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

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ABSTRACT:

In this paper, we explore the managerial decision-making process with a particular eye on 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, attempting to boost near-term results prior to raising external capital, or simply to increase their compensation? Using a very large, hand-collected dataset of swap activity, our empirical findings suggest that the choice of interest rate exposure is primarily driven by a concern to meet consensus earnings forecasts and raise managerial pay.

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Of primary interest in corporate finance research is a deeper understanding of what drives managerial decision-making, including decisions regarding the raising of financial capital and financial reporting. A key step in this inquiry is an examination of the factors that influence corporate managers' attempts to time financial markets to reduce their cost of capital. In this spirit, we examine interest rate swap usage among a very large panel of firms. We argue that the sensitivity of interest rate swap usage to the steepness of the yield curve (the difference between long- and short-term interest rates) is an example of myopic and/or speculative behavior. We test this hypothesis by determining if interest rate "timing" is stronger in cases where managers may be particularly myopic or more highly rewarded for successful speculation. By evaluating which firm and managerial characteristics are associated with interest rate timing, we hope to deepen our understanding of the factors that influence managerial decision making.

To fix ideas of why interest rate swap usage allows us to examine this timing behavior, consider the situation a firm's manager faces when the yield curve is steep, such as it was in January 1994. As shown in Figure 1, the prevailing yield on 1-year Treasuries was 3.54%, whereas the 10-year yield was 5.75%. Consider now a manager's incentive to issue fixed or floating rate debt. If he chooses to issue long-term fixed-rate debt, it would be priced at the long-term Treasury rate level (plus corresponding credit spread). On the other hand, a long-term *floating* rate debt issue would be priced at a lower basis close to the 1-year Treasury rate (plus credit spread).[1] Consequently, if a firm were issuing long-term debt, locking in a fixed interest rate would necessitate covering annual interest costs in the short-run that are approximately two percentage

[1] Floating-rate debt would likely have been based on LIBOR, but the rate level would be nearly identical.

points higher than if it had issued floating-rate debt or swapped the debt to floating. Of course, the Expectations Hypothesis suggests that this particular shape of the term structure reflects (among other things) the market's anticipation that short-term interest rates will rise. However, a myopic manager, or one that speculates that the expectations hypothesis of interest rates does not hold, is likely to prefer a floating exposure to capture the currently large differential in interest costs, even though future interest costs may be higher and the firm would now be susceptible to interest rate fluctuations.[2]

One could alternatively envision the situation this same manager faces when the yield curve is inverted, such as it was in August 2000. As shown in Figure 2, the prevailing yields on 1-year and 10-year Treasuries were 6.18% and 5.83%, respectively. In this case, this same manager would prefer fixed rate debt since interest costs in the short-run are approximately 35 basis points lower relative to the floating rate. Moreover, by locking in the fixed rate, this manager is able to eliminate the effects of interest rate volatility on their future earnings.[3] These two situations demonstrate that as the spread between long-term and short-term interest rates increases, managers whose behavior deviates from shareholder value maximization may raise their floating rate debt level, either directly or by adjusting their interest rate swap usage.

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[2] We characterize myopia as agents discounting future outcomes at interest rates higher than the rate at which the market would value those future outcomes. Such myopic managers would still value future outcomes but will overly focus on short-term outcomes. We define speculation as managers taking bets on future realizations based on their personal views. If those views are correlated with the shape of the term structure, such as a belief that the expectations hypothesis does not hold, this may also lead to managers to prefer floating rate debt when the term structure is steep. Because we do not know the interest rate views of the manager, many of our results can be interpreted as consistent with both myopia and speculation, so we will not attempt to distinguish between them.

[3] The empirical tests presented below will examine differences in yields calculated from interest rate swaps in addition to yields implied by Treasury prices. As will be demonstrated, the results are robust to both measures and as expected, are stronger for swap spreads since they represent the actual rates at which firms will transact for swaps.

As a more tangible example of such interest rate timing, consider Wal-Mart. During their 2001 fiscal year, the difference between the 10-year and 1-year Treasury yields was -0.095% (i.e., the yield curve was inverted on average). At the end of that fiscal year, Wal-Mart had swapped only 3.9% of their debt from a fixed to a floating interest rate exposure, with 18.7% of their total overall debt having a floating exposure. During the 2002 fiscal year, the Treasury yield spread had risen to an average of 1.75% and Wal-Mart increased their use of pay-floating interest rate swaps to 17.3% of debt with a total of 25.3% of their debt having 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 their use of pay-floating interest rate swaps to 32.6% of total debt with a total of 40.8% of their debt having a floating exposure. In their 2003 annual report, Wal-Mart notes that "interest costs on debt and capital leases, net of interest income, as a percentage of net sales [decreased] 0.17% when compared to fiscal 2002." Interest expense fell by $269 million (18.5%) even though total debt increased by $3.5 billion (16.1%). Arguably, Wal-Mart timed the interest rate swaps market to directly manage their short-term interest costs. The question we posit is: why would mangers do this, and can we identify firm and managerial characteristics that are correlated with such behavior?

Much of the early research on interest rate swap usage focuses on the potential hedging benefits to non-financial firms from using derivatives (see, e.g. Nance, Smith, and Smithson (1993), Mian (1996), Howton and Perfect (1999) and Graham and Rogers (2002)). However, more recent work has called into question the premise that swaps are being used for hedging purposes. For instance, Guay and Kothari (2003) find that corporate derivative positions are rather small relative to firm size, suggesting that observed derivatives usage is unlikely to generate large hedging benefits, such as either minimizing the frequency of raising external capital (see Froot, Scharfstein, and Stein, 1993) or lowering expected costs of financial distress (see Smith and Stulz, 1985). However, even if firms do perceive a hedging benefit from using swaps to match the interest rate exposure of their liabilities to that of their operating cash flows, it is unlikely that the value from such matching changes with the slope of the term structure.[4]

To the contrary, recent survey evidence (such as Bodnar, Hayt, and Marston, 1998) appears to be more consistent with the behavior in the Wal-Mart example than with a hedging story as it indicates that one of the key factors determining the timing and size of non-financial firms' interest rate derivatives usage is to reduce interest costs based upon interest rate timing. Faulkender (2005) finds this effect empirically 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, 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. If swap usage had been found to be more sensitive to the interest rate exposure of the firm's cash flows, then this would be consistent with a hedging story where swaps facilitated a reduction in the firm's residual cash flows. However, based upon his evidence, Faulkender (2005) concludes that firm

[4] We control for the potential effect of hedging on the firm's interest rate swap usage by employing firm fixed effects. Provided that the interest rate sensitivity of the firm's operations is stationary over the sample period, our methodology should allow for the presence of such benefits.

usage of interest rate swaps is largely driven by managerial myopia and/or pure interest rate speculation rather than hedging considerations.

In this paper, we seek to build on these results by investigating *why* there is variation across firm-years in the sensitivity of both firm swap usage and overall floating debt usage to movements in the term structure of interest rates. Specifically:

- Are firms more likely to engage in the timing of interest rate markets to help them increase earnings in the short-run to meet analyst earnings forecasts?
- Are managers using interest rate swaps to manipulate earnings prior to raising external capital in an attempt to improve the price at which the capital is raised?
- Are managers whose compensation contracts are more sensitive to stock price performance and volatility more likely to time their use of interest rate swaps to market movements?

It is important to note that we do not consider these behaviors to be mutually exclusive; some firm managers may use interest rate swaps to manage earnings while others may use them to increase their compensation due to the structure of their pay. In fact, it may be the case that firms are using interest rate swaps to manage earnings because doing so would increase their compensation.

To answer these questions, we hand collect interest rate 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 of how close the firm is to its earnings forecast, whether or not they raised external funds in the subsequent fiscal year, and various measures of managerial compensation, and ultimately interact these with the yield spread.

Our findings suggest that the key factors in the timing of interest rate swap usage are both earnings management considerations and the sensitivity of the CFO's compensation to both the performance *and* variability of the firm's stock price. Managers appear to be using swaps to move forward earnings when it allows them to meet the consensus analyst earnings forecast and they also appear to use swaps as a partial substitute for accruals. In addition, as managers receive higher compensation from increases in the firm's equity value, they are more likely to increase their use of pay-floating swaps and increase the percentage of their debt that has a floating rate exposure as the term structure steepens. We also find that as the manager's compensation is more positively affected by increases in the volatility of the firm's stock and as they have more options vesting relative to being granted, 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 interest rate swaps are being used by firms (at least a large fraction of them) to *both* manage earnings and to increase managerial pay.

The rest of this paper is organized as follows. Section I describes the relevant related literature in the areas of interest rate swap usage, earnings management, and managerial compensation. We then discuss our testable hypotheses and describe our empirical methodology in Section II. Section III provides details of which firms we examine, the sources of various data items, and how the hand collected interest rate swap and debt information was coded. We discuss the empirical results and the robustness checks in Section IV. Section V concludes.

I. Literature Review

There have been disparate empirical findings in the literature for interest rate risk management relative to findings for commodity and foreign exchange risk. Allayannis and Ofek (2001) find that firms that use foreign exchange derivatives reduce the sensitivity of their equity to foreign exchange rate movements, and Tufano (1996) finds that gold mining firms that use gold derivatives likewise reduce the gold-price sensitivity of their stock. However, when turning to interest rate derivatives, Faulkender (2005) finds that firms do not appear to be using swaps to match the interest rate exposure of their liabilities to the estimated exposure of their cash flows. Instead, firms appear to be timing the interest rate market by altering the actual interest rate exposure of their liabilities as a function of the *steepness* of the yield curve. When the yield spread is steep, firms are much more likely to engage in a pay-floating interest rate swap and less likely to use pay-fixed swaps. This difference across risk exposures leads us to focus solely on the use of interest rate swaps in our empirical examination.[5]

Arguably, the effect of using interest rate swaps in this manner is quite similar to the practice of earnings management, raising earnings in the short-run at the cost of lower earnings in the future. As the term structure widens, the difference in the near term between interest costs from floating-rate debt relative to a fixed-rate exposure rises. However, observe that 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.

[5] Empirical work is emerging showing that market timing considerations are also present in currency markets. McBrady and Schill (2005) find that firms' choice of location of bond issuance is impacted by covered interest rate yields (bond yield spreads over currency swaps) across different countries. In other words, firms issue in the country that offers the lowest effective borrowing costs at the time of issue.

Therefore, the swap merely changes *when* the firm is expected to make interest payments, reducing them in the short-run but, on average, increasing them in the future.

Because of this similarity, we turn to the empirical accounting literature's extensive examination of earnings management to formulate testable hypotheses as to why interest rate swap usage demonstrates a short-term focus on the part of managers. A recent survey article by Healy and Wahlen (1998) points to two primary reasons that firms may manage their earnings: (1) capital market motivations and (2) contracting motivations. For instance, if the perception is that missing an earnings forecast is particularly costly (which is consistent with the survey evidence of Graham, Harvey, and Rajgopal (2005)), firms may alter their mix of fixed and floating rate debt based upon the slope of the yield curve to improve earnings when they are short of analysts' forecasts. Likewise, if managers expect to raise capital in the near future, they may want to inflate earnings in an attempt to improve the pricing on their issue. Still other hypotheses that follow from this literature are that if managers have bonuses that are tied to earnings, stock options that are soon vesting, or for another reason their time horizon is short, they may want to move earnings forward. Consistent with this notion, Bergstresser and Philippon (2004) document that as managerial compensation is more comprised of stock and stock options, the use of discretionary accruals increases.

It is important to note that the aforementioned yield spread sensitivity found by Faulkender (2005) is also consistent with management attempting to increase their own wealth if their compensation is tied to firm performance. There is extensive evidence that the expectations hypothesis does not hold in practice and that 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 Schiller (1991)). If managers receive some of the benefits that are generated from profitably betting that the expectations hypothesis will not hold in the future through their compensation, they may be more likely to time their interest rate swap activities. In addition, if that compensation contract encourages risk-taking as a result of say, the inclusion of stock options, we would expect that managers whose compensation is more sensitive to the volatility of the firm's stock return to engage in swap transactions that are more sensitive to the term structure.

There has been some work examining the impact of executive compensation on firms' derivative usage. Tufano (1996) finds that the structure of top management compensation at gold-mining firms is strongly related to the prevalence of gold price risk hedging. That is, 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. The basic idea here is that if managers hold more stock options, they strictly prefer to be exposed to the stock return volatility associated with gold price volatility. 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 (2004) examine how differences in compensation structure for both CEOs and CFOs impact whether the executives in these firms incorporate a rate view in their use of derivatives. Specifically, they consider the delta of the executives' stock and option portfolio, and the vega of the executive's stock option portfolio.[6] 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 firm's debt and find that higher CFO delta is associated with less floating rate debt, whereas higher CFO vega is associated with more floating rate debt. Our work examines multiple firms over time, which allows us to characterize how their realized interest rate derivative usage (as opposed to what they state in a survey) changes due to movements in *both* the compensation structure of the manager and changes in the interest rate environment.

II. Empirical Strategy

Our objective 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. That paper finds (Table VIII) that while the initial exposure of issued debt is marginally sensitive to the term structure, it is predominantly the swap activity that is impacted by the yield spread. So, our baseline specifications take the percentage of the firm's debt

[6] 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.

that is swapped to floating, less the percentage swapped to fixed, and regress it on the term structure and 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 present that could be swapped to floating. To verify that the results are robust to the initial interest rate exposure of the debt, we also include specifications where the dependent variable is the percentage of the firm's debt that ends floating, after incorporating the use of swaps:

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

The details of how these variables are measured and the specific control variables that are included can be found in the next section.

The baseline specifications are initially estimated using OLS. We then verify that the results hold when we include firm fixed effects and when we solely focus on the subset of firms that use interest rate swaps at some point during the sample period. When we move to examine the differences in sensitivity associated with various firm and managerial characteristics, all of these results are conducted with firm fixed effects. While the results are not that different when the dependent variable is the percentage of debt that is swapped to floating, the results do significantly 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 tests 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 question of interest (what factors influence interest rate timing), we interact our proxies for these 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 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. By coding 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 interacting this indicator variable with the yield spread, we can determine whether the sensitivity to the yield curve is asymmetric across those firm-years in which firms may be more likely to manipulate their earnings in anticipation of a new security issuance. We test this hypothesis by estimating the following regression:

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

where $I_{Raise\ Funds}$ 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 usage of 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 three 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. We still follow an equation specification similar to equation (3), but now we are interested in the coefficient on the variable that is the product of the yield spread and discretionary accruals. Finding this coefficient to be significantly negative would suggest that firms with high levels of accruals are less sensitive to movements in the term structure. Because discretionary accruals are a continuous measure, to estimate the magnitude of the change in sensitivity, we will combine the estimated coefficient with a one standard deviation change in discretionary accruals.

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 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. 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 build on the empirical results of Yermack (1997) and interact the dollar value of options vesting, net of option grants, with the term structure. Yermack finds that stock options are often granted just prior to the release of good news. The basic idea here is that since stock options are almost always granted at-the-money, the executive's options would almost surely be in-the-money post the positive announcement. Thus, those managers that are receiving option grants may actually have an incentive to depress earnings around the time of the grants in an effort to reduce the current stock price since options are typically granted at the money. With this finding in hand, it seems natural that the opposite prediction would apply for options that are soon vesting. That is, managers with large option values currently vesting 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 these two effects are present, we would again expect the estimated coefficient corresponding to the interaction term between the swap spread and options vesting net of option grants to be significantly positive.

All of these tests are then repeated using 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. In addition, the results will be re-examined for just those firms that use interest rate swaps at some point during the sample period. Firms may choose not to use interest rate swaps because they are not timing the interest rate market (in which case it is important to include them in the specification), or because they are unable to access the interest rate swap market (in which case their presence would bias our estimated coefficients towards zero). Since we are unable to determine why they do not use swaps, it is important to initially include all observations and then conduct this robustness check.

III. Data

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.[7] 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, and 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 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).

[7] 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.

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.[8] 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" of the 10-K and the long-term debt footnote. We get our most precise estimates of floating-rate long-term debt for

[8] While accounting standards have changed over the sample period related to the qualifications for using hedge accounting treatment (see SFAS 119 and 133), interest rate swaps transforming debt from a floating to a fixed interest rate exposure (and vice-versa) qualify for hedge accounting treatment under all of the different regimes. 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.

those firm-years that in Item 7A, or in some other portion of the 10-K, 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 in Appendix 1. By examining individual debt instruments reported in the long-term debt footnote, we double-check, however, that the firm's classification of its debt as either variable or fixed is consistent with our own classification criteria.[9]

When no table similar to the one presented in Appendix 1 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;[10]
- "other" is treated as fixed-rate.

An example of our application of these assumptions is shown in Appendix 2. Because we examine firms' 10-Ks over time, we believe that we are able to make more accurate

[9] 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.
[10] 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.[11]

Overall, after dropping observations that a) do not have any debt, b) do not have 10-Ks in 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, if any, we are left with 11,261 firm-year observations.

Having defined our variables of interest – the percentage of firm's debt that is floating after interest rate swap effects and the percentage of firm's debt that is swapped to floating – we calculate the explanatory variables in our baseline regressions as follows. Our first set of variables controls 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. We also follow Faulkender and Petersen (2005)

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[11] 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.

and 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.

Using interest rate data from the Federal Reserve Board, we calculate the yield on the 1-year Treasury bond at the end of the fiscal year, the Treasury yield spread, defined as the average spread of 10-year Treasury bonds over 1-year Treasury bonds during the fiscal year, and the credit spread, defined as the average difference between Moody's Baa and Aaa rated debt over the fiscal year. In addition to the Treasury yield spread, we calculate an alternative measure of the slope of the yield curve – the swap yield spread, defined as the average difference between the 5-year swap rate and LIBOR over the fiscal year and calculated using data from Datastream. We obtain similar results using both of these yield spread measures.

We also control for changes in the macroeconomy that may impact the firm's choice of interest rate exposure and the source of funds. We use the Flow of Funds Accounts of the United States data published by the Federal Reserve Board to construct a measure of the economy-wide percentage of floating rate debt, which we define 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 the sample period that may impact the interest rate exposure that firms begin with. Finally, we use the value of the Index of Leading Indicators from the Conference Board, Inc., and the University of Michigan's Survey Research Center to capture differences over time in firms' abilities to endure interest rate risk due to expected changes in the strength of the macroeconomy.

Moving to the variables that we use to test our hypotheses, we calculate whether the firm raised either debt or equity during the next fiscal year 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.

Next, we follow numerous papers in the accounting literature (such as Burgshahler and Dichev (1997), Kasznik and McNichols (2002), Bartov, Givoly, and Hayn (2002), and Matsumoto (2002)) and use I/B/E/S data to construct an indicator variable which is set to 1 when realized earnings per share are equal to, or higher by no more than two cents, the mean of the final earnings forecast of the fiscal year, and to 0 otherwise. The idea is that firms that *barely made their earnings forecast are the firms most likely to have tried to manipulate earnings by reducing their interest expense via swaps*, based upon the term structure during the fiscal year. We then repeat this construction using a five cent cutoff since the impact from swapping debt to a floating exposure may have more than a two cents per share effect, especially when the term structure is rather steep.

For our third measure of potential earnings management, we code the variable equal to one if the firm would have made their earnings forecast had *all* of their debt had a floating interest rate exposure but they would have missed the consensus forecast if all of their debt had been fixed (as the summary statistics will demonstrate, the swap yield spread was positive over the entire sample period), and zero otherwise. The idea here is that we identify the firms that would 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 used interest rate swaps.

As a final check of earnings management, 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. Following previous studies of earnings management in the accounting literature (Healy (1985), Jones (1981), Dechow et al (1995)), we first compute total accruals (TA) as:

$$TA_t = (\Delta CA_t - \Delta CL_t - \Delta Cash_t + \Delta STD_t - Dep_t) / A_{t-1} \quad (4)$$

where ΔCA is the change in current assets (COMPUSTAT data item 4), ΔCL is the change in current liabilities (5), ΔCash is the change in cash and cash equivalents (1), ΔSTD is the change in debt included in current liabilities (34), Dep measures depreciation and amortization expense (14), and A is total book assets (6).

We then decompose TA into nondiscretionary accruals (NDA) and discretionary accruals (DA), where nondiscretionary accruals are estimated using a modified version of the Jones (1991) model, as specified by Dechow et al (1995).[12] Specifically, NDA are calculated as the predicted values from the following time-series regression estimated for each firm in the sample:

$$TA_t = \beta_1 (1 / A_{t-1}) + \beta_2 (\Delta Sales_t - \Delta Receivables_t) / A_{t-1} + \beta_3 (PPE_t / A_{t-1}) + \varepsilon_t \quad (5)$$

where ΔSales is the change in sales (12), ΔReceivables is the change in receivables (2), and PPE is gross property, plant, and equipment (7). The regression is designed to capture the effect of changes in key financial variables on the level of nondiscretionary

[12] Dechow et al (1995) evaluate a number of alternative accruals-based models for detecting earnings management and find that although all models they test appear to be well specified, their extension of the Jones (1991) model exhibits the most power.

accruals. Discretionary accruals are then calculated as the residuals (ε_t) from equation (5). To improve the statistical reliability of the estimated values, we run this regression using data covering the period from 1984 to 2004.[13]

Turning lastly to the compensation variables of interest, we focus here on the ExecuComp database, which includes, but is not limited to firms in the S&P 1500. The ExecuComp database is instrumental for our tests given its detailed disclosure of both cash and stock-based compensation, and in particular, stock options, for each of the firm's top 5 executives. Naturally, this list of the "top 5" includes the CEO, but in a large percentage of firms, this list also includes the firm's CFO, who arguably plays the key role in a firm's interest-rate swap usage.[14] Such detailed disclosure, in particular for the stock option holdings, will also allow us to delve a bit further than Tufano (1996) could, owing to the fact that only aggregate option holdings were disclosed for the management teams heading up the gold-mining firms.[15] We first focus on the sensitivity of the executives' (here the CFO and CEO) stock and stock option portfolios to changes in the firm's stock price (delta), and the sensitivity of the stock options portfolios to the underlying stock return volatility (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 (and for stock options, to its volatility).

[13] We get similar but statistically weaker results when we use the shorter 1993-2003 period, which matches our sample period.
[14] 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.
[15] Firms were not required to list individual compensation items in such detail until 1993, and Tufano's sample covers the period of 1990-1993.

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).[16] Their work offers a clever solution to the inherent shortcoming in the Compensation Disclosure Act of 1993 which only requires the firm to disclose detailed parameters for newly-issued stock options, including the time to maturity, exercise price, and the number of options granted. Coupling these disclosures with estimates from CRSP for 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.[17] Such a straightforward calculation for previously-issued stock options is not readily available in ExecuComp. That is, the only relevant parameters disclosed for these options are the total number of options (both in-the-money and out-of-the-money) held by the executive that are either exercisable or unexercisable, and the *intrinsic* value of the in-the-money options that are either exercisable or not.[18]

Including an estimate of the sensitivity of these previously-issued options to stock price and volatility is critical. It is at this point that we rely fully on the methodology of Core and Guay (1999), who provide a 'one-year approximation method' for inferring the

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[16] Without implicating them, 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.

[17] The Black-Scholes value of an executive stock option arguably provides an upper bound on the true value to the executive, owing to both issues of being relatively undiversified and the fact that few executives hold their stock options until expiration. Our paper does not speak to this valuation disparity, and instead we refer interested readers to the works of Hall and Murphy (2000), Meulbroek (2001), and Hall and Murphy (2002).

[18] 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 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.

relevant Black-Scholes parameters of the average exercise price and time to maturity of both the executive's exercisable and unexercisable options. 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). For 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 (CEO) Options*, which is the dollar value of stock options recently vesting minus the dollar value of stock options granted during the fiscal year. The dollar value of stock options that are vesting is estimated as the change in the dollar value of in-the-money exercisable options (we calculate the yearly change in INMONEX from ExecuComp), whereas the dollar value of yearly stock options granted is given directly in ExecuComp by SOPTGRNT. 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).

Summary statistics for all of our variables 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. Firms then swap an average of 3.4% of their debt to have 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. Interest rates over this time period fluctuated from a low of 1.5% for the average 1-year Treasury rate over a fiscal year to as high as 6.2%. The spread between yields on 10-year Treasuries and 1-year Treasuries averaged 1.0%, ranging from -0.1% to 3.0%. The standard deviation of the spread over this ten year period was 81 basis points, and therefore in most of the economic interpretations of our findings we will look at one percent changes in the yield spread to correspond roughly to this one standard deviation move. When we look at swap yield spreads rather than Treasury spreads, we see differences that are slightly smaller but still of similar magnitudes. 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 with public debt outstanding.

Looking at 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 29.0% (43.6%) of the firm-years correspond to periods where the firm either just met their consensus earnings forecast or beat it by within two (five) cents. Turning to an alternative measure of earnings management, 37.1% of the firm-years in the sample correspond to periods in which swap activity would 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

$353,000 more in options vest than are granted, which on average represents 30.7% of annual compensation. Note that there are sizable standard deviations and considerable skew in the compensation variables, which will impact our interpretations of the economic significance of our coefficient estimates for those variables.

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 impacting 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 that they appear basically uncorrelated with firm swap activities. Recall that we will be interested in how swap activity relates to the term structure interacted with these variables, and not so much whether these characteristics are related to swap activity and the floating structure of firm debt.

IV. Empirical Results

Our first step for 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. With these baseline specification results in hand, we move to our tests for differences in that interest rate sensitivity as a function of the several firm and managerial characteristics we discussed above. These are followed with a host robustness checks to ensure the stability of our results.

A. Baseline Specifications

Looking first at differences in the percentage of debt that is swapped to floating at the end of the fiscal year, the results of which can be found in Table 3, we confirm that an important driver is the average slope of the term structure during the fiscal year. Regardless of whether we look at the OLS results (column 1) or the firm fixed effects results (column 3), we see that for a one percent increase in the difference between the 10-year and 1-year Treasury rates (recall that a one standard deviation move is 81 basis points), an additional 2.3% of the average firm-year's debt is swapped to floating. Using actual swap yield spreads (columns 2 and 4), we see that a one percent increase in the difference between the 5-year swap rate and LIBOR equates to approximately a 1.7% increase in the percentage of debt that is swapped to floating. When focusing solely on firms that use interest rate swaps during the sample period, not surprisingly, the coefficients rise significantly. Here, a one percent increase in the swap spread corresponds to an increase in the percentage of debt swapped to floating of between 2.7% and 3.0%. These results certainly seem to imply that managers base their use of interest rate swaps on the structure of interest rates during the fiscal year.

In addition, 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 since if firms already have most of their debt with a floating rate exposure, they are more likely to enter into pay-fixed interest rate swaps (which by construction, corresponds 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. Leverage is statistically significant in five of the six specifications; it takes a negative coefficient in the OLS regressions and a positive coefficient in the firm fixed effects specifications. Such results suggest that highly levered firms are more likely to swap to fixed, but once we control for the average leverage of the firm (through the fixed effect), increases in leverage above the firm's average correspond to greater use of pay-floating swaps. 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.

To better understand the relationship between the interest rate environment and firm usage of swaps, Figure 3 contains the graphical representation of the yield spread and the percentage of debt swapped to floating over the same time period. The yield spread measure is the average yield spread over the preceding twelve months (the fiscal year) and the swap amounts are the average percentages of debt swapped to floating for the firms whose fiscal year ends in the corresponding four month period.[19] As shown in the graph, time periods in which the spread is high correspond to time periods in which average swap activity is from fixed to floating, implying that the lowering of interest costs on the debt that is swapped. In time periods in which the term structure is flat or inverted, swap activity among the sample firms is mostly from floating to a fixed interest rate exposure. Such activity is consistent with reducing future interest rate risk by

[19] We use a four month period because some months have very few firms with their fiscal year ending that month. Using four months will help to smooth the variation due to those months with few observations.

locking in their interest rate when there is little difference between long- and short-term rates.

We turn now to the factors that determine the percentage of the firm's debt that ends with a floating interest rate exposure. As seen in the results in Table 4, the Treasury yield spread and swap yield spread are both statistically insignificant in the OLS specifications (columns 1 and 2), but significant in the firm fixed effects regressions (columns 3 and 4). 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.[20] Economically, the estimated coefficients from the fixed effects regressions suggest that a one percent move in the spread corresponds to an additional 1.1% to 1.5% of the firm's debt having a floating rate exposure. When we focus solely on those firms that use interest rate swaps, we see that under both the OLS and fixed effects specifications that the interest rate spread is a statistically and economically significant determinant of the firm's ending interest rate exposure.

However, unlike the swaps regressions, we see that a number of other factors are also important in explaining 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 are essentially explaining the interest rate exposure of the underlying debt. First, we see that firms with more long-term debt and that have access to the public debt

[20] 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 14.8% of the sample have zero floating rate debt and 7.4% 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.

markets tend to have a greater proportion of their debt with a fixed interest rate exposure.[21] 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. As before, we also see that the coefficient on leverage changes on the basis of whether we use an OLS or firm fixed effects specification. The estimates take the same sign as for the swaps results, again suggesting that the debt of high leverage firms is more likely to have a fixed interest rate exposure, but that as individual firms increase their leverage, they are likely to move more towards floating rate debt.

B. Tests for Differences in Interest Rate Spread Sensitivity

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 how that sensitivity differs across firm-year characteristics. 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

[21] In unreported regressions, we find that our estimated coefficients on the yield spread and the swap spread are particularly sensitive to the inclusion of 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.

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 5), the estimated coefficients suggest that those firms that raise debt or equity in the next fiscal year are not significantly more sensitive to movements in the swap yield spread than are firms that aren't raising additional funds. Statistically insignificant coefficients are also estimated for the final exposure of the firm's debt (see columns 1 and 2 of Table 6). Notice, however, that in both specifications, the indicator variable corresponding to whether the firm did raise external debt or equity is positive and statistically significant in three of the four cases. 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 and overall have more floating rate debt if they are raising external funds. 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.

Examinations of our second hypothesis, that firms that just meet or slightly exceed their earnings forecast may be more sensitive to movements in the term structure, yield more striking results. Given the asymmetric reaction of the market to earnings announcements, the accounting literature suggests that these firms are the ones most likely to have possibly 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 two cents above the consensus forecast (column 3 of Table

5), 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 5), 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 1.06% of debt for a one percent increase in the swap yield spread, whereas those that meet their forecast by five cents or less have an estimated sensitivity to the swap yield spread of 2.47% (= 1.06 + 1.41), a difference that is statistically significant at better than one percent. We find similar results when we examine the ending interest rate exposure of firm debt (columns 3 and 4 of Table 6), rather than swap usage. We argue that these results are consistent with our hypothesis that firms are *more* likely to use interest rate swaps to time the market when it helps them avoid missing analyst earnings forecasts. The difference in the results for the different cutoffs suggests that the economic effect on earnings per share of using interest rate swaps can exceed two cents per share. 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. As we widened the range to include more firms that may potentially benefit, and apparently do, the statistical significance of the coefficient improves.[22]

When we look at the results for one of our alternative measures of earnings relative to analyst forecast, we again find that those firms for which using interest rate swaps would have enabled them to meet their forecast have swap usage that is

[22] In untabulated robustness checks, we find that the pivot point is at approximately three cents per share. At this level, the coefficient in the swaps regression is statistically significant whereas in the floating debt regression, it is not. At four cents, both are significant. Results are available upon request.

significantly more sensitive to movements in the term structure (column 5 of Table 5). Statistically, this difference is significant at better than one percent. Economically, the firms for which using swaps to meet their earnings forecast is not necessary increase their use of swaps by 79 basis points of their total debt outstanding for a one percent increase in the swap yield spread. However, for the firm-years in which swapping all of their debt to floating (the swap spread is positive over the entire sample period) would have allowed firms to meet their forecast, they increase the percentage of total debt swapped to floating by 2.67% (= 0.78% + 1.89%) for that same one percent increase in the swap yield spread. When we measure the portion of debt that has a floating interest rate exposure, after the incorporation of swaps (column 5 of Table 6), we similarly see that firms that would have met their earnings forecast from using swaps significantly increase their use of floating rate debt as the swap yield spread widens. These results provide additional evidence that interest rate swaps are being used for the purpose of meeting current period earnings forecasts.

For our final analysis of the influence of earnings management, we examine the relationship between market timing in the interest rate swap market and the use of discretionary accruals. We argue that if firms can manipulate earnings using discretionary accruals, they have less reason 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 both Tables 5 and 6, are consistent with this theory as they suggest that firms with higher use of discretionary accruals have swap usage and overall floating rate debt levels that are significantly lower than those firms that are reducing their discretionary accruals. Economically, firms that have zero discretionary accruals increase their use of interest rate swaps by 1.63% and their floating debt percentage by 1.18% for a one percent increase in the swap yield spread. This compares to firm-years in which reported earnings were managed upwards by 8.2% of the previous year's book assets (a one standard deviation increase in discretionary accruals), which increase their swap usage by only 1.06% and their floating debt percentage by 0.31% for the same one percent increase. We caution that while this specification assumes that swap usage and floating debt levels are a function of the level of discretionary accruals, it is possible that the choices are made simultaneously or that the causation goes in the opposite direction (that greater swap usage higher floating rate debt levels reduce 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 earnings management considerations are affecting corporate debt policy.

We turn now to the structure of the manager's compensation contract and its effect on the sensitivity to the term structure of interest rate swap usage and the use of floating rate debt. When we examine the results for the interaction of the swap yield spread with the delta of the CFO on swap usage (column 1 of Table 7) and on the overall use of floating rate debt (column 1 of Table 8), we see that the estimated coefficients are positive and statistically significant at better than one percent. These results indicate that as the CFO receives more of the gain that may come from reducing interest expense through the use of interest rate swaps, the firm's use of swaps becomes more sensitive to the term structure. We have normalized the compensation variables so that they represent the number of standard deviations they are away from the variable's mean value. Thus, the coefficient estimates for the interaction terms represent the difference in interest rate sensitivity of swap usage (or floating rate debt levels) for a one standard deviation move in the compensation variable. So, for the average firm with a CFO delta at the mean ($56,000), a one percent increase in the swap spread corresponds to a 2.24% 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 3.37% (= 2.24% + 1.13%) for that same one percent increase in the swap spread, a 50% increase in sensitivity.

When we look at the effect on overall floating rate debt, we find very similar statistical and economic magnitudes. For a CFO delta at the mean, a one percent increase in the swap yield spread corresponds to a 1.91% increase in the percentage of the firm's debt having a floating exposure. When we instead estimate the sensitivity for a CFO whose delta is one standard deviation above the mean, we estimate that a one percent increase in the swap yield spread equates to a 3.55% increase in the percentage of the firm's debt that floats with interest rates. This difference is an 86% increase in the sensitivity of the firm's debt structure to interest rates.

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 significant at better than one percent in the swap usage specification and better than ten percent in the floating debt regressions, 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 (column 2 of Table 7) and their overall use of floating rate debt (column 2 of Table 8).[23] Economic significance

[23] 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

also remains strong. For the average firm with a CFO vega at the mean ($18,000), a one percent increase in the swap yield spread is associated with a 2.30% 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 swap yield spread corresponds to a 3.26% increase in the percentage of debt swapped to floating, a 42% increase. Likewise, the average sensitivity moves from 1.88% at the mean CFO vega to 2.59% for a vega one standard deviation above the mean when we look at the percentage of debt with a floating interest rate exposure.[24] 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.

Another way to evaluate the role that compensation has on interest rate timing is to look at swap usage around the time that options are granted and are vesting. We once again find that compensation has a strong influence, as noted by the results found in columns 3 and 4 of Tables 7 and 8. Regardless of whether we measure option vesting net of grants using raw dollar figures or by normalizing them by total compensation, we see that years with larger net vesting of options correspond to greater swap yield spread sensitivity for both swap usage and floating rate debt structure. As with the delta and

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insignificant coefficients for both variables. In some of the specifications, only the CFO delta interaction term and the CFO vega term in statistically 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.

[24] 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 are instead by compensation, we estimated specifications adding a term that interacts the natural log of sales with the swap 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.

vega measures, these measures have been normalized by the corresponding mean and standard deviation, making it easier to interpret their economic impact. Specifically, a manager with $353,000 in options vesting net of grants (the mean) have a swap usage interest rate sensitivity of 2.43%, whereas an otherwise similar firm-year in which the manager has $1,426,000 worth of options vesting net of grants (a one standard deviation move), swap usage increases by 3.24% for a one percent increase in the swap yield spread. These results provide additional evidence that adjustments to the mix of fixed and floating rate debt depend upon the implications they may have on managerial compensation. Firms appear to reduce interest expense to raise earnings around the time of options vesting and increase interest expense around the time of option grants.

Since we find that firms are using interest rate swaps to manage 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 9, indicate that *both* factors significantly impact firms' usage of interest rate swaps, with magnitudes that are very similar to those found when their impacts were separately estimated.[25] When the swap yield spread is interacted with CFO delta and with our measure of whether realized earnings were equal to or beat the mean earnings forecast by no more than five cents (column 1), we see that *both* interaction terms are significant at better than one percent. Similarly, when we jointly examine the sensitivity of swap usage to swap yield spreads resulting from the CFO options vesting net of grants and the same earnings management

[25] In untabulated results, we also find that both factors influence the sensitivity of the overall percentage of debt that ends with a floating rate exposure to the swap spread. For purposes of brevity, we omit those results but they are available upon request.

measure (column 2), we find that both coefficients are statistically significant at better than ten percent. Note that the number of observations falls significantly in this specification, which will tend to lower significance levels.

When the swap yield spread is interacted with CFO delta and with our measure of whether using interest rate swaps would have helped firms make their earnings forecast, we again see that both interaction terms are significant at better than one percent. Once again the significance level declines but we still get statistical significance when we look at the sensitivity of swap usage to swap yield spreads resulting from the CFO options vesting net of grants and this alternative earnings management measure. Finally, we look at the use of discretionary accruals and our compensation measures and find that the compensation measures retain their high level of statistical and economic significance and that the estimated coefficient on discretionary accruals is significant in the specification that includes CFO delta. The coefficient estimate is of similar magnitude in the second regression but is no longer statistically significant, which may again be due to the reduced number of observations. Overall, the results suggest that *both* the desire to meet earnings forecasts and the extent to which the CFO has a high-powered compensation contract are impacting how firms manage their interest rate exposure.[26]

C. Robustness Checks

So far, we have examined the effects of 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

[26] 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).

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 (2004), Chava and Purnanandam (2004)) that suggest that CFO compensation is a more important determinant than CEO compensation. Therefore, we replicate our earlier tests using the CEO compensation structure and present the results in Tables 10.

When we examine the effect on the portion of debt that is swapped to floating, we find that both the delta (column 1) and vega (column 2) for the CEO are statistically significant at better than one percent in their respective specifications.[27] However, the economic magnitudes appear smaller than those that we estimated for the CFO. 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 swap yield spread corresponds to a 1.56% 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 2.30%, a 47% increase. Similarly, when we estimate the impact of vega, the sensitivity changes from 1.77% to 2.39%. We also find that net option vesting (columns 3 and 4) also have the same strong statistical significance levels as was reported for CFOs but that the economic significance is lower. Even though all of these moves are statistically significant at better than one percent, CFO compensation appears to have a greater economic impact on the swap usage of firms than CEO compensation.

[27] Results of CEO compensation on the floating rate debt percentage generate very similar results. The statistical and economic significance levels are very similar with the exception of CEO vega. While the coefficient retains its positive sign, its magnitude has dropped significantly and is no longer statistically significant (results are available upon request).

As a final set of robustness checks, we re-examine our results by confining our analysis to just those firms that use swaps at some point over the sample period. As stated earlier, the inclusion of non-swaps users enables us to determine whether our hypothesized factors induce firms to use interest rate swaps to time the interest rate market, which requires including those firms that do not use swaps. Now that we have established that market timing is occurring due to earnings management concerns and the compensation contracts of managers, we want to estimate the economic magnitude of these various factors on swap usage for those that are most likely market timing. These findings are located in Table 11.

In both of the specifications using earnings measures, the interaction coefficient is significant at better than one percent and as expected the coefficients are slightly larger in magnitude than those found for the entire sample. Looking at the compensation variables, we find them to be of similar economic magnitude to those presented for the entire sample. In terms of statistical significance, both the delta and vega interaction terms are significant at better than one percent while the net option vesting measures are significant at better than ten percent. Notice again that the net vesting specifications have fewer observations which likely explains the reduction in statistical significance since the magnitudes are similar to our earlier tests. In untabulated tests, we repeat these specifications for the overall percentage of floating rate debt and find results that are similar in statistical and economic magnitudes to those reported for the entire sample.

V. Conclusion

Interest rate swap usage has grown dramatically over the last fifteen years and it is important to understand how and why firms are using these securities. While firms claim that they are using swaps to hedge, and complying with FASB standards in order to claim hedge accounting treatment, our results suggest that firms are using swaps to manipulate earnings and in attempts to improve managerial compensation. We find that the strongest determinants of the cross-sectional variation in the sensitivity of firms' swap usage to the term structure of interest rates is the compensation scheme of the firm's management (specifically the CFO) and whether such an activity would help the firm hit their earnings forecast. We also find evidence that managers are using interest rate swaps to increase earnings per share, regardless of the steepness of the term structure, prior to raising outside capital.

We conclude that this behavior is consistent with managers responding to market and compensation-based incentives to focus on near-term outcomes. Firms use more pay-floating interest rate swaps as the term structure becomes steeper to move earnings forward to meet the expectations of analysts. We also find that for firms in which the manager shares in the gains of shareholders and where managers are rewarded for taking risk, use of interest rate swaps is significantly higher when the spread between long- and short-term interest rates is large (and thus short-term interest savings are the greatest). These results are not limited to the firm's use of interest rate swaps; we also find similar outcomes when we examine the portion of the firm's debt that has a floating interest rate exposure after the incorporation of swaps. While the compensation results are stronger for the CFO, in terms of the economic magnitude of the effect, the results are also robust to using the CEO's compensation structure. In addition, we find that when we limit our analysis to just those firms that use interest rate swaps, the magnitudes of the aforementioned effects are even larger.

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. It is particularly interesting to find that analyst earnings forecasts and the structure of executive compensation may actually increase the manager's focus on near-term outcomes at the expense of long-term value creation. This is troublesome given the entire 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 stern reminder for compensation committees to carefully consider the full ramifications of the incentive-based pay packages they offer to management.

Appendix 1

The following table, taken from Black Hills Corporation's 2003 10-K, filed on March 15, 2004, provides an example of firm's reporting of variable and fixed rate long-term debt as part of market risk disclosures in Item 7A "Quantitative and Qualitative Disclosures about Market Risk."

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.

Appendix 2

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.

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Figure 1 - Term Structure in January 1994

This figure contains a graphical representation of the term structure of U.S. Treasury yields on January 31, 1994. On the x-axis is the number of years to maturity of the particular Treasury instrument and on the y-axis is the corresponding yield.

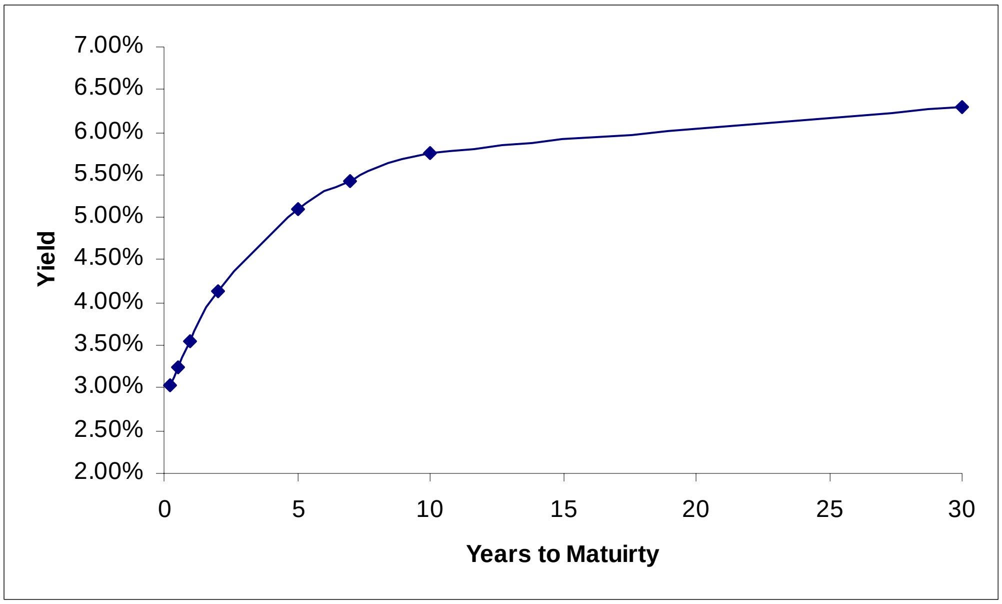

Figure 2 – Term Structure in August 2000

This figure contains a graphical representation of the term structure of U.S. Treasury yields on August 31, 2000. On the x-axis is the number of years to maturity of the particular Treasury instrument and on the y-axis is the corresponding yield.

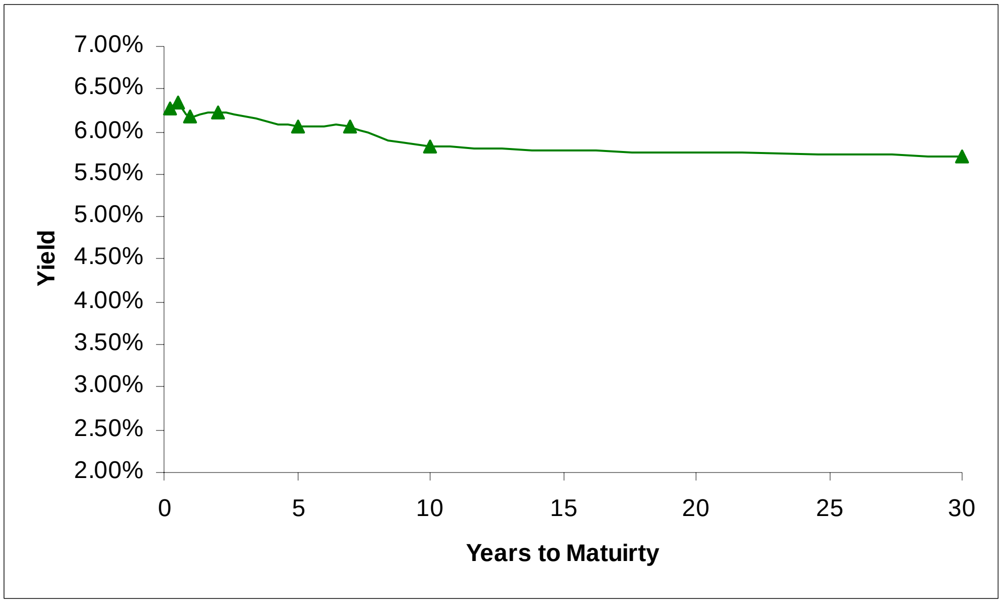

Figure 3 – Interest Rate Yield Spread and Use of Floating Rate Swaps for Dec. 1993-Mar. 2003

This figure contains the average yield spread (10-year Treasury yield minus the 1-year Treasury yield), represented by the yellow bars with the units on the left side, and the average percentage of debt swapped to floating for firms that ended their fiscal year in the corresponding month or one of the three months prior to that. Those values are represented by the blue line with the units on the right side. A negative value denotes that the average observation was a swap from floating to a fixed interest rate exposure.

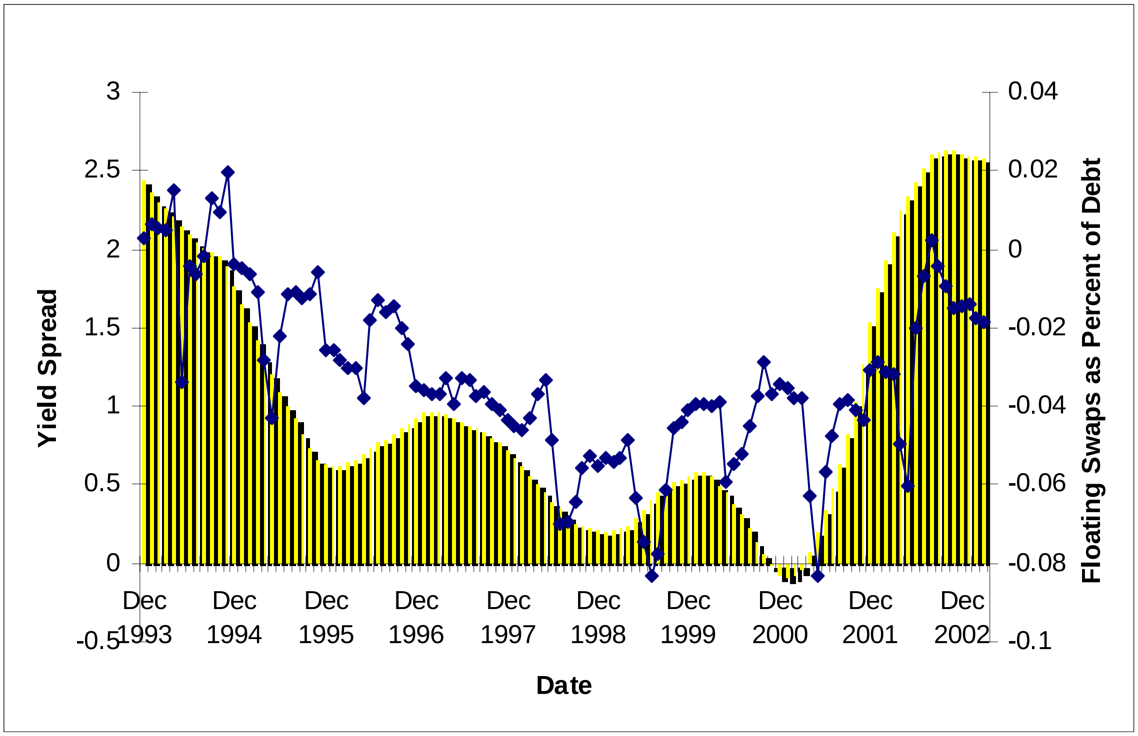

Table 1
Summary Statistics

The sample consists of 1,854 firms in the ExecuComp database during the June 1993 - May 2003 with positive amount of debt at some point during the sample period. Initial(final) floating debt percentage is the percentage of outstanding debt that has a 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 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. 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 business, 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 (2(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 2(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (exposure) is a binary variable taking the value 1 when earnings per share would have been above the final mean earnings forecast if all debt were floating and would have been below the forecast if all debt were fixed, and 0 otherwise. Discretionary accruals are calculated using The Modified Jones Model (see for instance Dechow et al (1995)). 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 vested minus the value of options granted during the fiscal year. Compensation is total compensation including option grants.

	Num. Obs.	Mean	Median	SD	Min	Max
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
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	0.049	0.053	0.012	0.015	0.062
Treasury yield spread	11261	0.010	0.007	0.008	−0.001	0.030
Swap yield spread	11261	0.011	0.008	0.007	0.001	0.027
Credit spread	11261	0.008	0.007	0.002	0.006	0.013
Index of leading indicators	11261	105.239	106.700	4.733	97.200	111.600
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 (2 cents)	9311	0.290	0.000	0.454	0.000	1.000
EPS close to foreacst (5 cents)	9311	0.436	0.000	0.496	0.000	1.000
EPS close to forecast (exposure)	9333	0.371	0.000	0.483	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	8248	1.951	0.000	6.435	−1.191	46.615
CFO Options	4008	0.353	0.000	1.073	−0.350	7.336
CEO Options / Compensation	8185	0.557	0.000	1.527	−0.217	10.334
CFO Options / Compensation	3980	0.307	0.000	0.816	−0.186	5.269

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 a 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 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 (2(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 2(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (exposure) is a binary variable taking the value 1 when earnings per share would have been above the final mean earnings forecast if all debt were floating and would have been below the forecast if all debt were fixed, and 0 otherwise. Discretionary accruals are calculated using The Modified Jones Model (see for instance Dechow et al (1995)). 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 vested minus the value of options granted during the fiscal year. Compensation is total compensation including option grants.

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 (2 cents)	EPS (5 cents)	EPS (exposure)	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 (2 cents)	−0.005	0.040	−0.026	0.015	1.000			
EPS close to foreacst (5 cents)	−0.004	0.032	−0.011	0.011	0.727	1.000		
EPS close to forecast (exposure)	0.032	0.010	−0.013	−0.017	0.298	0.214	1.000	
Discretionary accruals	0.013	0.074	0.004	0.019	0.018	0.021	0.032	1.000

Panel C

	Net Floating Swaps	Final Floating Debt	CEO Delta	CFO Delta	CEO Vega	CFO Vega	CEO Options	CFO Options
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	0.032	−0.028	0.333	0.380	0.242	0.198	1.000	
CFO Options	0.016	0.005	0.284	0.485	0.153	0.211	0.594	1.000

Table 3
Baseline Interest Rate Swap Usage Regressions

This table presents the results of baseline interest rate swap usage regressions, where the dependent variable is the percentage of total debt that is swapped to a floating interest rate. The first two columns report the results of standard OLS regressions. Columns 3 and 4 report the results of firm fixed effects regressions. Columns 5 and 6 report OLS and firm fixed effects regressions using only interest rate swap users, firms that report using interest rate swaps at some point during the sample period. 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 and 6-month LIBOR during the fiscal year. Initial floating debt percentage is the percentage of outstanding debt that has a 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedastic 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	1.317***	0.431	1.331***	0.467	0.626	0.813
	(0.317)	(0.271)	(0.365)	(0.298)	(0.458)	(0.500)
Credit spread	3.963***	2.870*	2.709	1.719	3.324	2.491
	(1.479)	(1.496)	(1.814)	(1.848)	(2.522)	(3.108)
Treasury yield spread	2.342***		2.271***			
	(0.357)		(0.487)			
Swap yield spread		1.765***		1.672***	2.992***	2.653***
		(0.255)		(0.319)	(0.439)	(0.541)
Initial floating debt percentage	−0.167***	−0.167***	−0.157***	−0.156***	−0.319***	−0.305***
	(0.011)	(0.011)	(0.006)	(0.006)	(0.018)	(0.011)
Long-term debt percentage	−0.002	−0.002	−0.002	−0.002	−0.001	−0.012
	(0.010)	(0.010)	(0.005)	(0.005)	(0.018)	(0.010)
Leverage	−0.080***	−0.080***	0.039**	0.036**	−0.046	0.097***
	(0.020)	(0.020)	(0.018)	(0.018)	(0.035)	(0.031)
Ln(Sales)	0.004*	0.004*	0.002	0.002	0.015***	0.003
	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.007)
Debt or CP rating	0.005	0.005	−0.011*	−0.011*	0.013	−0.018*
	(0.007)	(0.007)	(0.006)	(0.006)	(0.012)	(0.010)
Economy-wide floating debt percentage	0.133	0.170	0.025	0.056	0.341	0.139
	(0.129)	(0.130)	(0.119)	(0.120)	(0.217)	(0.204)
Index of leading indicators	−0.000	−0.001	−0.000	−0.001	−0.002	−0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−0.135	−0.019	−0.078	0.041	−0.066	0.094
	(0.091)	(0.083)	(0.104)	(0.081)	(0.143)	(0.139)
Num. Obs.	11261	11261	11261	11261	6269	6269
R^2	0.120	0.120	0.077	0.078	0.246	0.147
Firm Fixed Effects	No	No	Yes	Yes	No	Yes
Swap Users Only	No	No	No	No	Yes	Yes

Table 4
Baseline Floating Debt Percentage Regressions

This table presents the results of baseline floating debt percentage regressions, where the dependent variable is the percentage of outstanding debt that has a floating interest rate exposure after accounting for interest rate swaps. The first two columns report the results of standard OLS regressions. Columns 3 and 4 report the results of firm fixed effects regressions. Columns 5 and 6 report OLS and firm fixed effects regressions using only 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. 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 and 6-month LIBOR during the fiscal year. 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. White heteroskedastic 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	1.687***	1.619***	1.263**	0.710	1.162*	0.615
	(0.579)	(0.497)	(0.613)	(0.500)	(0.607)	(0.634)
Credit spread	5.663**	5.226*	2.320	1.573	3.498	1.494
	(2.669)	(2.727)	(3.042)	(3.101)	(3.175)	(3.935)
Treasury yield spread	0.231		1.465*			
	(0.714)		(0.817)			
Swap yield spread		0.383		1.147**	1.305**	1.835***
		(0.503)		(0.536)	(0.630)	(0.684)
Long-term debt percentage	−0.217***	−0.217***	−0.203***	−0.203***	−0.195***	−0.202***
	(0.017)	(0.017)	(0.009)	(0.009)	(0.022)	(0.012)
Leverage	−0.082**	−0.082**	0.212***	0.211***	−0.084	0.255***
	(0.038)	(0.038)	(0.030)	(0.030)	(0.052)	(0.039)
Ln(Sales)	0.006	0.006	0.017***	0.017***	−0.005	0.013
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.008)
Debt or CP rating	−0.159***	−0.159***	−0.131***	−0.131***	−0.127***	−0.105***
	(0.014)	(0.014)	(0.010)	(0.010)	(0.017)	(0.013)
Economy-wide floating debt percentage	0.433**	0.459**	0.729***	0.756***	0.719***	0.873***
	(0.214)	(0.214)	(0.200)	(0.201)	(0.262)	(0.258)
Index of leading indicators	0.003**	0.003***	0.002	0.001	0.003**	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−0.034	−0.055	−0.110	−0.044	−0.034	0.056
	(0.168)	(0.147)	(0.174)	(0.136)	(0.183)	(0.176)
Num. Obs.	11261	11261	11261	11261	6269	6269
R^2	0.146	0.146	0.094	0.094	0.130	0.095
Firm Fixed Effects	No	No	Yes	Yes	No	Yes
Swap Users Only	No	No	No	No	Yes	Yes

Table 5
Interest Rate Swap Usage and Raising Funds / Managing Earnings

This table presents the results of raising funds and managing earnings hypotheses tests for interest rate swap usage. All regressions are estimated using firm fixed effects. 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 and 6-month LIBOR during the fiscal year. EPS close to forecast (2(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 2(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (exposure) is a binary variable taking the value 1 when earnings per share would have been above the final mean earnings forecast if all debt were floating and would have been below the forecast if all debt were fixed, and 0 otherwise. Discretionary accruals are calculated using The Modified Jones Model (see for instance Dechow et al (1995)). 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	0.426	0.445	0.441	0.431	0.624*	0.445
	(0.306)	(0.306)	(0.334)	(0.333)	(0.335)	(0.304)
Credit spread	2.466	2.586	0.993	0.842	0.640	1.831
	(1.895)	(1.895)	(2.007)	(2.005)	(2.007)	(1.878)
Swap yield spread	1.595***	1.623***	1.552***	1.063***	0.786**	1.630***
	(0.341)	(0.334)	(0.375)	(0.391)	(0.388)	(0.326)
Raised debt	0.015**					
	(0.007)					
Raised debt * Yield spread	−0.083					
	(0.522)					
Raised equity		0.015				
		(0.011)				
Raised equity * Yield spread		−0.457				
		(0.843)				
EPS close to forecast (2 cents)			−0.001			
			(0.006)			
EPS close to forecast (2 cents) * Yield spread			0.314			
			(0.429)			
EPS close to foreacst (5 cents)				−0.013**		
				(0.006)		
EPS close to forecast (5 cents) * Yield spread				1.406***		
				(0.397)		
EPS close to forecast (exposure)					−0.010*	
					(0.006)	
EPS close to forecast (exposure) * Yield spread					1.888***	
					(0.415)	
Discretionary accruals						0.011***
						(0.002)
Discretionary accruals * Yield spread						−0.547***
						(0.187)
Initial floating debt percentage	−0.158***	−0.157***	−0.158***	−0.158***	−0.160***	−0.160***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)
Long-term debt percentage	−0.003	−0.003	−0.014**	−0.014**	−0.014**	−0.004
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Leverage	0.054***	0.038**	0.061***	0.061***	0.052**	0.035*
	(0.019)	(0.019)	(0.022)	(0.022)	(0.022)	(0.019)
Ln(Sales)	0.003	0.003	−0.001	−0.001	−0.002	0.002
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.004)
Debt or CP rating	−0.010*	−0.011*	−0.012*	−0.012*	−0.013*	−0.009
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.006)
Economy-wide floating debt percentage	0.055	0.064	0.028	0.039	−0.011	0.068
	(0.124)	(0.124)	(0.132)	(0.131)	(0.131)	(0.122)
Index of leading indicators	−0.001*	−0.001*	−0.001*	−0.001*	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.050	0.042	0.103	0.103	0.109	0.018
	(0.085)	(0.085)	(0.090)	(0.090)	(0.090)	(0.083)
Num. Obs.	10607	10607	9311	9311	9333	10737
R^2	0.079	0.078	0.076	0.077	0.080	0.082

Table 6
Floating Debt Percentage and Raising Funds / Managing Earnings

This table presents the results of raising funds and managing earnings hypotheses tests for floating debt percentage. All regressions are estimated using firm fixed effects/ 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 and 6-month LIBOR during the fiscal year. EPS close to forecast (2(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 2(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (exposure) is a binary variable taking the value 1 when earnings per share would have been above the final mean earnings forecast if all debt were floating and would have been below the forecast if all debt were fixed, and 0 otherwise. Discretionary accruals are calculated using The Modified Jones Model (see for instance Dechow et al (1995)). 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	0.706	0.781	0.811	0.803	0.968*	0.609
	(0.511)	(0.512)	(0.556)	(0.556)	(0.557)	(0.513)
Credit spread	0.933	1.301	0.731	0.654	0.898	0.658
	(3.164)	(3.168)	(3.346)	(3.345)	(3.340)	(3.168)
Swap yield spread	0.998*	1.191**	1.152*	0.751	−0.175	1.181**
	(0.569)	(0.559)	(0.625)	(0.652)	(0.645)	(0.549)
Raised debt	0.038***					
	(0.011)					
Raised debt * Yield spread	0.521					
	(0.872)					
Raised equity		0.048***				
		(0.018)				
Raised equity * Yield spread		−0.815				
		(1.409)				
EPS close to forecast (2 cents)			−0.010			
			(0.010)			
EPS close to forecast (2 cents) * Yield spread			0.613			
			(0.716)			
EPS close to foreacst (5 cents)				−0.020**		
				(0.009)		
EPS close to forecast (5 cents) * Yield spread				1.405**		
				(0.663)		
EPS close to forecast (exposure)					0.009	
					(0.010)	
EPS close to forecast (exposure) * Yield spread					2.228***	
					(0.690)	
Discretionary accruals						0.030***
						(0.004)
Discretionary accruals * Yield spread						−0.870***
						(0.315)
Long-term debt percentage	−0.199***	−0.201***	−0.220***	−0.220***	−0.219***	−0.202***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.009)
Leverage	0.270***	0.222***	0.283***	0.281***	0.251***	0.217***
	(0.032)	(0.032)	(0.036)	(0.036)	(0.036)	(0.031)
Ln(Sales)	0.017**	0.018***	0.016**	0.016**	0.016**	0.020***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.007)
Debt or CP rating	−0.126***	−0.128***	−0.132***	−0.132***	−0.133***	−0.127***
	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)	(0.010)
Economy-wide floating debt percentage	0.672***	0.704***	0.681***	0.693***	0.643***	0.779***
	(0.207)	(0.208)	(0.219)	(0.219)	(0.218)	(0.206)
Index of leading indicators	0.001	0.001	0.000	0.000	0.000	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−0.003	−0.038	0.087	0.086	0.089	−0.119
	(0.142)	(0.142)	(0.149)	(0.149)	(0.149)	(0.140)
Num. Obs.	10607	10607	9311	9311	9333	10737
R^2	0.096	0.093	0.105	0.106	0.110	0.102

Table 7
Interest Rate Swap Usage and CFO Compensation.

This table presents the results of CFO compensation hypotheses tests for interest rate swap usage. All regressions are estimated using firm fixed effecs. 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 and 6-month LIBOR during the fiscal year. CFO Delta and Vega are the changes (in millions of dollars) in 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. CFO Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CFO Options is the value of options vested minus the value of options granted during the fiscal year. Compensation is total compensation including option grants. CFO Delta, Vega, and Options have been 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, Vega, or Options. CFO Options / Compensation is calculated using raw values of CFO Options. Initial floating debt percentage is the percentage of outstanding debt that has a 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
1-year Treasury yield	0.407	0.285	1.167*	1.169*
	(0.452)	(0.443)	(0.653)	(0.655)
Credit spread	1.249	2.146	4.598	4.916
	(2.511)	(2.482)	(3.034)	(3.052)
Swap yield spread	2.236***	2.301***	2.428***	2.061***
	(0.484)	(0.476)	(0.615)	(0.623)
CFO Delta	−0.011***			
	(0.004)			
CFO Delta * Yield spread	1.135***			
	(0.265)			
CFO Vega		−0.002		
		(0.004)		
CFO Vega * Yield spread		0.958***		
		(0.235)		
CFO Options			−0.009**	
			(0.004)	
CFO Options * Yield spread			0.815**	
			(0.356)	
CFO Options / Compensation				−0.016***
				(0.006)
CFO Options / Compensation * Yield spread				1.020**
				(0.467)
Initial floating debt percentage	−0.182***	−0.182***	−0.194***	−0.189***
	(0.010)	(0.009)	(0.013)	(0.013)
Long-term debt percentage	0.005	0.007	0.012	0.013
	(0.008)	(0.008)	(0.011)	(0.011)
Leverage	0.035	0.056**	0.045	0.037
	(0.028)	(0.027)	(0.037)	(0.037)
Ln(Sales)	−0.001	−0.001	−0.002	−0.002
	(0.006)	(0.006)	(0.008)	(0.008)
Debt or CP rating	−0.025***	−0.022**	−0.021*	−0.022*
	(0.009)	(0.009)	(0.012)	(0.012)
Economy-wide floating debt percentage	0.187	0.305*	0.091	0.087
	(0.174)	(0.171)	(0.234)	(0.234)
Index of leading indicators	0.001	0.000	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−0.133	−0.123	−0.024	−0.003
	(0.122)	(0.119)	(0.154)	(0.154)
Num. Obs.	5949	6199	4008	3980
R^2	0.099	0.102	0.107	0.106

Table 8

Floating Debt Percentage and CFO Compensation.

This table presents the results of CFO compensation hypotheses tests for floating debt percentage. All regressions are estimated using firm fixed effects. 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 and 6-month LIBOR during the fiscal year. CFO Delta and Vega are the changes (in millions of dollars) in 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. CFO Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CFO Options is the value of options vested minus the value of options granted during the fiscal year. Compensation is total compensation including option grants. CFO Delta, Vega, and Options have been 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, Vega, or Options. CFO Options / Compensation is calculated using raw values of CFO Options. 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
1-year Treasury yield	1.435**	1.420**	2.384**	2.450**
	(0.724)	(0.709)	(1.000)	(1.008)
Credit spread	1.144	2.305	4.710	4.633
	(4.023)	(3.971)	(4.649)	(4.698)
Swap yield spread	1.911**	1.880**	2.361**	1.844*
	(0.776)	(0.761)	(0.943)	(0.958)
CFO Delta	−0.012*			
	(0.006)			
CFO Delta * Yield spread	1.641***			
	(0.425)			
CFO Vega		0.002		
		(0.007)		
CFO Vega * Yield spread		0.709*		
		(0.376)		
CFO Options			−0.014**	
			(0.007)	
CFO Options * Yield spread			1.668***	
			(0.546)	
CFO Options / Compensation				−0.015*
				(0.009)
CFO Options / Compensation * Yield spread				1.371*
				(0.719)
Long-term debt percentage	−0.204***	−0.196***	−0.202***	−0.203***
	(0.013)	(0.013)	(0.016)	(0.016)
Leverage	0.251***	0.250***	0.316***	0.306***
	(0.045)	(0.043)	(0.056)	(0.056)
Ln(Sales)	0.009	0.010	0.006	0.007
	(0.010)	(0.010)	(0.013)	(0.013)
Debt or CP rating	−0.152***	−0.148***	−0.124***	−0.127***
	(0.015)	(0.014)	(0.018)	(0.019)
Economy-wide floating debt percentage	0.658**	0.742***	0.518	0.492
	(0.278)	(0.273)	(0.358)	(0.360)
Index of leading indicators	0.002*	0.002	0.001	0.001
	(0.001)	(0.001)	(0.002)	(0.002)
Constant	−0.110	−0.132	−0.018	−0.002
	(0.196)	(0.191)	(0.236)	(0.237)
Num. Obs.	5949	6199	4008	3980
R^2	0.108	0.101	0.107	0.106

Table 9
Earnings Management, CFO Compensation, and Interest Rate Swap Usage.

This table presents the results of additional interest rate swap usage tests, in which earnings management and CFO compensation variables are included at the same time. All regressions are estimated using firm fixed effects. 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 and 6-month LIBOR during the fiscal year. EPS close to forecast (2(5) cents) is a binary variable taking the value 1 when realized earnings per share are equal to or are up to 2(5) cents above the final mean earnings forecast, and 0 otherwise. EPS close to forecast (exposure) is a binary variable taking the value 1 when earnings per share would have been above the final mean earnings forecast if all debt were floating and would have been below the forecast if all debt were fixed, and 0 otherwise. Discretionary accruals are calculated using The Modified Jones Model (see for instance Dechow et al (1995)). CFO Delta and Vega are the changes (in millions of dollars) in 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. CFO Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CFO Options is the value of options vested minus the value of options granted during the fiscal year. Compensation is total compensation including option grants. Initial floating debt percentage is the percentage of outstanding debt that has a 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	0.429	1.402*	0.677	1.486**	0.385	1.080
	(0.508)	(0.725)	(0.508)	(0.726)	(0.460)	(0.661)
Credit spread	0.280	3.233	−0.148	2.706	1.839	4.013
	(2.738)	(3.318)	(2.742)	(3.331)	(2.546)	(3.071)
Swap yield spread	1.633***	2.279***	1.180**	2.087***	2.196***	2.382***
	(0.598)	(0.755)	(0.588)	(0.749)	(0.493)	(0.626)
EPS close to foreacst (5 cents)	−0.012	−0.010				
	(0.008)	(0.010)				
EPS close to forecast (5 cents) * Yield spread	1.488***	1.192*				
	(0.571)	(0.720)				
EPS close to forecast (exposure)			−0.005	−0.012		
			(0.009)	(0.011)		
EPS close to forecast (exposure) * Yield spread			2.044***	1.644**		
			(0.591)	(0.751)		
Discretionary accruals					0.013***	0.016***
					(0.003)	(0.004)
Discretionary accruals * Yield spread					−0.686***	−0.448
					(0.248)	(0.367)
CFO Delta	−0.009**		−0.010**		−0.011***	
	(0.004)		(0.004)		(0.004)	
CFO Delta * Yield spread	0.934***		0.991***		1.314***	
	(0.289)		(0.285)		(0.284)	
CFO Options		−0.005		−0.006		−0.011**
		(0.005)		(0.005)		(0.005)
CFO Options * Yield spread		0.648*		0.726*		1.125***
		(0.377)		(0.375)		(0.386)
Initial floating debt percentage	−0.177***	−0.195***	−0.181***	−0.197***	−0.186***	−0.199***
	(0.011)	(0.015)	(0.011)	(0.015)	(0.010)	(0.013)
Long-term debt percentage	−0.007	−0.001	−0.010	−0.002	0.005	0.012
	(0.009)	(0.012)	(0.009)	(0.012)	(0.008)	(0.011)
Leverage	0.049	0.085**	0.035	0.075*	0.049*	0.060
	(0.033)	(0.043)	(0.033)	(0.043)	(0.029)	(0.037)
Ln(Sales)	0.002	−0.003	−0.001	−0.005	0.000	0.001
	(0.008)	(0.011)	(0.008)	(0.011)	(0.006)	(0.008)
Debt or CP rating	−0.035***	−0.034**	−0.036***	−0.033**	−0.022**	−0.020*
	(0.011)	(0.014)	(0.010)	(0.014)	(0.009)	(0.012)
Economy-wide floating debt percentage	0.156	0.020	0.092	0.010	0.225	0.062
	(0.193)	(0.258)	(0.192)	(0.258)	(0.177)	(0.237)
Index of leading indicators	0.000	−0.001	0.001	−0.001	0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−0.093	0.038	−0.089	0.030	−0.144	0.015
	(0.136)	(0.173)	(0.136)	(0.173)	(0.124)	(0.156)
Num. Obs.	5071	3458	5083	3463	5659	3827
R^2	0.091	0.103	0.096	0.104	0.107	0.119

Table 10
Interest Rate Swap Usage and CEO Compensation.

This table presents the results of CEO compensation hypotheses tests for interest rate swap usage. All regressions are estimated using firm fixed effecs. 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 and 6-month LIBOR during the fiscal year. CEO Delta and Vega are the changes (in millions of dollars) in 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. CEO Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CEO Options is the value of options vested minus the value of options granted during the fiscal year. Compensation is total compensation including option grants. CEO Delta, Vega, and Options have been 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 CEO Delta, Vega, or Options. CEO Options / Compensation is calculated using raw values of CEO Options. Initial floating debt percentage is the percentage of outstanding debt that has a 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
1-year Treasury yield	0.552*	0.470	0.630	0.605
	(0.322)	(0.319)	(0.392)	(0.394)
Credit spread	3.122	1.883	3.262	3.563
	(1.949)	(1.942)	(2.152)	(2.169)
Swap yield spread	1.564***	1.770***	1.641***	1.253***
	(0.345)	(0.343)	(0.391)	(0.399)
CEO Delta	−0.005			
	(0.003)			
CEO Delta * Yield spread	0.738***			
	(0.197)			
CEO Vega		0.002		
		(0.003)		
CEO Vega * Yield spread		0.617***		
		(0.172)		
CEO Options			−0.012***	
			(0.003)	
CEO Options * Yield spread			1.096***	
			(0.281)	
CEO Options / Compensation				−0.006***
				(0.002)
CEO Options / Compensation * Yield spread				0.651***
				(0.189)
Initial floating debt percentage	−0.170***	−0.168***	−0.174***	−0.173***
	(0.007)	(0.007)	(0.008)	(0.008)
Long-term debt percentage	−0.002	−0.004	0.003	0.004
	(0.006)	(0.006)	(0.007)	(0.007)
Leverage	0.019	0.030	0.033	0.033
	(0.021)	(0.021)	(0.024)	(0.024)
Ln(Sales)	0.002	0.000	0.005	0.004
	(0.004)	(0.004)	(0.005)	(0.005)
Debt or CP rating	−0.009	−0.008	−0.011	−0.012
	(0.007)	(0.007)	(0.008)	(0.008)
Economy-wide floating debt percentage	0.050	0.118	0.061	0.064
	(0.128)	(0.127)	(0.147)	(0.148)
Index of leading indicators	−0.001	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.019	0.024	−0.013	0.000
	(0.089)	(0.088)	(0.099)	(0.100)
Num. Obs.	9787	9969	8248	8185
R^2	0.086	0.088	0.088	0.087

Table 11

Yield Spread Sensitivity, Earnings Management, and CFO Compensation for Interest Rate Swap Users.

This table presents the results of earnings management and CFO compensation tests for interest rate swap users, firms that report using swaps at any point during the sample period. The dependent variable is interest rate swap usage. All regressions are estimated using firm fixed effects. 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 and 6-month LIBOR during the fiscal year. EPS close to forecast (exposure) is a binary variable taking the value 1 when earnings per share would have been above the final mean earnings forecast if all debt were floating and would have been below the forecast if all debt were fixed, and 0 otherwise. Discretionary accruals are calculated using The Modified Jones Model (see for instance Dechow et al (1995)). CFO Delta and Vega are the changes (in millions of dollars) in 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. CFO Delta and Vega are calculated using Core and Guay (2002) one-year approximation method. CFO Options is the value of options vested minus the value of options granted during the fiscal year. Compensation is total compensation including option grants. CFO Delta, Vega, and Options have been 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, Vega, or Options. CFO Options / Compensation is calculated using raw values of CFO Options. Initial floating debt percentage is the percentage of outstanding debt that has a 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 business, as reported in table L.102 of the Flow of Funds Accounts of the United States published by the Federal Reserve Board. *, **, and *** correspond to the coefficients being significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
1-year Treasury yield	1.000*	0.753	0.568	0.434	1.565	1.566
	(0.564)	(0.514)	(0.743)	(0.732)	(1.061)	(1.065)
Credit spread	1.020	2.910	1.150	2.925	5.956	6.365
	(3.342)	(3.176)	(4.056)	(4.021)	(4.849)	(4.882)
Swap yield spread	1.171*	2.668***	3.049***	3.191***	3.316***	2.826***
	(0.677)	(0.555)	(0.800)	(0.789)	(0.999)	(1.017)
EPS close to forecast (exposure)	−0.007					
	(0.010)					
EPS close to forecast (exposure) * Yield spread	2.439***					
	(0.692)					
Discretionary accruals		0.022***				
		(0.004)				
Discretionary accruals * Yield spread		−1.061***				
		(0.340)				
CFO Delta			−0.010*			
			(0.006)			
CFO Delta * Yield spread			1.318***			
			(0.384)			
CFO Vega				0.001		
				(0.006)		
CFO Vega * Yield spread				0.932***		
				(0.337)		
CFO Options					−0.010	
					(0.006)	
CFO Options * Yield spread					0.988*	
					(0.526)	
CFO Options / Compensation						−0.021**
						(0.009)
CFO Options / Compensation * Yield spread						1.197*
						(0.725)
Initial floating debt percentage	−0.319***	−0.312***	−0.333***	−0.335***	−0.334***	−0.328***
	(0.013)	(0.012)	(0.016)	(0.016)	(0.021)	(0.022)
Long-term debt percentage	−0.037***	−0.017	0.008	0.009	0.019	0.019
	(0.011)	(0.010)	(0.015)	(0.014)	(0.018)	(0.018)
Leverage	0.124***	0.087***	0.102**	0.127***	0.116*	0.097
	(0.037)	(0.032)	(0.047)	(0.045)	(0.060)	(0.060)
Ln(Sales)	−0.007	0.005	−0.009	−0.008	−0.010	−0.008
	(0.008)	(0.007)	(0.011)	(0.011)	(0.014)	(0.014)
Debt or CP rating	−0.022*	−0.015	−0.039**	−0.033**	−0.034*	−0.035*
	(0.012)	(0.010)	(0.015)	(0.015)	(0.020)	(0.020)
Economy-wide floating debt percentage	0.077	0.197	0.287	0.465	0.145	0.133
	(0.223)	(0.210)	(0.292)	(0.288)	(0.383)	(0.384)
Index of leading indicators	−0.002*	−0.001	0.001	−0.000	−0.001	−0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Constant	0.225	0.032	−0.091	−0.082	0.076	0.106
	(0.155)	(0.143)	(0.207)	(0.203)	(0.257)	(0.257)
Num. Obs.	5186	5932	3372	3508	2295	2276
R^2	0.151	0.155	0.174	0.178	0.179	0.177