt as either variable or fixed is consistent with our own classification criteria.[22]

[21] While accounting standards have changed over the sample period related to the qualifications for using hedge accounting treatment (see SFAS 119 and 133), it was rather straightforward under all of the different regimes to classify interest rate swaps transforming debt from a floating to a fixed interest rate exposure (and vice-versa) as hedges for hedge accounting treatment. Most swaps by firms in the sample are structured to fit under the "shortcut accounting method" which requires the swap to fulfill seven conditions including most importantly that "the index on which the variable leg of the swap is based matches the benchmark interest rate" on the liability (Trombley, 2003). This is important because hedge accounting treatment enables the firm to avoid marking the swaps to market on their financial statements. If the derivative were marked-to-market, the changes in value would also be accounted for in earnings, meaning that interest rate movements would impact earnings by more than just the difference in interest rates between short- and long-term debt. If the firm would like to swap less than the full amount of the corresponding debt, the short-cut method may still be applied provided that all other criteria are satisfied (http://www.fasb.org/derivatives/issuee10.shtml), and can therefore still claim hedge accounting treatment. Since the swaps in our sample were held for hedging purposes, we only concern ourselves with the differences in interest costs under fixed versus floating exposures.

[22] Some firms, for example, report commercial paper and credit facilities classified as long-term debt as fixed-rate instruments, even though due to their short-term nature, they should be treated as floating.

Table A1

The table below presents principal (or notional) amounts and related weighted average interest rates by year of maturity for our short-term investments and long-term debt obligations, including current maturities (in thousands).

	2004	2005	2006	2007	2008	Thereafter	Total
Cash equivalents							
Fixed rate	$ 172,771	$ --	$ --	$ --	$ --	$ --	$ 172,771
Long-term debt							
Fixed rate	$ 2,845	$ 2,854	$ 2,865	$ 2,049	$ 2,062	$ 449,149	$ 461,824
Average interest rate	8.5%	8.5%	8.5%	9.6%	9.6%	7.1%	7.2%
Variable rate (a)	$ 14,814	$ 15,504	$ 238,274	$ 113,468	$ 19,165	$ 23,069	$ 424,294
Average interest rate	2.7%	2.7%	2.2%	2.7%	1.7%	3.1%	2.4%
Total long-term debt	$ 17,659	$ 18,358	$ 241,139	$ 115,517	$ 21,227	$ 472,218	$ 886,118
Average interest rate	3.7%	3.6%	2.2%	2.8%	2.5%	6.9%	4.9%

(a) Approximately 32.5 percent of the variable rate long-term debt has been hedged with interest rate swaps moving the floating rates to fixed rates with an average interest rate of 4.62 percent.

When no table similar to the one above is included in the 10-K, classifying long-term debt instruments as either floating- or fixed-rate requires some subjective decisions on our part. In general, we are conservative in classifying long-term debt as floating, i.e., by treating most instruments as fixed unless explicitly reported otherwise, we bias our data against finding any results in the regressions of the percentage of total debt that is floating. More specifically, our default assumptions, unless the 10-K explicitly reports otherwise, are that:

- commercial paper, credit facilities, and short-term debt classified as long-term are floating rate;
- bank loans are floating rate;
- bonds, industrial revenue bonds, debentures, and notes are fixed rate;
- capital leases are treated as fixed rate;[23]
- "other" is treated as fixed rate.

An example of our application of these assumptions is shown below. Because we examine firms' 10-Ks over time, we believe that we are able to make more accurate

[23] In unreported regressions, we classified all capital leases as floating-rate and obtained similar results.

judgments, taking into consideration changes in the reported interest rates paid on various instruments and disclosures made in some years but not in others.[24]

Table A2

The following table, taken from Pennzoil-Quaker State Company's 2000 10-K, filed on March 20, 2001, provides an example of firm's disclosure of long-term debt instruments in the long-term debt footnote and of our classification of long-term debt instruments as either floating- or fixed-rate.

Debt outstanding was as follows:	December 31	
	2000	1999
	(EXPRESSED IN THOUSANDS)	
7.375% Debentures due 2029, net of discount	$ 398,105	$ 398,038
6.750% Notes due 2009, net of discount	199,159	199,057
8.65% Notes due 2002, net of discount	149,746	--
6.625% Notes due 2005, net of discount	99,708	99,647
Commercial paper	57,709	242,578
Revolving credit facility	195,000	--
Pollution control bonds, net of discount	50,522	50,549
International debt facilities	51,808	23,460
Other variable-rate credit arrangements with banks	--	16,000
Other debt	6,455	7,534
Total debt	1,208,212	1,036,863
Less amounts classified as current maturities	(13,786)	(10,710)
Total long-term debt	$ 1,194,426	$ 1,026,153

According to our classification criteria:

1) debentures and notes are recorded as fixed-rate;

2) commercial paper, revolving credit facility, international debt facilities, and other variable-rate credit arrangement with banks are recorded as floating-rate;

3) absent explicit discussion, pollution control bonds would have been recorded as fixed-rate; however, in this particular case, the footnote specifically states that in 2000, 11,800 pollution control bonds carry a fixed interest rate and 38,722 carry a floating interest rates;

4) other debt is recorded as fixed-rate.

[24] To verify the reliability of our estimation procedure, we compared our estimates of the percentage of debt with a floating interest rate exposure to Compustat Data148, "Long-Term Debt Tied to Prime." There is a high correlation (0.882) between the two. However, we believe that we have a much better measure of floating-rate debt because Compustat Data148 a) is missing for 37.6% of our observations, b) appears to be inconsistent about whether interest rate swap effects are taken into account, and c) sometimes ignores certain items such as commercial paper and credit lines which should be treated as floating. In terms of the effects of our results, we used this measure in unreported regressions and find that swap usage results are not affected, as expected, but the results for the percentage of debt that has a floating-rate exposure are weaker. This is consistent with having fewer observations and with the measure having greater noise.

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Table 1
Summary Statistics

The full sample consists of 1,854 firms in the ExecuComp database over the period June 1993 - May 2003 that have positive amounts of debt at some point during the sample period. The swap users subsample consists of firms that report using interest rate swaps at some point during the sample period. Initial(final) floating debt percentage is the percentage of outstanding debt that has floating interest rate exposure before(after) accounting for interest rate swaps. Percentage swapped to floating is the percentage of outstanding debt that is swapped to a floating interest rate. Long-term debt percentage is the percenage of outstanding debt that has more than five years to maturity. Treasury yield spread is the average spread between the 10-year Treasury bond and the 1-year Treasury bond during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Economy-wide floating debt percentage is the ratio of commercial paper and bank loan liabilities to the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporate businesses, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. Raised debt(equity) is a binary variable taking the value 1 if the firm raised debt(equity) financing during the following fiscal year, and 0 otherwise. EPS close to forecast (1(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 1(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (swaps (debt) is a binary variable taking the value 1 when a firm met its mean earnings forecast using current values of swap usage (floating debt percentage) but would have missed its mean earnings forecast using lagged values of swap usage (floating debt percentage), and 0 otherwise. Discretionary accruals measure the amount of earnings management. They are calculated using a modified version of the Jones (1991) model (see for instance Dechow et al (1995)) and are scaled by lagged total assets. CEO(CFO) Delta and Vega are the changes (in millions of dollars) in CEO(CFO)'s stock and option portfolio value for a 1% change in the stock price and for a 0.01 change in the annualized standard deviation of stock returns respectively. CEO(CFO) Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CEO(CFO) Options is the value of options vesting. Compensation is total compensation including option grants. Delta, Vega, Options, and Options/Compensation are truncated at the 1st and 99th percentiles.

	Num. Obs.	Mean	Median	SD	Min	Max
Panel A: Full Sample						
Initial floating debt percentage	11261	0.416	0.333	0.351	0.000	1.000
Percentage swapped to floating	11261	−0.034	0.000	0.178	−1.000	1.000
Absolute value of the percentage swapped to floating	11261	0.068	0.000	0.168	0.000	1.000
Final floating debt percentage	11261	0.383	0.308	0.333	0.000	1.000
Long-term debt percentage	11261	0.474	0.495	0.345	0.000	1.000
1-year Treasury yield	11261	4.876	5.310	1.219	1.548	6.248
Treasury yield spread	11261	1.005	0.722	0.813	−0.095	2.966
Swap yield spread	11261	1.117	0.829	0.742	0.139	2.695
Swap spread	11261	0.499	0.484	0.225	0.217	0.946
Credit spread	11261	0.765	0.689	0.190	0.587	1.313
Economy-wide floating debt percentage	11261	0.327	0.343	0.041	0.206	0.363
Ln(Sales)	11261	6.955	6.917	1.448	−3.058	12.410
Leverage	11261	0.185	0.159	0.140	0.000	0.853
Debt or CP rating	11261	0.555	1.000	0.497	0.000	1.000
Raised debt	10607	0.161	0.000	0.367	0.000	1.000
Raised equity	10607	0.058	0.000	0.233	0.000	1.000
EPS close to forecast (1 cent)	9311	0.201	0.000	0.401	0.000	1.000
EPS close to forecast (5 cents)	9311	0.436	0.000	0.496	0.000	1.000
EPS close to forecast (swaps)	7689	0.033	0.000	0.178	0.000	1.000
EPS close to forecast (debt)	7689	0.054	0.000	0.226	0.000	1.000
Discretionary accruals	10737	−0.006	−0.003	0.082	−2.389	2.159
CEO Delta	9787	0.584	0.132	1.623	0.000	12.520
CFO Delta	5949	0.056	0.024	0.095	0.000	0.617
CEO Vega	9969	0.064	0.021	0.120	0.000	0.754
CFO Vega	6199	0.018	0.008	0.030	0.000	0.184
CEO Options	5401	3.419	0.415	9.123	0.000	64.943
CFO Options	2666	0.634	0.122	1.454	0.000	9.870
CEO Options / Compensation	5356	0.959	0.213	2.084	0.000	14.263
CFO Options / Compensation	2645	0.529	0.149	1.012	0.000	6.251

(continued)

Table 1-*Continued*

	Num. Obs.	Mean	Median	SD	Min	Max
Panel B: Swap Users Subsample						
Initial floating debt percentage	6269	0.426	0.355	0.326	0.000	1.000
Percentage swapped to floating	6269	−0.061	0.000	0.235	−1.000	1.000
Absolute value of the percentage swapped to floating	6269	0.123	0.000	0.210	0.000	1.000
Final floating debt percentage	6269	0.368	0.316	0.290	0.000	1.000
Long-term debt percentage	6269	0.493	0.511	0.320	0.000	1.000
1-year Treasury yield	6269	4.854	5.310	1.229	1.548	6.248
Treasury yield spread	6269	1.023	0.722	0.824	−0.095	2.966
Swap yield spread	6269	1.132	0.829	0.749	0.139	2.695
Swap spread	6269	0.499	0.495	0.225	0.217	0.946
Credit spread	6269	0.767	0.689	0.192	0.587	1.313
Economy-wide floating debt percentage	6269	0.327	0.343	0.041	0.206	0.363
Ln(Sales)	6269	7.418	7.360	1.346	1.398	12.410
Leverage	6269	0.203	0.183	0.133	0.000	0.853
Debt or CP rating	6269	0.679	1.000	0.467	0.000	1.000
Raised debt	5999	0.169	0.000	0.375	0.000	1.000
Raised equity	5999	0.043	0.000	0.203	0.000	1.000
EPS close to forecast (1 cent)	5173	0.203	0.000	0.402	0.000	1.000
EPS close to forecast (5 cents)	5173	0.440	0.000	0.496	0.000	1.000
EPS close to forecast (swaps)	4412	0.057	0.000	0.232	0.000	1.000
EPS close to forecast (debt)	4412	0.064	0.000	0.245	0.000	1.000
Discretionary accruals	5932	−0.005	−0.002	0.078	−2.389	2.159
CEO Delta	5597	0.591	0.148	1.596	0.000	12.520
CFO Delta	3372	0.064	0.029	0.103	0.000	0.617
CEO Vega	5707	0.081	0.028	0.140	0.000	0.754
CFO Vega	3508	0.022	0.010	0.034	0.000	0.184
CEO Options	3134	3.797	0.571	9.440	0.000	64.943
CFO Options	1515	0.775	0.163	1.642	0.000	9.870
CEO Options / Compensation	3111	0.943	0.244	1.984	0.000	14.263
CFO Options / Compensation	1501	0.574	0.179	1.057	0.000	6.251

Table 2
Simple Correlations

This table presents pairwise correlation coefficients for some of the variables in the sample. Initial(final) floating debt percentage is the percentage of outstanding debt that has floating interest rate exposure before(after) accounting for interest rate swaps. Percentage swapped to floating is the percentage of outstanding debt that is swapped to a floating interest rate. Long-term debt percentage is the percenage of outstanding debt that has more than five years to maturity. Treasury yield spread is the average spread between the 10-year Treasury bond and the 1-year Treasury bond during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Raised debt(equity) is a binary variable taking the value 1 if the firm raised debt(equity) financing during the following fiscal year, and 0 otherwise. EPS close to forecast (1(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 1(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (swaps) is a binary variable taking the value 1 when a firm met its mean earnings forecast using current values of swap usage but would have missed its mean earnings forecast using lagged values of swap usage, and 0 otherwise. Discretionary accruals measure the amount of earnings management. They are calculated using a modified version of the Jones (1991) model (see for instance Dechow et al (1995)) and are scaled by lagged total assets. CEO(CFO) Delta and Vega are the changes (in millions of dollars) in CEO(CFO)'s stock and option portfolio value for a 1% change in the stock price and for a 0.01 change in the annualized standard deviation of stock returns respectively. CEO(CFO) Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CEO(CFO) Options is the value of options vesting. Compensation is total compensation including option grants. Delta, Vega, and Options are truncated at the 1st and 99th percentiles.

Panel A

	Net Floating Swaps	Initial Floating Debt	Final Floating Debt	Long-term Debt	1-year Treasury yield	Treasury yield spread	Swap yield spread	Credit spread
Net floating swaps	1.000							
Initial floating debt	−0.333	1.000						
Final floating debt	0.165	0.871	1.000					
Long-term debt	0.103	−0.335	−0.298	1.000				
1-year Treasury yield	−0.037	0.095	0.077	−0.010	1.000			
Treasury yield spread	0.077	−0.116	−0.079	0.026	−0.823	1.000		
Swap yield spread	0.082	−0.107	−0.067	0.020	−0.719	0.950	1.000	
Credit spread	0.020	−0.059	−0.049	−0.014	−0.854	0.602	0.598	1.000

Panel B

	Net Floating Swaps	Final Floating Debt	Raised Debt	Raised Equity	EPS (1 cents)	EPS (5 cents)	EPS (swaps)	Accruals
Net floating swaps	1.000							
Final floating debt	0.165	1.000						
Raised debt	−0.016	0.047	1.000					
Raised equity	−0.016	0.052	0.053	1.000				
EPS close to forecast (1 cent)	−0.002	0.048	−0.036	0.015	1.000			
EPS close to forecast (5 cents)	−0.004	0.032	−0.011	0.011	0.571	1.000		
EPS close to forecast (swaps)	0.055	0.024	−0.011	0.001	0.265	0.200	1.000	
Discretionary accruals	0.013	0.074	0.004	0.019	0.017	0.021	−0.002	1.000

Panel C

	Net Floating Swaps	Final Floating Debt	CEO Delta	CFO Delta	CEO Vega	CFO Vega	CEO Options vesting	CFO Options vesting
Net floating swaps	1.000							
Final floating debt	0.165	1.000						
CEO Delta	0.050	0.009	1.000					
CFO Delta	0.045	−0.030	0.453	1.000				
CEO Vega	0.083	−0.047	0.286	0.467	1.000			
CFO Vega	0.088	−0.052	0.287	0.698	0.694	1.000		
CEO Options	0.047	−0.032	0.391	0.465	0.385	0.307	1.000	
CFO Options	0.029	0.005	0.345	0.631	0.271	0.378	0.626	1.000

Table 3
Baseline Interest Rate Swap Usage and Floating Debt Percentage Regressions

This table presents the results of baseline interest rate swap usage and floating debt percentage regressions. In columns 1-3, the dependent variable is the percentage of total debt that is swapped to a floating interest rate, and the sample is the subsample of interest rate swap users, firms that report using interest rate swaps at some point during the sample period. In columns 4-6, the dependent variable is the percentage of outstanding debt that has a floating interest rate exposure after accounting for interest rate swaps. These regressions are estimated using the full sample. Regressions 1 and 4 are standard OLS, the rest are estimated using firm fixed effects. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Treasury yield spread is the average spread between the 10-year Treasury bond and the 1-year Treasury bond during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. Initial floating debt percentage is the percentage of outstanding debt that has floating interest rate exposure before accounting for interest rate swaps. Long-term debt percentage is the percenage of outstanding debt that has more than five years to maturity. Economy-wide floating debt percentage is the ratio of commercial paper and bank loan liabilities to the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporate businesses, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedasticity-consistent standard errors, adjusted for clustering by company, are reported in parenthesis below the coefficients. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	Swap Usage			Floating Debt Percentage		
	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	−0.026	0.396	2.061***	1.055*	0.301	0.856
	(0.517)	(0.500)	(0.541)	(0.544)	(0.508)	(0.538)
Credit spread	0.355	−0.011	2.732	7.043***	1.888	2.808
	(2.439)	(2.265)	(2.196)	(2.604)	(2.324)	(2.257)
Treasury yield spread			5.117***			1.734**
			(0.749)			(0.768)
Swap yield spread	3.911***	3.382***		0.044	1.170**	
	(0.479)	(0.495)		(0.556)	(0.507)	
Swap spread	1.995	1.077	4.911**	5.658***	3.335*	4.604**
	(1.833)	(1.871)	(2.097)	(1.910)	(1.830)	(2.059)
Initial floating debt percentage	−0.320***	−0.305***	−0.305***			
	(0.018)	(0.020)	(0.020)			
Long-term debt percentage	−0.001	−0.012	−0.012	−0.216***	−0.202***	−0.202***
	(0.018)	(0.018)	(0.018)	(0.017)	(0.015)	(0.015)
Leverage	−0.049	0.089**	0.090**	−0.084**	0.205***	0.206***
	(0.036)	(0.044)	(0.044)	(0.038)	(0.043)	(0.043)
Ln(Sales)	0.015***	−0.000	0.000	0.006	0.016	0.016*
	(0.004)	(0.009)	(0.009)	(0.005)	(0.010)	(0.010)
Debt or CP rating	0.013	−0.020	−0.020	−0.159***	−0.131***	−0.131***
	(0.012)	(0.015)	(0.015)	(0.014)	(0.017)	(0.017)
Economy-wide floating debt percentage	0.651***	0.356	0.380*	0.521**	0.843***	0.850***
	(0.223)	(0.222)	(0.223)	(0.216)	(0.204)	(0.205)
Constant	−0.300***	−0.106	−0.255**	0.242***	0.067	0.019
	(0.078)	(0.108)	(0.117)	(0.079)	(0.102)	(0.111)
Num. Obs.	6269	6269	6269	11261	11261	11261
R^2	0.246	0.146	0.147	0.146	0.094	0.094
Firm Fixed Effects	No	Yes	Yes	No	Yes	Yes
Swap Users Only	Yes	Yes	Yes	No	No	No

Table 4

Interest Rate Swap Usage and Raising Funds / Manipulating Earnings

This table presents the results of raising funds and manipulating earnings hypotheses tests for interest rate swap usage. All regressions are estimated using firm fixed effects using the subsample of interest rate swap users, firms that report using interest rate swaps at any point during the sample period. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. Raised debt(equity) is a binary variable taking the value 1 if the firm raised debt(equity) financing during the following fiscal year, and 0 otherwise. EPS close to forecast (1(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 1(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (swaps) is a binary variable taking the value 1 when a firm met its mean earnings forecast using current values of swap usage but would have missed its mean earnings forecast using lagged values of swap usage, and 0 otherwise. Discretionary accruals measure the amount of earnings management. They are calculated using a modified version of the Jones (1991) model (see for instance Dechow et al (1995)) and are first scaled by lagged total assets and then standardized so that the interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in discretionary accruals. Economy-wide floating debt percentage is the ratio of commercial paper and bank loan liabilities to the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporate businesses, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedasticity-consistent standard errors, adjusted for clustering by company, are reported in parenthesis below the coefficients. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	0.305	0.358	0.560	0.529	1.693**	0.279
	(0.506)	(0.505)	(0.552)	(0.550)	(0.802)	(0.517)
Credit spread	0.885	1.242	−0.725	−1.034	0.047	0.698
	(2.376)	(2.374)	(2.538)	(2.533)	(2.503)	(2.364)
Swap yield spread	3.285***	3.237***	3.270***	2.389***	2.846***	3.349***
	(0.523)	(0.518)	(0.603)	(0.652)	(0.535)	(0.512)
Swap spread	0.583	0.672	−0.295	−0.062	−1.429	1.701
	(1.936)	(1.944)	(2.094)	(2.091)	(2.170)	(1.890)
Raised debt	0.025**					
	(0.012)					
Raised debt * Yield spread	−0.062					
	(1.058)					
Raised equity		0.018				
		(0.020)				
Raised equity * Yield spread		0.262				
		(1.435)				
EPS close to forecast (1 cent)			0.005			
			(0.012)			
EPS close to forecast (1 cent) * Yield spread			−0.079			
			(0.994)			
EPS close to forecast (5 cents)				−0.020**		
				(0.009)		
EPS close to forecast (5 cents) * Yield spread				2.182***		
				(0.758)		
EPS close to forecast (swaps)					0.036*	
					(0.020)	
EPS close to forecast (swaps) * Yield spread					5.398***	
					(1.333)	
Discretionary accruals						0.022***
						(0.005)
Discretionary accruals * Yield spread						−1.076***
						(0.377)
Initial floating debt percentage	−0.301***	−0.300***	−0.313***	−0.312***	−0.314***	−0.312***
	(0.020)	(0.020)	(0.023)	(0.023)	(0.025)	(0.020)
Long-term debt percentage	−0.015	−0.015	−0.037*	−0.037*	−0.045**	−0.017
	(0.019)	(0.019)	(0.021)	(0.021)	(0.023)	(0.019)
Leverage	0.119**	0.092**	0.142***	0.143***	0.168***	0.077*
	(0.046)	(0.046)	(0.054)	(0.054)	(0.060)	(0.046)
Ln(Sales)	0.002	0.002	−0.009	−0.009	0.002	0.001
	(0.009)	(0.009)	(0.011)	(0.011)	(0.012)	(0.010)
Debt or CP rating	−0.020	−0.021	−0.021	−0.021	−0.022	−0.017
	(0.015)	(0.015)	(0.017)	(0.017)	(0.018)	(0.015)
Economy-wide floating debt percentage	0.357	0.366*	0.280	0.304	0.100	0.419*
	(0.220)	(0.222)	(0.243)	(0.243)	(0.284)	(0.233)
Constant	−0.130	−0.128	−0.003	0.001	−0.087	−0.132
	(0.109)	(0.110)	(0.123)	(0.123)	(0.132)	(0.114)
Num. Obs.	5999	5999	5173	5173	4412	5932
R^2	0.145	0.143	0.144	0.146	0.171	0.154

Table 5
Interest Rate Swap Usage and Executive Compensation

This table presents the results of executive compensation hypotheses tests for interest rate swap usage. All regressions are estimated using firm fixed effecs using the subsample of interest rate swap users, firms that report using interest rate swaps at any point during the sample period. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. CFO(CEO) Delta and Vega are the changes (in millions of dollars) in CFO(CEO)'s stock and option portfolio value for a 1% change in the stock price and for a 0.01 change in the annualized standard deviation of stock returns respectively. CFO(CEO) Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CFO(CEO) Options is the value of options vesting. Compensation is total compensation including option grants. CFO(CEO) Delta, Vega, and Options / Compensation are first truncated at the 1st and 99th percentiles and are then standardized so that interaction term coefficients measure the change in the sensitivity of swap usage to yield spread due to one standard deviation change in CFO(CEO) Delta, Vega, and Options / Compensation. Initial floating debt percentage is the percentage of outstanding debt that has floating interest rate exposure before accounting for interest rate swaps. Long-term debt percentage is the percenage of outstanding debt that has more than five years to maturity. Economy-wide floating debt percentage is the ratio of commercial paper and bank loan liabilities to the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporate businesses, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedasticity-consistent standard errors, adjusted for clustering by company, are reported in parenthesis below the coefficients. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	−0.847	−0.998	−0.122	0.335	0.275	−0.316
	(0.809)	(0.801)	(1.901)	(0.542)	(0.541)	(0.953)
Credit spread	−0.047	0.705	−1.126	2.253	0.528	−1.481
	(3.409)	(3.398)	(6.349)	(2.343)	(2.351)	(3.913)
Swap yield spread	3.900***	4.259***	5.328***	3.179***	3.405***	3.691***
	(0.785)	(0.771)	(1.518)	(0.524)	(0.522)	(0.800)
Swap spread	7.767***	7.287***	3.708	1.655	1.347	3.021
	(2.586)	(2.651)	(4.744)	(2.003)	(2.007)	(2.597)
CFO Delta	−0.013**					
	(0.006)					
CFO Delta * Yield spread	1.426**					
	(0.587)					
CFO Vega		−0.003				
		(0.006)				
CFO Vega * Yield spread		1.130**				
		(0.442)				
CFO Options / Compensation			−0.022			
			(0.016)			
CFO Options / Compensation * Yield			1.897			
			(1.905)			
CEO Delta				−0.008		
				(0.007)		
CEO Delta * Yield spread				1.260***		
				(0.488)		
CEO Vega					0.004	
					(0.004)	
CEO Vega * Yield spread					0.560**	
					(0.253)	
CEO Options / Compensation						−0.016*
						(0.009)
CEO Options / Compensation * Yield spread						2.265**
						(1.136)
Initial floating debt percentage	−0.332***	−0.334***	−0.358***	−0.318***	−0.315***	−0.321***
	(0.027)	(0.027)	(0.045)	(0.022)	(0.021)	(0.028)
Long-term debt percentage	0.011	0.012	0.018	−0.016	−0.016	0.001
	(0.021)	(0.021)	(0.041)	(0.020)	(0.020)	(0.029)
Leverage	0.079	0.103*	0.082	0.060	0.075	0.035
	(0.064)	(0.061)	(0.108)	(0.052)	(0.050)	(0.071)
Ln(Sales)	−0.012	−0.012	−0.018	−0.004	−0.006	−0.006
	(0.013)	(0.014)	(0.025)	(0.011)	(0.010)	(0.015)
Debt or CP rating	−0.040*	−0.034	−0.044	−0.016	−0.014	−0.030
	(0.021)	(0.022)	(0.032)	(0.016)	(0.016)	(0.021)
Economy-wide floating debt percentage	0.753**	0.969***	0.683	0.406*	0.485**	0.524
	(0.322)	(0.321)	(0.660)	(0.232)	(0.234)	(0.340)
Constant	−0.114	−0.199	−0.064	−0.100	−0.104	−0.067
	(0.156)	(0.156)	(0.300)	(0.124)	(0.120)	(0.175)
Num. Obs.	3372	3508	1501	5597	5707	3111
R^2	0.178	0.182	0.194	0.154	0.154	0.157

Table 6

Earnings Manipulation, Executive Compensation, and Interest Rate Swap Usage

This table presents the results of additional interest rate swap usage tests, in which earnings manipulation and executive compensation variables are included at the same time. All regressions are estimated using firm fixed effects using the subsample of interest rate swap users, firms that report using interest rate swaps at any point during the sample period. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. EPS close to forecast (5 cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 5 cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (swaps) is a binary variable taking the value 1 when a firm met its mean earnings forecast using current values of swap usage but would have missed its mean earnings forecast using lagged values of swap usage, and 0 otherwise. Discretionary accruals measure the amount of earnings management. They are calculated using a modified version of the Jones (1991) model (see for instance Dechow et al (1995)) and are first scaled by lagged total assets and then standardized so that the interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in discretionary accruals. CFO Delta is the change(in millions of dollars) in CFO's stock and option portfolio value for a 1% change in the stock price and is calculated using Core and Guay (2002) one-year approximation method. CEO Options is the value of options vesting. Compensation is total compensation including option grants. CFO Delta and CEO Options/Compensation are standardized so that interaction term coefficients measure the change in the sensitivity of swap usage to yield spread due to one standard deviation change in CFO Delta and CEO Options / Compensation. Initial floating debt percentage is the percentage of outstanding debt that has floating interest rate exposure before accounting for interest rate swaps. Long-term debt percentage is the percenage of outstanding debt that has more than five years to maturity. Economy-wide floating debt percentage is the ratio of commercial paper and bank loan liabilities to the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporate businesses, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedasticity-consistent standard errors, adjusted for clustering by company, are reported in parenthesis below the coefficients. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
1-year Treasury yield	1.226	0.938	−0.750	−0.407
	(1.167)	(1.324)	(0.836)	(0.983)
Credit spread	−0.643	−2.655	1.395	−2.638
	(3.607)	(4.572)	(3.534)	(4.008)
Swap yield spread	4.087***	3.674***	3.821***	3.431***
	(0.873)	(0.951)	(0.805)	(0.811)
Swap spread	6.167**	1.273	7.106***	3.117
	(3.065)	(3.116)	(2.680)	(2.633)
EPS close to forecast (swaps)	0.015	0.023		
	(0.030)	(0.032)		
EPS close to forecast (swaps) * Yield spread	6.950***	5.479***		
	(1.835)	(1.938)		
Discretionary accruals			0.022***	0.029***
			(0.006)	(0.008)
Discretionary accruals * Yield spread			−1.172***	−0.925**
			(0.388)	(0.455)
CFO Delta	−0.008		−0.013**	
	(0.007)		(0.006)	
CFO Delta * Yield spread	1.166		1.626***	
	(0.731)		(0.628)	
CEO Options / Compensation		−0.015		−0.015*
		(0.011)		(0.009)
CEO Options / Compensation * Yield spread		2.634*		2.291**
		(1.508)		(1.125)
Initial floating debt percentage	−0.320***	−0.322***	−0.341***	−0.331***
	(0.034)	(0.036)	(0.028)	(0.029)
Long-term debt percentage	−0.029	−0.050	0.008	−0.009
	(0.024)	(0.035)	(0.022)	(0.029)
Leverage	0.146*	0.099	0.097	0.027
	(0.080)	(0.090)	(0.066)	(0.073)
Ln(Sales)	−0.005	−0.011	−0.012	−0.005
	(0.020)	(0.016)	(0.014)	(0.016)
Debt or CP rating	−0.052**	−0.018	−0.034*	−0.026
	(0.026)	(0.024)	(0.021)	(0.021)
Economy-wide floating debt percentage	0.353	0.281	0.804**	0.445
	(0.423)	(0.427)	(0.335)	(0.344)
Constant	−0.135	0.004	−0.145	−0.020
	(0.210)	(0.190)	(0.164)	(0.179)
Num. Obs.	2544	2294	3179	2966
R^2	0.183	0.175	0.191	0.165

Table 7
Floating Debt Percentage and Raising Funds / Manipulating Earnings

This table presents the results of raising funds and manipulating earnings hypotheses tests for floating debt percentage. All regressions are estimated using firm fixed effects using the full sample. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. Raised debt(equity) is a binary variable taking the value 1 if the firm raised debt(equity) financing during the following fiscal year, and 0 otherwise. EPS close to forecast (1(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 1(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (debt) is a binary variable taking the value 1 when a firm met its mean earnings forecast using current values of floating debt percentage but would have missed its mean earnings forecast using lagged values of floating debt percentage, and 0 otherwise. Discretionary accruals measure the amount of earnings management. They are calculated using a modified version of the Jones (1991) model (see for instance Dechow et al (1995)) and are first scaled by lagged total assets and then standardized so that the interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in discretionary accruals. Economy-wide floating debt percentage is the ratio of commercial paper and bank loan liabilities to the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporate businesses, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedasticity-consistent standard errors, adjusted for clustering by company, are reported in parenthesis below the coefficients. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	0.195	0.330	0.474	0.447	1.005	0.088
	(0.524)	(0.521)	(0.576)	(0.576)	(0.780)	(0.519)
Credit spread	0.807	1.535	0.367	0.263	−1.116	1.288
	(2.418)	(2.406)	(2.615)	(2.617)	(2.516)	(2.380)
Swap yield spread	1.172**	1.259**	1.391**	0.921	1.180**	1.156**
	(0.526)	(0.528)	(0.604)	(0.643)	(0.588)	(0.515)
Swap spread	3.769*	3.599*	2.135	2.264	1.579	4.388**
	(1.924)	(1.930)	(2.034)	(2.035)	(2.113)	(1.871)
Raised debt	0.038***					
	(0.012)					
Raised debt * Yield spread	0.517					
	(0.968)					
Raised equity		0.047**				
		(0.020)				
Raised equity * Yield spread		−0.765				
		(1.460)				
EPS close to forecast (1 cent)			−0.008			
			(0.011)			
EPS close to forecast (1 cent) * Yield spread			0.581			
			(0.894)			
EPS close to forecast (5 cents)				−0.020**		
				(0.009)		
EPS close to forecast (5 cents) * Yield spread				1.438**		
				(0.729)		
EPS close to forecast (debt)					0.063***	
					(0.019)	
EPS close to forecast (debt) * Yield spread					4.461***	
					(1.396)	
Discretionary accruals						0.030***
						(0.006)
Discretionary accruals * Yield spread						−0.880*
						(0.488)
Long-term debt percentage	−0.199***	−0.201***	−0.219***	−0.219***	−0.220***	−0.201***
	(0.016)	(0.016)	(0.017)	(0.017)	(0.018)	(0.015)
Leverage	0.263***	0.216***	0.280***	0.276***	0.343***	0.210***
	(0.047)	(0.046)	(0.051)	(0.051)	(0.057)	(0.045)
Ln(Sales)	0.015	0.017	0.015	0.015	0.029**	0.019*
	(0.010)	(0.011)	(0.012)	(0.012)	(0.015)	(0.010)
Debt or CP rating	−0.127***	−0.128***	−0.132***	−0.132***	−0.135***	−0.127***
	(0.017)	(0.018)	(0.019)	(0.019)	(0.021)	(0.017)
Economy-wide floating debt percentage	0.810***	0.811***	0.780***	0.795***	0.629**	0.880***
	(0.211)	(0.211)	(0.232)	(0.232)	(0.269)	(0.210)
Constant	0.073	0.067	0.104	0.109	0.019	0.044
	(0.107)	(0.109)	(0.123)	(0.123)	(0.140)	(0.105)
Num. Obs.	10607	10607	9311	9311	7689	10737
R^2	0.096	0.093	0.105	0.106	0.131	0.103

Table 8
Floating Debt Percentage and Executive Compensation

This table presents the results of executive compensation hypotheses tests for floating debt percentage. All regressions are estimated using firm fixed effects using the full sample. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. CFO(CEO) Delta and Vega are the changes (in millions of dollars) in CFO(CEO)'s stock and option portfolio value for a 1% change in the stock price and for a 0.01 change in the annualized standard deviation of stock returns respectively. CFO(CEO) Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CFO(CEO) Options is the value of options vesting. Compensation is total compensation including option grants. CFO(CEO) Delta, Vega, and Options / Compensation are standardized so that interaction term coefficients measure the change in the sensitivity of swap usage to yield spread due to one standard deviation change in CFO(CEO) Delta, Vega, and Options / Compensation. Long-term debt percentage is the percenage of outstanding debt that has more than five years to maturity. Economy-wide floating debt percentage is the ratio of commercial paper and bank loan liabilities to the sum of commercial paper, bank loan, and corporate bond liabilities of nonfarm, nonfinancial corporate businesses, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedasticity-consistent standard errors, adjusted for clustering by company, are reported in parenthesis below the coefficients. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	0.804	0.714	0.400	0.471	0.538	0.588
	(0.793)	(0.772)	(1.563)	(0.548)	(0.546)	(0.924)
Credit spread	2.347	3.146	−2.895	1.620	1.192	−3.578
	(3.303)	(3.235)	(5.963)	(2.358)	(2.375)	(4.051)
Swap yield spread	1.867**	1.932**	4.140***	1.342**	1.446***	2.010**
	(0.789)	(0.762)	(1.414)	(0.532)	(0.535)	(0.826)
Swap spread	4.887*	5.085*	4.015	2.788	2.752	2.379
	(2.618)	(2.598)	(4.270)	(1.978)	(1.983)	(2.550)
CFO Delta	−0.012					
	(0.008)					
CFO Delta * Yield spread	1.679***					
	(0.636)					
CFO Vega		0.001				
		(0.007)				
CFO Vega * Yield spread		0.785*				
		(0.471)				
CFO Options / Compensation			−0.016			
			(0.016)			
CFO Options / Compensation * Yield			1.612			
			(1.505)			
CEO Delta				−0.011		
				(0.008)		
CEO Delta * Yield spread				1.043**		
				(0.468)		
CEO Vega					0.004	
					(0.005)	
CEO Vega * Yield spread					0.355	
					(0.279)	
CEO Options / Compensation						−0.003
						(0.008)
CEO Options / Compensation * Yield spread						1.721**
						(0.840)
Long-term debt percentage	−0.203***	−0.196***	−0.209***	−0.212***	−0.210***	−0.201***
	(0.020)	(0.020)	(0.031)	(0.017)	(0.017)	(0.022)
Leverage	0.243***	0.241***	0.264***	0.199***	0.211***	0.153**
	(0.062)	(0.059)	(0.098)	(0.049)	(0.048)	(0.065)
Ln(Sales)	0.009	0.010	0.036	0.010	0.008	0.018
	(0.015)	(0.014)	(0.025)	(0.011)	(0.011)	(0.017)
Debt or CP rating	−0.153***	−0.149***	−0.131***	−0.114***	−0.112***	−0.122***
	(0.022)	(0.022)	(0.037)	(0.019)	(0.018)	(0.026)
Economy-wide floating debt percentage	0.782**	0.897***	0.966*	0.769***	0.805***	0.517
	(0.308)	(0.299)	(0.532)	(0.223)	(0.223)	(0.336)
Constant	0.088	0.039	−0.126	0.123	0.117	0.181
	(0.151)	(0.146)	(0.242)	(0.115)	(0.113)	(0.175)
Num. Obs.	5949	6199	2645	9787	9969	5356
R^2	0.109	0.102	0.110	0.096	0.094	0.092

Table 9
Changes in Interest Rate Swap Usage

This table presents the results of changes in interest rate swap usage and floating debt percentage regressions. All regressions are estimated using standard OLS. In columns 1-3, the dependent variable is the change in the percentage of total debt that is swapped to a floating interest rate, and the sample is the subsample of interest rate swap users, firms that report using interest rate swaps at some point during the sample period. In columns 4-6, the dependent variable is the change in the percentage of outstanding debt that has a floating interest rate exposure after accounting for interest rate swaps. These regressions are estimated using the full sample. Credit spread is the average difference between Moody's Baa and Aaa rated debt during the fiscal year. Treasury yield spread is the average spread between the 10-year Treasury bond and the 1-year Treasury bond during the fiscal year. Swap yield spread is the average spread between the 5-year swap rate and 6-month LIBOR during the fiscal year. Swap spread is the average difference between the 5-year swap rate and the 5-year Treasury bond during the fiscal year. Initial floating debt percentage is the percentage of outstanding debt that has floating interest rate exposure before accounting for interest rate swaps. Long-term debt percentage is the percenage of outstanding debt that has more than five years to maturity. EPS close to forecast (swaps (debt) is a binary variable taking the value 1 when a firm met its mean earnings forecast using current values of swap usage (floating debt percentage) but would have missed its mean earnings forecast using lagged values of swap usage (floating debt percentage), and 0 otherwise. CFO Delta is the change(in millions of dollars) in CFO's stock and option portfolio value for a 1% change in the stock price and is calculated using Core and Guay (2002) one-year approximation method. CFO Delta is standardized so that interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in CFO Delta. White heteroskedasticity-consistent standard errors, adjusted for clustering by company, are reported in parenthesis below the coefficients. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	Swap Usage			Floating Debt Percentage		
	(1)	(2)	(3)	(4)	(5)	(6)
D.(1-year Treasury yield)	1.061*	0.798	−0.328	0.410	0.531	1.594*
	(0.606)	(0.617)	(0.916)	(0.594)	(0.618)	(0.823)
D.(Credit spread)	2.223	0.932	1.981	0.006	0.701	3.336
	(2.459)	(2.475)	(3.362)	(2.434)	(2.502)	(3.205)
D.(Swap yield spread)	1.850***	1.705***	2.362***	1.575***	1.132**	2.054***
	(0.469)	(0.511)	(0.690)	(0.482)	(0.527)	(0.664)
D.(Swap spread)	2.119	3.289	3.172	2.803	4.284*	2.651
	(2.119)	(2.285)	(3.135)	(2.076)	(2.252)	(2.990)
EPS close to forecast (swaps)		0.171***				
		(0.013)				
EPS close to forecast (swaps) * D.(Yield spread)		2.762**				
		(1.231)				
EPS close to forecast (debt)					0.183***	
					(0.009)	
EPS close to forecast (debt) * D.(Yield spread)					3.941***	
					(1.074)	
L.(CFO Delta)			0.007*			0.003
			(0.004)			(0.003)
L.(CFO Delta) * D.(Yield spread)			1.666**			1.619***
			(0.669)			(0.572)
D.(Initial floating debt percentage)	−0.250***	−0.240***	−0.297***			
	(0.022)	(0.024)	(0.031)			
D.(Long-term debt percentage)	−0.005	−0.019	0.001	−0.194***	−0.194***	−0.170***
	(0.014)	(0.016)	(0.019)	(0.015)	(0.017)	(0.020)
D.(Leverage)	0.184***	0.150***	0.201**	0.458***	0.435***	0.459***
	(0.050)	(0.054)	(0.079)	(0.046)	(0.050)	(0.063)
D.(Ln(Sales))	−0.034***	−0.029**	−0.019	−0.007	−0.012	−0.020
	(0.011)	(0.012)	(0.016)	(0.010)	(0.012)	(0.015)
D.(Debt or CP rating)	−0.017	−0.019	−0.029	−0.137***	−0.131***	−0.143***
	(0.016)	(0.018)	(0.024)	(0.016)	(0.018)	(0.023)
D.(Economy-wide floating debt percentage)	−0.195	0.041	0.545	0.800***	0.744**	0.619
	(0.297)	(0.313)	(0.449)	(0.291)	(0.308)	(0.402)
Constant	−0.005	−0.013***	−0.004	−0.002	−0.014***	−0.005
	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.006)
Num. Obs.	5255	4412	2734	9168	7689	4721
R^2	0.092	0.150	0.128	0.099	0.136	0.102
Swap Users Only	Yes	Yes	Yes	No	No	No