

Interest Rates and the Timing of Corporate Debt Issues*

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Abstract

Survey evidence suggests that managers attempt to time financial markets in making their financing decisions. Using aggregate, macroeconomic funds flow data, Baker, Greenwood, and Wurgler (2003) (BGW) conclude that managers are successful in timing new issues of debt by decreasing the share of long term debt financing prior to high excess bond returns. We employ a sample of more than 14,000 new issues of corporate debt over the period 1970-2001 which allows us to examine issues that cannot be tested with macroeconomic data. Contrary to BGW, we find managers to be generally unsuccessful at timing debt issues. We find that managers do not issue more debt prior to increases in interest rates. Future interest rates do not increase in the amount of debt issued or the effective maturity of debt issued, and future excess bond returns are not significantly higher when smaller amounts of long-term debt are issued. Furthermore, for the separate periods 1970-1981 and 1982-2001 there is no evidence of timing ability based on debt maturity or any other characteristics of debt that we examine. When net debt issues are used rather than gross debt issues, BGW's results on debt timing disappear even with the flow of funds data that they employed. However, consistent with recent survey results, we find strong evidence of choices by management to issue debt when interest rates are attractive in relation to historical rates. The level of interest rates relative to historical levels strongly affects debt issuance, debt maturity choices, call features, and put features of debt. Our results hold for all issues, whether or not refinancing transactions are included.

Interest Rates and the Timing of Corporate Debt Issues

1. Introduction

Results of the Graham and Harvey (2001) survey of financial officers suggest that managers try to time interest rates in their debt issuance decisions. For example, Graham and Harvey (2001) report:

“...[W]e find surprising indications that they [executives] try to time the market in other ways. We inquire whether executives attempt to time interest rates by issuing debt when they feel that market interest rates are particularly low. The rating...provides moderately strong evidence that firms try to time the market in this sense...We also find evidence that firms issue short-term debt in an effort to time market interest rates. CFOs issue short term when they feel that short rates are low relative to long rates...or when they expect long-term rates to decrease...”

Bancel and Mittoo (2004) find similar results from their survey of European financial managers.¹

The Graham and Harvey survey and the Bancel and Mittoo survey found some results that could be interpreted as forward-looking market timing and some that can be interpreted as backward-looking market timing.² Both found that managers like to issue debt when interest rates are particularly low, which tends to be reflective of the current level of rates relative to recent historical levels. Both also found that managers try to issue short-term debt when they think that future long-term interest rates will fall, which is a form of forward-looking debt timing.

A debate exists regarding whether managers can successfully time corporate issuances in a forward looking sense. Baker, Greenwood, and Wurgler (2003) employ macro-level funds flow

¹ Bancel and Mittoo (2004) also find evidence of efforts to time interest rates, concluding that “[t]his evidence supports the notion that managers use windows of opportunity to raise capital.” The managers they surveyed also indicated that they issue short-term debt when they are waiting for long-term interest rates to decline.

² We thank John Graham for providing us with his interpretations of some of the survey results in his corporate finance survey paper with Campbell Harvey. His interpretations were based in part on conversations with survey respondents.

data and contend that corporations time the bond market by the choice of short-term debt versus long-term debt, and they state that “[t]he maturity of new debt issues predicts excess bond returns.” Butler, Grullon, and Weston (2005) present evidence that the apparent timing found by Baker, Greenwood, and Wurgler is a form of “pseudo market timing” because it is no longer found once they adjust for structural changes in interest rate behavior. On the other hand, Baker, Taliaferro, and Wurgler (2005) argue that the “pseudo market timing bias” is “much too small to overturn prior inferences” about the ability of aggregate debt maturity structure to explain bond returns.

We shed new light on this debate by using a detailed sample, of more than 14,000 new corporate public debt issues, instead of using aggregate macroeconomic data. The detailed dataset allows us to examine debt market timing issues while accounting for important firm level bond characteristics such as debt maturity, quantity of debt issued, and call and put features.³ These features appear to be important market-based responses which firms and investors use to address interest rate changes.

First, we examine whether debt issuance decisions are followed by interest rate movements that demonstrate managers’ ability to time future interest rates. In other words we test for “forward-looking” timing success. Consistent with Baker, Greenwood and Wurgler (2003), we find that higher debt maturity across the full period of our sample tends to be associated with higher future interest rates and negative future excess bond returns. However, contrary to Baker, Greenwood and Wurgler, our results generally do not support their finding that managers have the ability to successfully time future interest rates or returns when we account for the quantity of debt issued or for effective bond maturities (considering call and put

³ Both the Baker, Greenwood, and Wurgler (2003) and Butler, Grullon, and Weston (2004) studies employ annual macroeconomic funds flow data that do not permit the examination of bond characteristics that may be important in analyzing the ability to time interest rates and returns with the issuance of debt.

provisions). Further, when we take into account the regime shift identified by Butler, Grullon and Weston (2004), even the maturity-based timing shown in Baker, Greenwood and Wurgler disappears.⁴ There is no evidence of timing ability for the 1970-1981 period or for the 1982-2001 period.⁵ We also show that the relation between maturity choice and future excess bond returns completely disappears when we apply Baker, Greenwood and Wurgler's methodology to actual net issuances from the Flow of Funds as opposed to their implied measure of issuance.

Prior literature has not examined the other form of debt timing highlighted in the surveys, "backward timing." We fill this void by examining issuances and the level of interest rates relative to their historical levels. Our evidence suggests that Graham and Harvey's findings that "managers attempt to time interest rates by issuing debt when they feel that market interest rates are particularly low" refer to backward-looking timing as opposed to attempts to time future rates. We find that the amount of debt issued is substantially higher when interest rates are low relative to historical rates. We also examine the characteristics of debt issued and find that the levels of interest rates relative to historical levels are influential in a variety of choices of debt characteristics. We find that corporations issue larger quantities of debt and larger numbers of debt issues when interest rates are in low deciles relative to rates over the prior decade. We also find that the maturity choice, the decision to issue callable bonds, and the decision to issue puttable bonds are all associated with these relative interest rate levels. Since refinancing is natural when interest rates fall, we also examine the results after accounting for refinancings and find that our conclusions are not driven by refinancings. We also examine the state of equity

⁴ The Baker, Greenwood and Wurgler (2003) data do not identify the maturities of the debt in their sample. Their sample consists only of "short" or "long" debt, with no data on actual maturities. Our data provide details of maturities and other characteristics of bond issues.

⁵ Our extensive dataset helps shed some light on the "structural change" reported by Butler, Grullon, and Weston (2004). For example, a high percent of callable issuances occur around the 1981-1982 period they identify as the timing of a regime shift in monetary policy affecting interest rates and inflation.

markets and measures of economic growth and again find that our results are not driven by these variables.

The remainder of the paper proceeds as follows. In section two of the paper, we discuss previous literature on debt issuance and debt timing, and we put the timing decision in context. In section three, we describe the data and characteristics of the samples used in our study. Section four provides results based on forward-looking debt timing choices. Section five presents results based on interest rates relative to historical rates (i.e., backward-looking timing), and section six provides the conclusions from our work.

2. The Issuance of Debt: Overview of the Literature

Many factors affect the decisions by companies to issue new debt and the features they select for the debt. A number of theoretical and empirical research papers in finance have examined the debt versus equity choice as well as other factors that affect decisions to issue debt. Such studies include Myers (1977), Myers and Majluf (1984), Diamond (1991), Barclay and Smith (1995), Guedes and Opler (1996), Stohs and Mauer (1996), Jung, Kim and Stulz (1996), Houston and James (1996), and Hovakimian, Opler and Titman (2001), among others.

Taggart (1977) examines debt/equity choices and their relation to measures of target capital structure and debt capacity. He concludes that timing considerations might affect debt/equity choices, and he suggests the need for further research on the issues. Marsh (1982) examines corporate issues in the U.K. between 1959 and 1974, and he finds that companies are influenced by market conditions and recent security prices in choosing between debt and equity. He argues that the managers appear to “time” their decisions based on market conditions at the time that they issue securities.

Debt maturity choice has also been an important factor noted in the literature. For example, Barclay and Smith (1995) examine debt maturity relative to a measure of the quality of the issuing firm, the firm's growth opportunities, and the size of the firm. Guedes and Opler (1996) examine the debt maturity decision with a sample of over 7,000 debt issues. They observe that higher quality firms tend to borrow at both ends of the maturity spectrum, while lower quality firms tend to borrow at middle maturities. Their sample covers bonds and notes issued during 1982 to 1993. Guedes and Opler do not find that a firm's debt maturity choice is related to the firm's future equity market performance or the firm's tax position. They also find that debt maturities tend to be shorter when the term premium is higher, and, similarly to Marsh's argument, they argue that such choices are inconsistent with an expectations theory of the term structure. Barclay and Smith (1995) and Stohs and Mauer (1996) document a similar effect at the level of aggregate balance sheet data rather than new issue data (i.e., the average maturity of a firm's combined debt outstanding is negatively related to the term premium).

The Graham and Harvey (2001) and Bancel and Mittoo (2004) survey papers provide evidence that managers attempt to time their debt issues and maturity choices based on the level of interest rates. Baker, Greenwood, and Wurgler (2003) investigate forward-looking debt timing in terms of the maturity decision based on Federal *Flow of Funds* data. They conclude that corporations time the bond market by means of their debt maturity choice because the proportion of long-term financing used by corporations, in aggregate, is negatively related to subsequent excess long bond returns (the total return differential between long-term and short-term debt). The abstract of their paper begins with the statement, "The maturity of new debt issues predicts excess bond returns."

Butler, Grullon, and Weston (2004) examine Federal *Flow of Funds* data like that used by Baker, Greenwood, and Wurgler. They contend that the apparent timing found by Baker, Greenwood, and Wurgler is a form of “pseudo market timing” (as described by Schultz (2003)) because evidence of timing disappears once they account for a single regime change in the structure of the data. They identify a regime shift over the 1981 – 1982 period when the government was instituting policies to deal with unusually high levels of inflation in the United States. Our data indicate that this time frame corresponds with a relatively high level of callable debt issuances, a factor that could not be accounted for by the macroeconomic data used in these previous studies. Butler, Grullon, and Weston suggest that the policy changes instituted during that period led to a steepening of the yield curve that inspired firms to begin issuing more short-term debt relative to long-term debt. They conclude that the inclusion of a dummy variable to account for the regime shift eliminates evidence of corporate ability to predict subsequent changes in yields.⁶

Both the Baker, Greenwood, and Wurgler and the Butler, Grullon, and Weston studies use aggregate data from the Federal *Flow of Funds* databases. They use annual, end-of-year aggregate amounts of corporate debt, comparing short term and long term corporate debt. Baker, Greenwood, and Wurgler recognize that their data have a number of limitations. One such limitation is that the only maturity values observable in their database are less than a year (short term debt) versus greater than a year (long term debt). The authors state, “...one would like to have detailed data on maturity.” But the *Flow of Funds* data do not provide for the possibility of observing and analyzing maturity levels. The authors also point out that they do not have data on other debt features such as callability and floating rates.

⁶ The Baker, Greenwood, and Wurgler (2003) excess return measure compares total returns (coupons plus change in price) for long-term bonds to the total return for either T-bills or commercial paper, as provided by Ibbotson Associates. Excess bond returns are generally positive when yields drop, and negative when yields rise.

Another limitation of the data used in both studies is that they are limited to annual data only. During a given year, debt issues and interest rates can vary quite substantially. Long term debt might be issued early in a given year while long term interest rates are fairly low, and then they might fall off as interest rates rise within the same year. The characterization of the end-of-year aggregate debt levels might not accurately describe the behavior of the debt market during parts of that year in relation to interest rates. Thus, the use of only annual data obscures some of the relations that naturally occur within a given year as debt market conditions change and may result in misleading observations. Also, by limiting themselves to annual data, the studies limit their sample sizes as well. Both have relatively small samples (Baker, Greenwood, and Wurgler have maximum sample sizes of 47, for example).

In light of the limitations of the two studies described above, we use data on more than 14,000 new issues of corporate debt. We describe the data in detail in the next section of this paper, but it is useful to highlight here some of the key aspects of why the data provide an advantage in analysis in comparison to the Baker, Greenwood, and Wurgler and the Butler, Grullon, and Weston studies. Since we use issues by individual companies, we are able to observe the number, dollar amounts, and characteristics of debt issues on a monthly basis. We identify the maturities of each issue and use other features of the individualized data such as callability, puttability, and whether the issues use floating rates. Our data cover the period 1970-2001, a period encompassing 376 months of bond issuance data and interest rates. The nature of the data is such that we can explore aspects of the debt timing issues in greater detail and with more powerful tests.

3. Data and Sample Characteristics

We obtain data for new, nonconvertible, public debt issues from January 1970 to April 2001 from Thompson Financial's SDC New Issues database (SDC). There are 85,724 debt issues during this period. We obtain data on the issue date, the identity and characteristics of the borrower (such as industry and nationality), and various characteristics of the bond issue, such as proceeds in nominal dollars, maturity, yield to maturity (YTM) at issuance, credit rating, whether the issue is floating or fixed rate, and whether it is callable or puttable. We adjust the nominal proceeds with the monthly consumer price index (CPI) to obtain proceeds in constant dollars measured as of January 1, 2001. We exclude issues by non-US firms, issues outside of the U.S., issues by firms in SIC codes 6000-6999 (financial companies), issues by non-profit organizations (such as churches or universities), and issues that are components of derivative instruments. Those screens reduce the number of issues with available issuance data to 14,623.

The debt issues we examine are bonds issued in the public debt market. They are not commercial paper issues or other such short term securities. If companies expect interest rates or spreads to fall, they may prefer to issue shorter-term bank debt instead of public bonds. If they expect rates or spreads to rise, they may be more likely to "lock in" the current lower rates or spreads by issuing bonds. Therefore, a sample of publicly-issued bonds should be especially useful for examining whether the issuance decision by corporate managers reflects an ability to time the debt markets. Baker, Greenwood, and Wurgler (2003) suggest that larger firms are more apt to be successful in timing interest rates. The issuers in our sample also tend to be among the larger firms in the COMPUSTAT database, so, again, they are especially useful for examining a forward-looking timing hypothesis.

In addition to data on new issues, we obtain interest rate, inflation and interest rate spread data. We obtain time series of the monthly yields on Treasury and corporate bonds with various maturities and on inflation rates (measured from the Consumer Price Index) from the Federal Reserve Bank of Saint Louis' FRED database. The interest rates we observe include the 90-day Treasury Bill rate (sometimes denoted herein as TB90), the 10-year constant maturity Treasury rate (sometimes denoted herein as G10), and the Baa corporate rate. We measure the term spread as the difference between the ten-year constant maturity Treasury rate and the 90-day Treasury Bill rate, and we measure the risk spread as the difference between the Baa rate and the 10-year constant maturity Treasury rate. We use monthly returns data for long-term corporate and government bonds and for short-term Treasuries from Ibbotson Associates to compute bond excess returns.

We also obtain COMPUSTAT data for the issuers. We obtain firm COMPUSTAT data for 9,614 of the 14,623 issuances, or approximately two-thirds of our issuance sample. We also collect data that characterize (in the aggregate) the stock market, such as the price-earnings ratio and price-book value ratio of the S&P 500 index (from CRSP and COMPUSTAT).

Finally, for our macro-level analysis, we obtain data from the Flow of Funds table L 102 (for outstanding debt levels, following Baker, Greenwood and Wurgler), and from table F 102 (for net debt issuance), during the period 1952- 2003. We also obtain annual bond returns from Ibbotson Associates for long-term government and corporate bonds and for short-term treasuries in order to calculate annual excess bond returns.

We examine two measures of issuance activity: (1) the total dollars of debt issued within a period, in constant January 2001 dollars; and (2) the number of issues within a period. Virtually all results obtained with dollar amounts issued are qualitatively identical to those

obtained with the number of issues; therefore we report the former results only.⁷ The Appendix presents the issuance activity by year. The total amount issued in our sample was \$2.60 trillion. The largest amount issued in a single year was \$182 billion in 1993, occurring with the second largest number of issues (1,049). 1993 had the lowest median level of short-term rates (measured by 90-day Treasury bills) and the fourth-lowest median level of long-term rates (measured by ten-year constant maturity Treasuries) across the 32 years of our sample. The smallest amount raised (\$28 billion) and fifth smallest number of issues (221), excluding the partial year of 2001, occurred in 1983 when median short-term rates and long-term rates were at their sixth and fifth highest levels, respectively, across the sample. The Appendix also shows maturity and other characteristics of issues on an annual basis and provides annual averages of 90-day and 10-year U. S. Treasury yields.

As the Appendix shows, there is a noticeable trend across the sample toward shorter maturities. For the period 1970-1983, it was very common for the median maturity of issues to exceed 20 years. After 1983, there was no year in which the median maturity exceeded 12 years. After 1986, the median maturity was about ten years during every year except 1999 and 2000, when it fell sharply. The Appendix also shows that the percent of callable issues tracks interest rates very closely, peaking at 88.5% in 1981, the year with the highest average yield on 10-year Government bonds of 13.9% and the highest average yield to maturity on new issues of 15.8%. As mentioned earlier, this corresponds with the time of structural change identified by Butler, Grullon, and Weston (2004).

Figure 1 provides an overview of interest rates and quantities of debt issued on a monthly basis during our sample period. The peak period of interest rates was in the early 1980s at the same time that inflation in the U. S. was very high, as discussed by Butler, Grullon, and Weston

⁷ The results based on number of issues are available from the authors.

(2004). In broad terms, interest rates trended upward until late 1981 and early 1982, with the ten-year constant maturity Treasuries peaking at 15.32% in September 1981 and Baa issues peaking at 17.18% in February 1982. The term spread for ten-year Treasuries versus 90-day Treasury Bills reached a maximum of 4.42% in September 1982. Debt issuances increased dramatically after several years of interest rate declines following the early 1980s. In the early 1990s, rates again began declining, and the declines generally were followed by increases in debt issued. The graphical results indicate a general tendency for debt issuances to follow rate declines.

Table 1 provides an overview of the average issue characteristics of our sample. We refer to the minimum of the ordinary maturity date or time to earliest call or put date as the effective maturity. There is an appreciable difference in maturity when measured by simple maturity terms versus effective maturity. The average maturity of debt issues in our sample was about fifteen years, but the average effective maturity was less than nine years. Median maturity was ten years versus less than six years for the median effective maturity. Accordingly, the choice of whether to use maturity or effective maturity makes an appreciable difference for much of the analysis of our sample.

In our overall sample, more than 41% of the issues were callable. About 8% of the issues included put provisions and a similar amount were issued with floating rates. The relatively large number of issues with call features and the sizable difference between maturity and effective maturity overall are important in tests of debt timing versus maturity. As the Appendix shows, the largest percentage of calls in our sample occurred during the 1978-1983 period, a period of very high interest rates, when more than 80% of new issues were callable, and the lowest was 1997, with only 6% callable.

Table 2 provides correlations between various issue characteristics and interest rate measures based on monthly data. We observe that the number of issues and total amount issued are negatively correlated with all of our interest rate measures but are positively correlated with rate spreads, whether measured by ten-year government bond yields versus 90-day Treasury bill rates (“term spreads”) or by Baa bond yields versus ten-year government bond yields (“risk spreads”). It is interesting to note that maturity is negatively correlated with spreads but not correlated with corporate (Baa) bond yields, while effective maturity is uncorrelated with the term spread but highly negatively correlated with absolute interest rates. Call features are highly positively correlated with absolute levels of interest rates (.61, .68 and .69 with T90, Baa, and G10, respectively), but not with rate spreads. Conversely, put provisions correspond to times of low rates. We see a tendency for debt issuance activity to be higher in times of low rates. We also see a clearly pronounced tendency for firms to augment their stated maturity with high use of call provisions in times of high rates. In a number of months in the late 1970s and early 1980s, 100% of the issued debt was callable.

In addition to the monthly, firm-level issuance data, we also employ Flow of Funds data to examine the relation between net issuance of debt and future bond returns in a manner similar to Baker, Greenwood, and Wurgler. First, we replicate their analysis, and then we apply their methodology to net issues of debt. This analysis is presented in section IV.B.

4. Forward-looking Debt Timing

Graham and Harvey (2001) report that “executives attempt to time interest rates by issuing debt when they feel that market interest rates are particularly low.” Such an attempt could mean that executives issue when current rates are lower than previous rates, or it could mean that

executives attempt to issue debt when they believe that interest rates will rise. The latter interpretation suggests that the executives believe they possess information not reflected in market prices of debt. In this section, we examine whether or not managers are successful in this forward-looking sense. We examine whether interest rates rise on average following debt issuances. If interest rate timing is successful, we should observe that large levels of long-term issuances are followed by an increase of interest rates or by negative excess bond returns. To account for the regime shift identified by Butler, Grullon and Weston (2004), we also examine results separating the data into 1970-1981 and 1982-2001 subperiods. We test for these results below.

4.1 Forward-looking Debt Timing and Subsequent Interest Rates

To test the success of managers' interest rate timing decisions, we examine interest rates subsequent to debt issues. Table 3 shows results for Baa bond rates and for constant-maturity, ten-year government bonds (G10). In our sample, across the full 1970-2001 time period the average interest rate was falling (for example, it fell on average by 1.4 basis points in the case of the six-month rate differences for Baa bonds). The results we show in Table 3 for yield changes across time ("differential yield changes") are based on observed changes weighted by various variables less the unweighted differences across the full sample. We use the unweighted changes as benchmarks indicating average changes in yields during the sample period.

We examine the ability of managers to time by subtracting unweighted changes in yields (unconditional means) from mean changes in yields conditioned on issuance characteristics. The results are based on future yields 6, 12, 18, 24 and 36 months in the future after debt issuance. In the first row of results in Panel A of Table 3, we weight the conditional means by maturity.

Consistent with conclusions in Baker, Greenwood, and Wurgler, the results for several periods of forward interest rate changes are related significantly to maturity. The results demonstrate that, on average, when maturity is high (low), future interest rates tend to rise (fall).⁸

However, if higher maturity debt is issued but only in small quantities before interest rates rise, the maturity does not provide convincing evidence of timing ability. In other words, if managers issue very little debt before interest rates rise but much debt before interest rates fall, their choices would seem inconsistent with timing ability. Thus, the second set of results in Panel A examines proceeds-weighted changes in yields. The results demonstrate that future interest rates (yields) are not higher when larger quantities of debt are issued. Thus, managers do not seem to be taking advantage of higher future yields by issuing more debt before the interest rates rise.

The third set of results in Panel A combines proceeds and maturity for weighting future yields. There, the results are again consistent with predictability of future government bond rates but not with corporate bond rates. Since corporate bond rates are the more important determinant of cost of debt for corporate debt issuers, on balance the results do not support the ability to time future interest rates, or yields. In addition, when issues are weighted by effective maturity, the evidence does not support the hypothesis that managers successfully time the debt market.

Panel B of Table 3 reports results for future excess bond returns, the variable predominately used in the Baker, Greenwood and Wurgler (2003) results. If debt is issued and then future excess bond returns are negative, then the issuer has benefited by issuing before a decline in bond values. The initial results based on maturity alone are consistent with timing ability. However, when issues are weighted by proceeds, the results are entirely inconsistent

⁸ Baker, Greenwood and Wurgler focus on future excess bond returns rather than interest rates. Panel B of Table 3 deals with excess bond returns.

with timing ability. Further, when issues are weighted by maturity and proceeds, the results fail to support timing ability. The differential excess returns are on average very small and are not statistically significant. Further, when issues are weighted by effective maturity, they again provide no evidence of timing ability.⁹

Butler, Grullon and Weston (2004) provide evidence of a regime shift in monetary policies and related interest rates or excess returns during the period 1981-1982. The regime shift is key to their finding that Baker, Greenwood and Wurgler's (2003) evidence is not supportive of timing ability but rather is an example of pseudo-timing. Accordingly, in Table 4 we examine the two subperiods of 1970-1981 and 1982-2001 for evidence of timing. The results we present are entirely based on maturity weighting. Although we do not present the results on proceeds weighting, maturity and proceeds weighting, or effective maturity weighting, those results also do not support timing ability.

In Panel A of Table 4, we show the subperiod results for differential interest rate yields. Both the 1970-1981 results and the 1982-2001 results strongly demonstrate a lack of interest rate timing ability. Similarly, in Panel B we examine future excess bond returns based on maturity weighting. Again, the results are completely unresponsive to timing ability.

4.2 Forward-looking Debt Timing and Net Debt Issues

In Table 4 of their paper, Baker, Greenwood and Wurgler (2003) present evidence about the ability of the maturity of bond issues to predict future excess bond returns based on Flow of Funds data over 1954-2000. They find highly significant t-scores in relating their measures of

⁹ In untabulated analysis, we examined the relation between issuance characteristics such as amount issued, maturity, and effective maturity, and the subsequent spread between the yield on 10-year corporate or government bonds and T-bills. In no case do we find successful timing of future yield spreads.

maturity to future long term government bond rates minus future short term government bond rates and future long term corporate bond rates versus commercial paper rates.

Baker, Greenwood and Wurgler use Federal Reserve Flow of Funds data to calculate debt issuances. They define debt issuances in the following way. Short-term debt issuance is equal to the outstanding level of short-term debt, consisting of commercial paper, bank loans, and other loans and advances. Long-term debt issuance is defined as the difference in the annual levels of outstanding levels of long-term debt (consisting of the sum of outstanding industrial bonds, corporate bonds, and mortgages), plus ten percent of the long-term debt outstanding in the prior year. Baker, Greenwood and Wurgler obtain the needed *levels* of debt outstanding from Flow of Funds Table L 102.

Both the short-term issuance and long-term issuance definitions contain implicit assumptions. The definition of short-term debt issuance assumes that all of the outstanding short-term debt is due and will be replaced with new debt, which may or may not be true. For example, many bank loans are term loans with maturities up to 5 years. Many revolving lines of credit do not require annual repayment of outstanding debt prior to their maturity, typically 3 years. Furthermore, even if these assumptions are true, the definition of issuance is one of *gross* issuance, not net issuance.

Similarly, in their calculation of long-term issuance Baker, Greenwood and Wurgler assume that 1/10 of the previously outstanding debt will be due and will be renewed. This assumption is not necessarily correct. For example, firms may choose not to renew the maturing debt with new long-term debt, or instead finance it with internal or external equity, or with short-term debt, e.g., a bank loan. Even if the assumption is correct, it still implies *gross* issuance of debt.

However, it is actually the *net* issuance of debt that alters the existing maturity structure. The authors seem to recognize that it is the effect of issuance on existing maturity that matters. For example, in their description of their Table 4, they say:

“We measure changes in the maturity structure as new issues of long-term debt ($dL/Dt-1$) controlling for new issues of short-term debt ($dS/Dt-1$) and as the long-term share of total new issues ($dL/[dL+dS]$).”

Gross issuance by itself may have no effect on existing maturity structure, for example, if all new funds refinance outstanding debt with the same maturity. It is net issuance that results in changes in maturity structure. The following example illustrates the point. Suppose a firm had outstanding short-term debt of \$350 million and long term debt of \$650 million in year t . Suppose that in year $t+1$ the firm also had short-term debt of \$350 million and long term debt of \$650, i.e., the net issuance of short- or long-term debt was 0. However, following the calculations of Baker, Greenwood and Wurgler, the short term issuance would be \$350 million, and long-term issuance would be \$65 million, while the share of long-term debt in new issuance would be $65 / (65 + 350) = 0.16$. The remaining part of the “issuance,” 84%, is the share of short-term debt. Thus, the Baker, Greenwood, and Wurgler assumptions significantly overstate all issuance, especially the issuance of short-term debt.¹⁰

Unlike the data in Table L 102 of the Flow of Funds data, which reports debt levels and requires assumptions to be made for debt issuance, the Flow of Funds Table F 102 directly reports data for net issuance of debt. Both the issuance of short term debt and the issuance of long term debt are defined as the annual change in the outstanding levels of those two classes of

¹⁰ If the proportions of long-term debt and short-term debt have been constant over time, the resulting overestimation of the change in maturity will affect equally all observations. However, this has not been the case – the ratio of short term debt outstanding to long-term debt is highly correlated with interest rate levels. Therefore, the Baker, Greenwood, and Wurgler measure of issuance will overstate the issuance of short-term debt in periods with high ratios of short-term debt to long-term debt as compared to periods of lower relative short-term debt use, i.e., periods with lower ratios of short-term debt to long-term debt.

debt. We use these definitions directly to calculate the issuance of net short-term and long-term debt and the share of long-term debt in new issuance.¹¹

We first replicate the results obtained by Baker, Greenwood, and Wurgler using their definition of issuance as applied to Flow of Funds Table L 102. We then show that their results disappear if data from Flow of Funds Table F 102 are used to obtain measures of net debt issuance of debt.

We collect data on debt levels, debt issuance, and bond returns starting in 1952, and we extend the sample to 2003. The data on short- and long-term debt levels is obtained from Flow of Funds Table L 102. Following the methodology of Baker, Greenwood, and Wurgler, we calculate the short-term (DSt), long-term (DLt) debt levels as follows. We calculate short-term debt is the sum of commercial paper, bank loans, and other loans and advances. We calculate long-term debt is defined as the sum of outstanding industrial bonds, corporate bonds, and mortgages. Total credit market debt (Dt) is the sum of short-term and long-term debt.

Short-term debt issuance is equal to the outstanding level of short-term debt ($dSt = DSt$). Long-term debt issuance (dLt) is calculated as the difference in the annual levels of outstanding levels of long-term debt, plus ten percent of the long-term debt outstanding in the prior year ($dLt = DLt - DLt-1 + 0.1*DLt-1$). The long-term share in new debt issuance is the ratio of short-term issuance to total issuance.

The data on net debt issuance is obtained from Table F 102 of the Flow of Funds. Net short-debt issuance is the sum of the net issuance of commercial paper, bank loans, and other loans and advances. Net long-term debt issuance is calculated as the new issuance of

¹¹ Note that Butler, Grullon and Weston also recognize that the measure employed by Baker, Greenwood, and Wurgler does not appropriately represent the changes in maturity. They show using a measure of the percentage change in short-term debt relative to the prior year and the percentage change in long-term debt relative to the prior year, and the difference between the two growth rates, that the Baker, Greenwood, and Wurgler results disappear.

(municipal) industrial bonds, corporate bonds, and mortgages. We also calculate the long-term share in net new debt issuance as the ratio of net short-term issuance to total net issuance.

Data used to calculate excess bond returns is obtained from Ibbotson Associates. The excess return in a given year t is the difference between the return on long-term government bonds (rGL_t) corporate bonds (rCL_t) less than the contemporaneous returns on T-bills ($rGSt$). We calculate the future excess returns one, two, and three years ahead of issuance, as well as the three year cumulative return (denoted with R). Like Baker, Greenwood, and Wurgler, we use the returns on long-term government and corporate bonds with 20-year maturities. However, unlike Baker, Greenwood, and Wurgler, we use the return on Treasury bills to calculate the excess returns on both long-term government and long-term corporate bonds. In any case, the differences in methodology are minimal as we are able to replicate Baker, Greenwood, and Wurgler's Table 4 regression results very closely.

In our Table 5, we approximately replicate Baker, Greenwood and Wurgler's results based on Flow of Funds data for 1953-2002. The dependent variables are future excess government (in Panel A) and corporate (in Panel B) bond returns. The results with the column headings of "BGW" refer to results calculated as in Baker, Greenwood and Wurgler's Table 4. We standardize the independent variables to have unit variance. We correct the standard errors for heteroscedasticity and time-series dependence up to three lags using the Newey-West method. Even though we use Treasury bills instead of commercial paper returns and a slightly different sample period, the results are close to those in Baker, Greenwood, and Wurgler's Table 4. Our Table 5 indicates that short-term debt issuance is positively associated with future excess bond returns, and that the long-term share in debt issuance is negatively associated with future

excess returns. Those results generally show statistically significant relations between the maturity measures and future excess returns.

After approximately replicating the Baker, Greenwood and Wurgler results, we then examine the relation between maturity choice and future excess bond returns for net debt issues. In Table 5, we report results based on net issuance data in the columns immediately to the right of the “BGW” columns. In nearly all cases reported, the results are no longer significant, and they demonstrate that when considering properly net debt issued by corporations, they do not demonstrate timing ability.

Butler, Grullon, and Weston use aggregate *Funds Flow* data like that used by Baker, Greenwood, and Wurgler (2003), but they adjust for a regime shift in monetary policy that was associated with large increases in short term debt around 1981 followed by a rapid decline in inflation and nominal interest rates following the recession of 1982. They conclude that companies did not demonstrate forward-looking debt timing ability once the regime shift was accounted for. They liken the results of Baker, Greenwood, and Wurgler to the “pseudo-timing” described by Schultz (2003). Our results in Table 5 are consistent with the findings in Butler, Grullon, and Weston (2004). However, we show that even if a regime shift is not imposed, timing evidence is eliminated by the use of net issues.

Finally, in untabulated analysis, we replicated our result from Table 3 using firm-level net issues only. We calculated the net issuance of debt for each firm in each fiscal year as the difference between the amount of debt issued (Compustat item 111) and the amount of debt retired (item 114). Then, we retained only those issuers for which the net debt increased by at least the amount of the public debt issued, indicating that the issue was incremental to existing

debt. Unlike Baker, Greenwood, and Wurgler's results, our conclusions from Table 3 are robust to the examination of net issues only.

The fact that in our analyses debt issuers did not demonstrate the ability to time future interest rates or rate spreads means that the debt timing decisions likely did not reduce the cost of capital for the issuers. However, the survey results of Graham and Harvey (2001) suggest that businesses are interested in issuing debt at times when rates are favorable relative to past rates. We examine that issue in the next section.

5. Backward-looking Debt Timing

Graham and Harvey (2001) find that managers are interested in the current levels of interest rates relative to historical rates. They describe the finding as follows: "We inquire whether executives attempt to time interest rates by issuing debt when they feel that market interest rates are particularly low. The rating of 2.22 in Table 6 provides moderately strong evidence that firms try to time the market in this sense." We refer to this type of timing as "backward-looking" timing of interest rates in the sense that it suggests that managers seek to issue when interest rates are low relative to historical levels.¹²

"Backward-looking" timing can be motivated by a number of considerations. One explanation is that if the cost of debt has been relatively high for some time, companies may have postponed investments while waiting for the cost of funds to decline. For example, managers may believe that some projects have positive net present values (NPVs) at lower costs of funds but negative NPVs at higher costs. As rates decline, there may be more favorable

¹² John Graham explained in private communication on this topic that although CFOs in the Graham and Harvey (2001) survey were not explicit about what "particularly low" meant to them, it was his interpretation, based in part on his conversations with the executives who responded to their survey, that they were referring to current interest rates compared to their historical levels.

investment opportunities. In addition, some managers may believe that interest rates are mean reverting. If so, then as rates achieve low levels relative to historical levels, they may expect future rates to rise. In this sense, they look backward to forecast forward. Some firms may find that the risk associated with bond issues is higher than they desire when rates are relatively high, so they postpone issuance until a time when rates are lower. Such debt characteristics as interest coverage ratios may be more attractive and associated with higher debt ratings when the cost of debt is lower.¹³ Alternatively, Kahneman and Tversky (1984) suggest that mental framing can influence decisions. If the determination of whether rates are “low” is framed against historical rates, a given level of rates could be evaluated as either low or high depending on the recent rate history. Thus, there may be a variety of reasons to consider current rates relative to historical rates in making debt issuance decisions.

We examine backward-looking timing associated with current interest rates versus historical rates using absolute levels and relative levels of interest rates. We expect that relative levels of interest rates will be important in the issuance decision. For instance, are companies likely to issue new debt when their required yield would be 10%? We expect that both their decision to issue debt and the characteristics of the debt would be different if interest rates had been in the 12-15% range in recent years than if they had been in the 5-8% range in recent years.

5.1. Debt Issues and Historical Interest Rate Deciles

We construct measures of relative interest rates by identifying the decile ranking of current interest rates against rates over the previous 10 years. We refer to the deciles by the lowest percentile of rates within their decile. For instance, decile 0 includes rates from the lowest

¹³ As Table 2 shows, the fraction of investment grade bond issues is significantly negatively correlated with interest rate levels.

rate in the ten years prior to the issue to rates just below the 10th percentile of the prior ten years. Decile 10 refers to rates from the 10th percentile to just below the 20th percentile, and so on.

Table 6 shows the effects of relative interest rates on debt issues and their characteristics. Results are presented for interest rate deciles based on the yields of 10-year Treasuries and Baa corporate bonds. Table 6 shows average issue amounts for months when the rates at the time of issue were in various deciles. For example, the results for Baa decile zero under amount issued and number of issues show the mean monthly amount of debt issued and the mean number of issues in months in which the Baa rate was among the lowest 10% of all months in the prior ten years.

Consistent with “backward-looking” timing of debt issues, in each Panel of Table 6 we observe that the largest amount of debt and the largest number of issues occurred in months in which rates were in the lowest decile. Moreover, while the values are not monotonically decreasing in rate deciles, there is a strong tendency for the amount of debt issued to decrease as rate deciles rise.¹⁴ The amounts issued in months with lowest-decile rates are more than twice the amounts for highest-decile rates, regardless of the choice of base rates used in the analysis (i.e., whether the rate is a Treasury rate or a Baa rate). Consistent with that result, the average number of issues in months with lowest-decile rates is consistently more than 2.5 times the number of issues in months with highest-decile rates. We found similar results (not reported here) based on the Aaa and prime rates of interest.¹⁵

The results on maturity in Table 6 are especially interesting. We can see the effects most easily by focusing on the median figures rather than the averages. Median maturity is usually 10

¹⁴ At the bottom of each column of results, we show p-values from the t-test for equality of the means between the first and the tenth decile, t-test between the lowest three deciles (L) and the highest three deciles (H), and the Kruskal-Wallis test for equality across all deciles.

¹⁵ We also validated these results using as an alternative measure the aggregate amount issued across the whole sample within a decile, and the total number of issues across the whole sample within a decile.

years for all of the interest rate deciles from 0 through 50 (with an exception at 50 for the Aaa rate, where the median maturity is 5 years), and the median maturity for the three highest rate deciles is invariably much higher. We would expect this longer maturity to be offset by call features. Table 6 shows that the fraction of callable issues is generally much higher when debt is issued at higher interest rate deciles. Also, although we do not report the details here, we observe that maturity is highly correlated with callability.

There is also a higher tendency to offer put features when rates are in low interest rate deciles. While put features are not very common even in the low rate deciles, they are more common under low relative rates than under high relative rates.

Given the call and put features of debt, maturity choices should again be examined in light of the earliest dates at which bonds can be called or put (i.e., the effective maturity). The results in Table 6 show that when interest rates are in their lowest deciles, the effective maturity tends to be at or near its highest value. However, at the highest rate deciles, there is also a tendency for relatively high times to earliest call or put date. In effect, the use of call and put features tends to smooth out the effects of interest rates on effective maturity. Compared to maturity values, effective maturity values are relatively similar across all rate deciles. The smallest and largest median values for Baa maturity are 9.9 years and 24.6 years, respectively, a difference of almost 150%. The minimum and maximum values of median time to earliest call or put date are 6.46 years and 9.59 years, respectively, a difference of about 50%.

In light of the call, put and floating rate features of many of the bonds in our sample, we also examined the issue quantities, number of issues and maturities that are reported in Table 6 after eliminating debt issues with those features. The results, not reported here, are generally similar to those reported in Table 6 in the sense that proceeds and number of issues tend to be

greatest when interest rates are in low deciles, but maturity tends to be highest when rates are in relatively high deciles.

5.2 Backward-looking Debt Timing Under High and Low Relative Interest Rates

A given interest rate could be high or low relative to historical rates. For example, each of the G10 rates from 5% to 9% were observed in periods when they were low rates and periods when they were high rates relative to the prior ten years of history. A manager confronted with a 10% required yield on a bond issue might react to that rate very differently if the rate was among the lowest rates observed in a number of years as opposed to being among the highest rates in recent memory.

Therefore, to further contrast the effects of interest rate levels against their relative levels in historical terms, in Table 7 we break the rates into three categories of relative interest rates. We compare debt issuance under high and low relative interest rates, while holding constant the level of the rate contemporaneous to the issuance. The “low” relative rate category indicates that a given rate ranks among the lowest 30% of rates for the prior ten years, and a “high” rate is one that ranks among the highest 30% of rates in the prior ten years. The remaining rates are “medium” relative rates.¹⁶

Consider the 5% absolute rate for 10-year Treasuries (G10) reported in Table 7, for example. When 5% has been a low rate historically, there has been a larger total monthly amount of debt issued (\$12.9 billion) than when 5% has been a high rate (\$5.4 billion). The 6%, 7%, 8%, and 9% rates show similar patterns. Similar results also hold for the figures based on Baa rates when the absolute rates range from 8% to 10%. These results are consistent with timing based on

¹⁶ Our results are qualitatively similar if we use deciles for the historical distribution of the rates, as opposed to the low, medium and high categories.

relative rates, and they are consistent with the framing argument from Kahneman and Tversky (1984).

Table 7 provides tests of whether the differences we observe for given rates are significant. We compare “low” vs. “high” and also the distribution of issuance across all three categories. In general, when a given interest rate is relatively low (versus relatively high), larger amounts of debt are issued and larger numbers of issues are made. Thus, we again find strong evidence of “backward-looking” timing of debt issues.

In light of the call, put and floating rate features of many of the debt issues, we recalculated the results in Table 7 for the subsample of debt issues without those features. The results, not reported here, are similar to those reported for the full sample.

5.3. Issuance Activity across Relative Interest Rates and Market-wide Growth Measures

One possible concern regarding the apparent relation between issuance and relative interest rates is that periods of low relative rates may coincide with the ends of periods of economic recession or slow economic growth, with expectations of higher growth to follow. In other words, the apparent effect of relative rates may not be due to the rates themselves but rather to firms issuing more debt when their anticipated growth opportunities are high. To account for the possibility of such effects, in Table 8 we examine the distribution of issuance across relative interest rates and two measures characterizing market-wide growth expectations: the price-earnings (P/E) ratio and the market price-to-book value ratio (M/B) of the S&P 500 index.

Specifically, we group issuance across quartiles of the S&P P/E or price-book value ratios, and across the three categories, low, medium, and high, of the relative interest rate for the 10-year treasury constant maturity rate (G10) and the Moody's Seasoned Baa Corporate Bond

Yields (Baa). As expected, in Table 8 we observe significantly higher issuance when the P/E or the M/B ratios are high, holding constant the relative interest rates. This result suggests that companies issue large amounts of debt at such times despite the positive environment for equity issuance.

We observe that the highest levels of debt issuance occur when growth proxies are high *and* interest rates are historically low. The lowest levels of debt issuance occur when rates are high *and* expected growth is low. Holding constant the level of the expected growth, we observe within each quartile of P/E and M/B larger monthly amounts raised when rates are low relative to when rates are high.¹⁷ Therefore, we conclude that our findings regarding the effect of relative interest rates on debt issuance remain even after accounting for the effect of expected overall economic growth.

5.4 Multivariate Analysis of the Issuance Activity

In Table 9, we provide results of three multivariate regression models for the effects of various variables on the amount of debt issuances.¹⁸ We provide results based on interest rates measured by the 10-year Treasury rate as well as by Baa corporate rates.

We observe that both the absolute level of interest rates and the relative level of those rates have significant effects on the number of issues of debt and the amount of debt raised. Specifically, both measures of issuance activity are negatively related to the historical decile in which the current rate falls.¹⁹ The relative rate affects issuance in an economically meaningful

¹⁷ Similar results (not reported here) are found in terms of higher number of debt issues during times when rates are relatively low.

¹⁸ Similar results are obtained using the number of issues.

¹⁹ We obtain similar results if we use a dummy variable indicating whether the rate is relatively “low”, i.e., falls into the lowest three deciles, or “high”, i.e., in the top three deciles, or a dummy variable indicating whether the rate was lower or higher than the median rate over the preceding 120 months.

way; for example, the first column of Panel A indicates that if the decile rank of the relative rate increased by one, issuance would decrease by \$405 million in a month. For comparison, if the rate itself increases by one percent, the amount issued in a month decreases by \$196 million.

In addition, the credit spread (measured by the difference between the Baa rate and the 10-year constant maturity treasuries) has significant effects on debt issues. The term spread (measured as the 10-year Treasury rate minus the rate on 90-day Treasury bills), however, does not have such effects. Across all models and specifications, the term spread is insignificant at the 1% level, and is generally insignificant at the 5% level. However, the S&P 500 P/E ratio and the market-to-book ratio have a strong positive effect on issuance in all models.

5.5. Debt Timing and Firm Characteristics

The previous subsections provide evidence suggesting that managers appear to be more likely to issue debt when rates are low relative to historical levels. We also investigate whether firms differ in their observed ability to implement a backward-looking timing strategy. We examine cross-sectional variation in apparent timing by focusing on firm characteristics likely to influence firm debt issuances. We hypothesize that firms with higher financial flexibility, lower needs for external funds to finance growth, and those with better access to public debt markets, will be more likely to devise and implement a timing strategy. For example, Graham and Harvey (2001) document that managers of larger firms who are perhaps financially more “sophisticated” report greater likelihood to time their debt issues.

We examine variation in the timing of issuance across the following firm characteristics: total assets; firm market-to-book ratio; capital expenditures to total assets; EBITDA to assets; free cash flow to total assets; quick ratio; and leverage (total debt to total assets). We find that

firms with higher profitability, higher free cash flows, but lower capital expenditures, appear to be more able to time debt issues. We also find more evidence of timing among larger and more levered firms – presumably those with easier access to the market.²⁰

5.6. Debt Refinancing, Incremental Issues, and Historical Interest Rate Levels

The timing of debt issuance relative to historical rates is probably strongly influenced by the desire to refinance expensive debt.²¹ Accordingly, in this section we examine the robustness of our backward-looking decile-based interest rate timing results with respect to the use of the proceeds.²² If firms issue new debt to retire existing debt that was previously issued at a higher rate, that decision could be driven entirely by the difference between past rates and current rates, without reflecting managers' expectations about future rates.²³ Therefore, we divide our sample into subsets of firms that were net issuers of debt vs. firms that apparently used the proceeds to refinance existing debt.

We calculate the net issuance of debt for each firm in each fiscal year as the difference between the amount of debt issued (Compustat item 111) and the amount of debt retired (item 114). Then, we divide firms into a net issuers subsample if the difference is positive and a refinancing subsample if the difference is zero or negative (i.e., if more debt was retired than issued). The results are presented in Panel A of Table 10. We observe significant effects of

²⁰ These results are not presented in a table and are available from the authors.

²¹ Forward-looking timing may also be affected by refinancing transactions. For example, Richardson and Sloan (2003) examine the timing of corporate financing decisions relative to subsequent stock returns. Among other findings, they observe that their results are affected by whether a transaction is a refinancing transaction versus a change in net external financing.

²² Panel B in Tables 3-5 present results for the non-refinancing (net issues only) sample examined in tests of forward-looking timing.

²³ An alternative view on refinancings could be that they reflect timing in a similar way as net new issuances. Given the substantial fixed costs associated with issuing public debt, managers cannot refinance continuously, and the current rate being lower than the cost of previously issued debt is not a sufficient condition for refinancing to occur. Because of the discreteness and infrequency of the option to refinance, that decision must reflect past rates, the current rate, but also the managers' expectations of future rates. Furthermore, refinancings are generally not confounded by issues such as expected growth or financial deficits.

relative interest rates in both the refinancing subsample (shown on first data column) and the net issuers subsample (shown on the last data column), although the refinancing subsample appears to exhibit a greater tendency to time in terms of current interest rates relative to historical levels.

We further split the net issuers into firms that used some of the proceeds for refinancing (i.e., the net amount issued is smaller than the annual proceeds from public debt issued), and firms whose net debt increased by more than the amount of the public debt issued, indicating that those firms borrowed from other sources in addition to public debt. These results are shown in the middle column of Table 10. Once again, while it appears that there is more timing by the firms using at least part of the proceeds for refinancing, there is significant timing by the firms that used all of their proceeds as new financing. Therefore, consistent with the survey evidence discussed earlier, our findings show that managers carry out backward-looking timing of the debt markets whether or not refinancing is a part of their debt issuance decision.

We also consider the effect of contemporaneous stock issuance on the decision to issue debt. We calculate the net issuance of common and preferred stock for each firm in each fiscal year as the difference between the amount of stock issued (Compustat item 108) and the amount of stock repurchased (item 115). We further break our sample into firms with positive net stock issues and negative net stock issues.²⁴ Panel B of Table 10 presents this analysis. Our results with respect to historically-based debt timing remain robust across the stock issuance categories. In all cases, the evidence supports the hypothesis that managers carry out backward-looking timing of the debt markets.

²⁴ We do not subtract interest expense in the calculation of net debt, and we do not subtract dividends in the calculation of net stock issued. Our approach is similar to the approach of Richardson and Sloan (2003) who argue that the dividends are part of the finance charge to equity.

6. Conclusion

We examine empirically whether corporate managers attempt to time the issuance of external debt with respect to interest rates, controlling for other factors that affect the issue decision. We ask whether interest rates or spreads tend to rise after companies issue debt or whether the excess returns of bonds tend to decline after debt issuance. We also ask whether debt issuance is affected by the current level of interest rates at the time of issuance relative to historical rates. We refer to these two types of timing as “forward-looking” timing and “backward-looking” timing. Overall, we find that managers are not successful in issuing debt and locking in interest rates in anticipation of increased future interest rates or reduced excess bond returns. These results contradict the idea that corporate managers possess informational advantages about future interest rates that allow them to succeed in forward-looking timing of the debt markets. However, we find that debt issuance activity is very much affected by the level of interest rates relative to historical rates.

We test whether managers successfully timed interest rates in the sense of issuing debt when, had they waited, rates or term spreads would have been higher. We find managers were not successful at this type of forward-looking timing when weighting issuances by proceeds, but we find some evidence of timing ability when weighting by maturity. When weighted by both maturity and proceeds, evidence of successful timing is very weak or nonexistent. When the call and put features of debt are taken into account and effective maturities are used in place of maximum maturities for weighting interest rates, spreads, or excess returns, there is no evidence of successful forward-looking timing ability.

Our results on forward-looking debt timing are in contrast with the results in Baker, Greenwood, and Wurgler (2003) who report evidence of forward-looking debt timing ability. Their results are based on aggregate yearly *Flow of Funds* data. Butler, Grullon, and Weston (2004) also use aggregate data but explain that the reported forward-looking timing is really “pseudo-market timing” that no longer exists once a structural shift is accounted for. Baker, Taliaferro, and Wurgler (2004) take issue with those findings, suggesting that the bias associated with “pseudo market timing” explains only a small part of the total observation of market timing ability. The detailed data we employ sheds some light on how accounting for some debt characteristics eliminates the apparent forward-looking debt timing reported by Baker, Greenwood, and Wurgler (2003), even without treating any aspect of “pseudo market timing” or regime shifting. When we also consider the “regime shift” in 1981-1982 and break our sample into the two periods 1970-1981 and 1982-2001, there is no evidence of successful forward debt timing at all. Even the maturity-only kind of timing shown in Baker, Greenwood and Wurgler (2003) disappears when we examine the subperiods. Thus, evidence based on the twenty year period of 1982-2001 does not support the ability of corporate managers to time future interest rates or bond excess returns.

Our results on backward-looking timing contrast sharply with the results on forward-looking timing and are highly consistent with the survey results on historical interest rate levels in Graham and Harvey (2001) and Bancel and Mittoo (2004). We document that debt issuance measured by total amount issued and number of issues of new debt is related to the relative level of interest rates in comparison to their historical values over the prior ten years. The survey results are consistent with attempts to timing debt with respect to future interest rates under a scenario in which managers believe that interest rates are mean reverting, but our results on

forward-looking timing show that such attempts, if, indeed, they occur, are generally not successful.

We find strong evidence that the amount of debt issued and the number of debt issues is related both to the absolute level of interest rates and to their relative levels where the relative level is measured as the decile of historical rates in which the current rate would fall. We find that firms issue significantly higher amounts of long-term debt when long-term interest rates are low in absolute terms or in low deciles of the empirical distribution of the historical rates over the previous ten years. We find similar results after controlling for other market conditions affecting issuance.

We observe some tendency for debt to have longer maturities when interest rates are high relative to historical levels, but there is an offsetting tendency for debt to be callable as well under those circumstances. In light of characteristics of debt that may change the effective maturity of the debt, we analyzed our results using effective maturity in which for callable or puttable bonds maturity is replaced by “time to earliest call or put date.” We find that effective maturity tends to be much more evenly distributed across historical rate deciles, with longest effective maturity generally occurring in the lowest rate deciles, although the relation is not monotonic across deciles. We also examined the subsample of issues that did not have call, put or floating rate features. It remained the case that both the number and amount of issues tended to be greatest when rates were in their lowest historical deciles. However, maturity for this subsample also was highest when interest rates were at their highest decile levels.

When interest rates decline, companies tend to refinance past debt that is eligible for refinancing. Therefore, we also consider the effects of refinancing transactions on backward-looking debt timing. Refinancing is indeed much more likely in our sample when interest rates

are at low levels relative to their history. However, focusing on the non-refinancing transactions we still find that debt issuance is significantly greater when relative interest rate levels are low. Thus, refinancing transactions do not cause the results.

Thus, overall our results are consistent with findings in the surveys of financial officers by Graham and Harvey (2001) and Bancel and Mittoo (2004) that financial managers seek to issue debt when rates are “particularly low” if the interpretation of “particularly low” is low relative to previous debt levels. Our results are not consistent with successful debt timing in the forward looking sense. Thus, even if managers attempt to issue longer-term debt when they anticipate that future interest rates or spreads will rise, they appear to be unsuccessful in doing so.

While debt timing attempts do not appear to result in lower debt costs, they do affect financial policy. Managers appear to consider the state of economic conditions, especially the level of interest rates relative to historical levels, when they make the debt issuance decisions and when they choose the characteristics (such as call features) of the debt. Thus, such conditions should probably be considered both in developing the theory and conducting empirical tests of capital structure.

References

- Baker, Malcolm, Robin Greenwood, and Jeffrey Wurgler (2003), "The maturity of debt issues and predictable variation in bond returns," *Journal of Financial Economics*, 70, 261-291.
- Baker, Malcolm, Ryan Taliaferro, and Jeffrey Wurgler (2004), "Pseudo market timing and predictive regressions," Unpublished working paper, Harvard University.
- Bancel, Frank and Usha Mittoo (2004), "Cross-country determinants of capital structure choice: A survey of European firms," *Financial Management*, forthcoming.
- Barclay, Michael and Clifford Smith (1995), "The maturity structure of corporate debt," *Journal of Finance*, 50, 609-632.
- Butler, Alexander W., Gustavo Grullon and James P. Weston (2004), "Can managers successfully time the maturity structure of their debt issues?" Unpublished working paper, Rice University and the University of South Florida.
- Diamond, Douglas W. (1991), "Debt maturity structure and liquidity risk," *Quarterly Journal of Economics*, 33, 341-368.
- Graham, John and Campbell Harvey (2001), "The theory and practice of corporate finance: evidence from the field," *Journal of Financial Economics*, 60, 187-243.
- Guedes, Jose and Tim Opler (1996), "The determinants of maturity of corporate debt issues," *Journal of Finance*, 51, 1809-1833.
- Houston, Joel and Chris James (1996), "Bank information monopolies and the mix of private and public debt claims," *Journal of Finance*, 51, 1863-1889.
- Hovakimian, Armen, Tim Opler and Sheridan Titman (2001), "The debt-equity choice," *Journal of Financial and Quantitative Analysis*, 36, 1-24.
- Jung, Kooyul, Yong-Cheol Kim and René M. Stulz (1996), "Timing, investment opportunities, managerial discretion, and the securities issue decision," *Journal of Financial Economics*, 42, 159-185.
- Marsh, Paul (1982), "The choice between equity and debt: An empirical study," *Journal of Finance*, 37, 121-144.
- Myers, Stewart C. (1977), "Determinants of corporate borrowing," *Journal of Financial Economics*, 5, 147-175.

Myers, Stewart C. and Nicholas S. Majluf (1984), "Corporate financing and investment decisions when firms have information that investors do not have," *Journal of Financial Economics*, 13, 187-221.

Richardson, Scott A. and Richard G. Sloan (2003), "External financing and future stock returns," unpublished working paper, University of Pennsylvania.

Stohs, Mark Hoven, and David C. Mauer (1996), "The determinants of corporate debt maturity structure," *Journal of Business*, 69, 279-312.

Taggart, Robert A., Jr. (1977), "A model of corporate financing decisions," *Journal of Finance*, 32, 1467-1484.

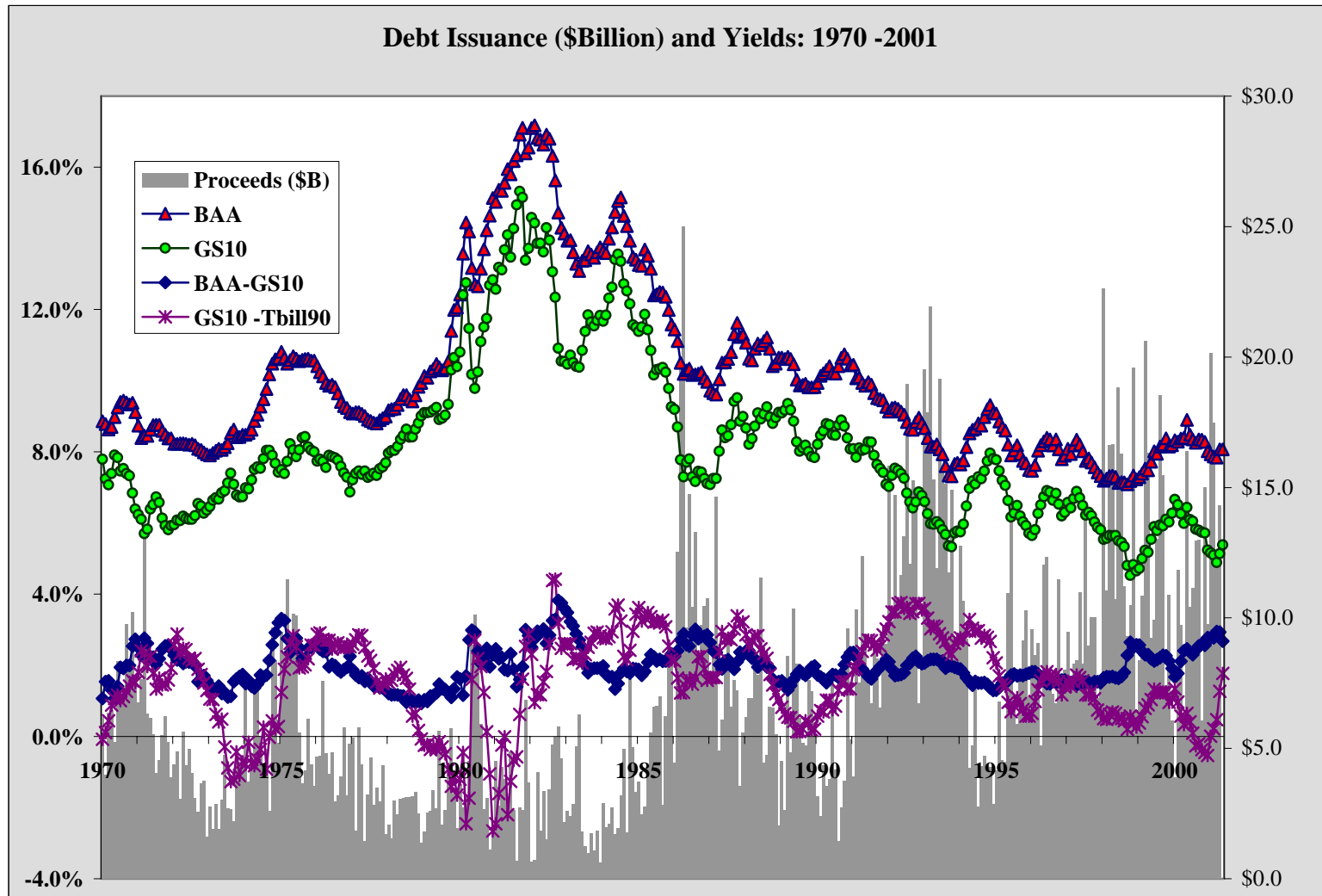


Figure 1. Debt Issuance and Yields.

The figure describes the distribution of issuance characteristics and interest rates and spreads using monthly observations for sample of 14,623 public straight debt issues by US non-financial firms during January 1970- April 2001. Dollar amounts are measured in millions of constant (January 2001) dollars. T90 is the 90-day T-bill Rate. Baa is Moody's Seasoned Baa Corporate Bond Yields. G10 is the 10-Year Treasury Constant Maturity Rate.

TABLE 1
Public Debt Issuance

The table provides sample characteristics for a sample of 14,623 public straight debt issues by US non-financial firms during January 1970- April 2001. Amounts are in millions of constant (January 2001) dollars. Effective maturity equals maturity for issues without call or put features and equals the time to earliest call or put date for issues with those features. For fraction of callable issues, fraction of puttable issues, and effective maturity, the sample is from January 1976 – May 2001 since SDC did not collect data on callability, puttability, call and put dates consistently until 1976. For fraction of floating issues the sample is from 1979 –2001 since SDC did not collect data on those until 1979.

	All years
Number of Issues	14,623
Total Amount Issued	2,604,877
Average (Median) Issue Size	178.1 (128.4)
Average (Median) Maturity	15.2 (10.03)
Average (Median) Effective Maturity	8.6 (5.51)
Median Moody's Rating	A3
Median S&P Rating	A-
Fraction of callable issues	0.418
Fraction of puttable issues	0.087
Fraction of floating rate issues	0.077
Fraction of investment grade issues	0.792
Average (Median) Yield to Maturity, %	9.0 (8.4)

TABLE 2
Correlations of Debt Issue Characteristics with Interest Rates and Spreads

This table presents the correlation coefficients (p-values in parentheses) between issuance characteristics and interest rates and spreads using monthly observations for a sample of 14,623 public straight debt issues by US non-financial firms during January 1970- April 2001. Dollar amounts are measured in millions of constant (January 2001) dollars. T90 is the 90-day T-bill Rate. Baa yields are Moody's Seasoned Baa Corporate Bond Yields. G10 is the 10-Year Treasury Constant Maturity Rate. Effective maturity equals maturity for issues without call or put features and equals the time to earliest call or put date for issues with those features. For fraction of callable issues, fraction of puttable issues, and effective maturity, the sample is from January 1976 – April 2001 since SDC did not collect data consistently on callability, puttability, or call and put dates until 1976.

Issuance Characteristics	T90	Baa	G10	G10-T90	Baa-G10
Number of Issues	-0.52 (0.00)	-0.46 (0.00)	-0.51 (0.00)	0.13 (0.01)	0.14 (0.01)
Total Amount Issued	-0.51 (0.00)	-0.45 (0.00)	-0.53 (0.00)	0.08 (0.10)	0.25 (0.00)
Maturity	0.13 (0.01)	0.03 (0.58)	0.07 (0.20)	-0.14 (0.01)	-0.16 (0.00)
Effective Maturity	-0.32 (0.00)	-0.40 (0.00)	-0.38 (0.00)	-0.04 (0.51)	-0.18 (0.00)
Fraction of callable issues	0.61 (0.00)	0.68 (0.00)	0.69 (0.00)	0.01 (0.92)	0.09 (0.09)
Fraction of puttable issues	-0.32 (0.00)	-0.27 (0.00)	-0.26 (0.00)	0.20 (0.00)	-0.09 (0.13)

TABLE 3

Interest Rates and Bond Returns Subsequent to Issuance

Debt issuances are from the period January 1970 – April 2001. The proceeds are the constant-dollar debt issue proceeds in the month of issuance. Maturity is measured in years. Effective maturity is the time until the first call or put date, in years. For effective maturity, the sample is from January 1976 – April 2001 since SDC did not collect data on call and put dates consistently until 1976.

Panel A presents the average difference between the rate i months after debt issuance and the rate at issuance, where $i = 6, 12, 18, 24,$ and 36 months. We present results for Baa, the Moody's Seasoned Baa Corporate Bond Yield, and G10, the 10-Year Treasury Constant Maturity Rate, both measured in percentage. We normalize the rate changes by subtracting the overall mean from each monthly observation. We report the maturity-weighted, proceeds-weighted, proceeds-and-maturity-weighted, and effective maturity-weighted mean rate changes. T-values for the hypotheses that the difference in rates is 0 are reported in parentheses.

Panel B presents the average excess bond return on corporate (CB-Tbill) or government (GB-Tbill) bonds in years 1, 2, and 3 after issuance, and the annualized 3-year cumulative returns for each. The annual excess corporate (government) bond return is measured as one plus the compounded monthly return on long-term corporate (government) bonds over 12 months divided by one plus the compounded monthly return on T-bills over 12 months, minus 1. The annualized 3-year cumulative excess corporate (government) bond return is measured as the third root of (one plus the compounded monthly returns on long-term corporate (government) bonds over 36 months divided by one plus the compounded monthly returns on T-bills over 36 months) minus 1. We normalize the excess return by subtracting the overall mean from each monthly observation. We report the maturity-weighted, proceeds-weighted, proceeds-and-maturity-weighted, and effective maturity-weighted mean excess returns. T-values for the hypotheses that the means excess return is 0 is reported in parentheses.

Panel A: Interest Rates: Differential Yield Changes									
Baa ₆₋ Baa ₀	Baa ₁₂₋ Baa ₀	Baa ₁₈₋ Baa ₀	Baa ₂₄₋ Baa ₀	Baa ₃₆₋ Baa ₀	G10 ₆₋ G10 ₀	G10 ₁₂₋ G10 ₀	G10 ₁₈₋ G10 ₀	G10 ₂₄₋ G10 ₀	G10 ₃₆₋ G10 ₀
<i>Maturity-weighted Means</i>									
0.059 (1.36)	0.133 (1.92)	0.201 (2.21)	0.261 (2.44)	0.363 (2.72)	0.069 (1.39)	0.147 (2.02)	0.214 (2.40)	0.276 (2.77)	0.359 (3.04)
<i>Proceeds-weighted Means</i>									
-0.027 (-0.71)	-0.011 (-0.20)	0.000 (0.00)	-0.049 (-0.63)	-0.134 (-1.52)	-0.015 (-0.32)	0.034 (0.52)	0.051 (0.65)	0.022 (0.28)	-0.034 (-0.41)
<i>Proceeds- and Maturity-weighted Means</i>									
0.012 (0.30)	0.060 (1.00)	0.114 (1.49)	0.093 (1.11)	0.087 (0.89)	0.032 (0.69)	0.123 (1.87)	0.204 (2.55)	0.217 (2.64)	0.235 (2.63)
<i>Effective Maturity-weighted Means.</i>									
0.024 (0.50)	0.023 (0.30)	0.023 (0.24)	0.031 (0.28)	0.114 (0.80)	0.034 (0.60)	0.027 (0.32)	0.023 (0.23)	0.030 (0.27)	0.098 (0.76)
Panel B: Bond Returns: Differential Excess Returns									
CB-Tbill Yr 1	CB-Tbill Yr 2	CB-Tbill Yr 3	CB-Tbill 3yr cumul.	GB-Tbill Yr 1	GB-Tbill Yr 2	GB-Tbill Yr 3	GB-Tbill 3yr cumul.		
<i>Maturity-weighted Means</i>									
-0.011 (-1.99)	-0.010 (-1.83)	-0.008 (-1.36)	-0.010 (-2.93)	-0.012 (-2.09)	-0.011 (-1.96)	-0.008 (-1.29)	-0.010 (-3.09)		
<i>Proceeds-weighted Means</i>									
0.002 (0.42)	0.003 (0.59)	0.006 (1.13)	0.004 (1.52)	0.004 (0.70)	0.004 (0.72)	0.004 (0.85)	0.004 (1.70)		
<i>Proceeds- and Maturity-weighted Means</i>									
-0.004 (-0.72)	-0.005 (-1.01)	-0.002 (-0.40)	-0.003 (-1.23)	-0.002 (-0.46)	-0.005 (-1.05)	-0.003 (-0.53)	-0.003 (-1.26)		
<i>Effective Maturity-weighted Means</i>									
-0.002 (-0.31)	-0.001 (-0.22)	-0.007 (-1.09)	-0.003 (-0.88)	-0.001 (-0.13)	0.000 (0.00)	-0.005 (-0.76)	-0.002 (-0.48)		

TABLE 4

Maturity Timing for the Periods 1970-1981 (70-81) and 1982-2001 (82-01)

Debt issuances are from the period January 1970 – April 2001. The proceeds are the constant-dollar debt issue proceeds in the month of issuance. Maturity is measured in years. The period 1970-1981 is indicated as “70-81,” and the period 1982-2001 is indicated as “82-01.”

Panel A presents the average difference between the rate i months after debt issuance and the rate at issuance, where $i = 6, 12, 18, 24,$ and 36 months, before and after 1981. We present results for Baa, the Moody's Seasoned Baa Corporate Bond Yield, and G10, the 10-Year Treasury Constant Maturity Rate, both measured in percentage. We first present the raw means by subperiod. We normalize the rate changes by subtracting the mean for each subperiod from each subperiod monthly observation and report the maturity-weighted rate changes, with t-values for the hypotheses that the change is 0 reported in parentheses.

Panel B presents the average excess bond return on corporate (CB-Tbill) or government (GB-Tbill) bonds in years 1, 2, and 3 after issuance, and the annualized 3-year cumulative returns for each, before and after 1981. The annual excess corporate (government) bond return is measured as the compounded monthly return on long-term corporate (government) bonds over 12 months divided by the compounded monthly return on T-bills over 12 months, minus 1. The annualized 3-year cumulative excess corporate (government) bond return is measured as the third root of the compounded monthly returns on long-term corporate (government) bonds over 36 months divided by the compounded monthly returns on T-bills over 36 months, minus 1. We first report the means for each subperiod. We normalize the excess return by subtracting the subperiod mean from each subperiod monthly observation. We report the maturity-weighted mean excess returns, and t-values for the hypotheses that the mean excess return is 0 reported in parentheses.

Panel A: Interest Rate Yields after Issuance

Period	Baa ₆₋ Baa ₀	Baa ₁₂₋ Baa ₀	Baa ₁₈₋ Baa ₀	Baa ₂₄₋ Baa ₀	Baa ₃₆₋ Baa ₀	G10 ₆₋ G10 ₀	G10 ₁₂₋ G10 ₀	G10 ₁₈₋ G10 ₀	G10 ₂₄₋ G10 ₀	G10 ₃₆₋ G10 ₀
<i>Raw Means</i>										
70-81	0.335	0.584	0.791	1.000	1.503	0.274	0.471	0.655	0.883	1.402
82-01	-0.231	-0.422	-0.571	-0.735	-1.132	-0.235	-0.412	-0.570	-0.769	-1.201
<i>Maturity-weighted differential yields</i>										
70-81	-0.013	0.035	0.093	0.150	0.200	-0.003	0.050	0.091	0.128	0.145
t-score	-(0.19)	(0.32)	(0.59)	(0.77)	(0.88)	-(0.05)	(0.49)	(0.66)	(0.80)	(0.81)
82-01	0.008	0.013	0.014	-0.003	-0.043	0.031	0.052	0.070	0.065	0.009
t-score	(0.15)	(0.17)	(0.17)	-(0.03)	-(0.48)	(0.46)	(0.55)	(0.68)	(0.65)	(0.09)

Panel B: Bond Excess Returns after Issuance

Period	CB-Tbill Yr 1	CB-Tbill Yr 2	CB-Tbill Yr 3	CB-Tbill 3yr cumul.	GB-Tbill Yr 1	GB-Tbill Yr 2	GB-Tbill Yr 3	GB-Tbill 3yr cumul.
<i>Raw Excess Returns</i>								
70-81	-0.014	-0.006	-0.014	-0.016	-0.017	-0.014	-0.022	-0.022
82-01	0.059	0.054	0.061	0.055	0.061	0.058	0.065	0.057
<i>Maturity-weighted differential excess returns</i>								
70-81	-0.005	-0.008	-0.003	-0.005	-0.005	-0.006	-0.001	-0.004
t-score	-(0.52)	-(0.77)	-(0.25)	-(0.88)	-(0.58)	-(0.70)	-(0.15)	-(0.81)
82-01	-0.002	0.000	0.002	0.000	-0.002	-0.001	0.004	0.000
t-score	-(0.29)	-(0.04)	(0.41)	(0.02)	-(0.33)	-(0.13)	(0.62)	(0.04)

TABLE 5

Excess Bond Returns and the Maturity of Net and Gross Corporate Debt Issues, 1953-2002

In Panel A, the dependent variable is the excess return on 20-year maturity government bonds over Treasury bills. In Panel B, the dependent variable is the excess return of 20-year corporate bonds over Treasury bills. The excess returns are calculated one-year-ahead, two-year-ahead, and three-year-ahead (r), and cumulatively three-year-ahead (R). Long-term rates are denoted with L, while short-term rates are denoted with S. Government bonds and bills are denoted with G, while corporate bonds are denoted with C. The independent variables are measures of the maturity of aggregate corporate debt issues. The maturity of new debt is calculated using Flow of Funds data as new issues of long-term debt ($dL/Dt-1$), new issues of short-term debt ($dS/Dt-1$) and as the long-term share of total new issues ($dL/(dL+dS)$). Under the heading “BGW,” we calculate debt issuance as defined in Baker, Greenwood, and Wurgler (2003). Net issues are calculated as the changes in the levels of short and long-term debt, from Flow of Funds table F 102. The independent variables are standardized to have unit variance. T-statistics are heteroscedasticity-adjusted and corrected for time-series dependence up to three lags using the Newey-West procedure.

Independent Variable	BGW			Net Issues			Independent Variable	BGW			Net Issues		
	Coef.	t-value	Adj. R ²	Coef.	t-value	Adj. R ²		Coef.	t-value	Adj. R ²	Coef.	t-value	Adj. R ²
Panel A: Excess Government Bond Returns													
rGLt+1 –rGSt+1, N=50													
Intercept	0.016	1.22	0.024	0.016	1.08	-0.035	Intercept	0.016	1.21	0.027	0.016	1.07	-0.021
dLt/Dt-1	-0.010	-0.66		-0.001	-0.06		dLt/(dLt + dSt)	-0.023	-1.70		0.002	0.27	
dSt/Dt-1	0.025	2.12		-0.009	-0.52								
rGLt+2 –rGSt+2, N = 49													
Intercept	0.014	1.19	0.077	0.016	1.01	-0.007	Intercept	0.015	1.18	0.080	0.01	0.73	0.001
dLt/Dt-1	-0.020	-2.31		-0.021	-2.07		dLt/(dLt + dSt)	-0.034	-3.34		-0.032	-1.19	
dSt/Dt-1	0.031	3.20		0.001	0.07								
rGLt+3 –rGSt+3, N=48													
Intercept	0.014	1.16	0.106	0.013	0.90	0.017	Intercept	0.014	1.15	0.108	0.017	0.92	-0.021
dLt/Dt-1	-0.023	-1.6		-0.021	-1.18		dLt/(dLt + dSt)	-0.040	-2.92		0.006	0.16	
dSt/Dt-1	0.036	3.25		0.025	1.94								
RGLt+3 –RGSt+3, N=48													
Intercept	0.038	1.30	0.362	0.041	1.05	0.036	Intercept	0.039	1.28	0.322	0.040	0.97	-0.015
dLt/Dt-1	-0.062	-2.81		-0.052	-1.93		dLt/(dLt + dSt)	-0.109	-4.95		-0.033	-0.86	
dSt/Dt-1	0.098	4.39		0.028	0.98								
Panel B: Excess Corporate Bond Returns													
rCLt+1 –rGSt+1, N=50													
Intercept	0.019	1.43	0.034	0.019	1.29	-0.029	Intercept	0.019	1.41	0.038	0.019	1.28	-0.018
dLt/Dt-1	-0.015	-1.25		-0.006	-0.46		dLt/(dLt + dSt)	-0.025	-2.22		0.005	0.67	
dSt/Dt-1	0.023	1.88		-0.010	-0.52								
rCLt+2 –rGSt+2, N = 49													
Intercept	0.017	1.40	0.069	0.018	1.22	-0.013	Intercept	0.018	1.39	0.071	0.015	1.02	-0.008
dLt/Dt-1	-0.016	-1.62		-0.018	-1.59		dLt/(dLt + dSt)	-0.031	-2.85		-0.023	-1.03	
dSt/Dt-1	0.029	3.27		0.004	0.29								
rCLt+3 –rGSt+3, N=48													
Intercept	0.017	1.33	0.099	0.016	1.09	0.035	Intercept	0.017	1.32	0.095	0.019	1.07	-0.022
dLt/Dt-1	-0.019	-1.32		-0.018	-1.07		dLt/(dLt + dSt)	-0.036	-2.51		-0.001	-0.02	
dSt/Dt-1	0.034	2.92		0.030	2.24								
RCLt+3 –RGSt+3, N=48													
Intercept	0.046	1.53	0.337	0.048	1.27	0.050	Intercept	0.047	1.51	0.296	0.047	1.21	-0.012
dLt/Dt-1	-0.059	-3.09		-0.052	-2.24		dLt/(dLt + dSt)	-0.104	-4.55		-0.037	-0.98	
dSt/Dt-1	0.094	3.91		0.039	1.39								

TABLE 6
Distribution of Issuance Activity and Debt Features across
Historical Interest Rate Deciles

The table presents characteristics of issuance activity and debt features across historical interest rate deciles. The issuance sample consists of 14,623 public straight debt issues by US non-financial firms during 1970-2001. Amount issued is in millions of constant (January 2001) dollars. In each issuance month, we compare the level of the respective interest rate to its level during the preceding 120 months, and classify it into historical distribution yield or rate deciles. Baa and Aaa are Moody's Seasoned Baa and Aaa Corporate Bond Yields, respectively. G10 is the 10-Year Treasury Constant Maturity Rate. Prime is the Bank Prime Loan Rate. Below each decile distribution, we report the p-values from the t-test for equality of then means between the first and the tenth decile, t-test between the lowest three deciles ("L") and the highest three deciles ("H"), and the Kruskal-Wallis test for equality across all deciles.

Historical Yield Decile	Amount Issued Per Month	Number of Issues Per Month	Average (Median) Time to Final Maturity	Average (Median) Effective Maturity	Fraction Callable	Fraction Puttable
Baa						
0	11,251	71	13.9 (10.0)	9.84 (9.59)	0.26	0.13
10	8,123	51	12.8 (10.0)	9.05 (8.40)	0.24	0.09
20	7,465	43	13.4 (10.0)	7.08 (6.96)	0.42	0.09
30	9,062	42	13.5 (10.0)	6.78 (6.65)	0.60	0.05
40	9,419	41	12.2 (10.0)	6.60 (6.46)	0.46	0.05
50	7,161	34	11.3 (9.9)	6.60 (6.70)	0.43	0.06
60	3,700	21	19.1 (19.9)	7.68 (8.18)	0.63	0.03
70	3,520	21	20.4 (20.0)	7.07 (6.82)	0.76	0.03
80	4,408	23	21.5 (24.6)	7.39 (7.34)	0.79	0.03
90	5,257	27	18.8 (19.5)	7.10 (7.13)	0.63	0.02
0 v. 90	0.00	0.00	0.00	0.00	0.00	0.00
L v. H	0.00	0.00	0.00	0.00	0.00	0.00
All deciles	0.00	0.00	0.00	0.00	0.00	0.00
G10						
0	12,687	72	13.3 (10.0)	9.26 (9.19)	0.30	0.12
10	8,487	50	14.2 (10.0)	8.66 (7.91)	0.35	0.11
20	8,041	46	13.2 (10.0)	8.16 (7.80)	0.32	0.09
30	7,838	43	11.4 (10.0)	6.80 (6.38)	0.39	0.06
40	5,872	32	11.7 (10.0)	6.38 (6.45)	0.44	0.08
50	8,382	40	11.7 (10.0)	6.62 (6.93)	0.42	0.04
60	3,624	23	19.2 (16.4)	7.47 (7.97)	0.74	0.03
70	3,710	22	20.7 (24.2)	7.00 (6.80)	0.78	0.05
80	4,832	22	21.8 (24.7)	7.34 (7.20)	0.52	0.03
90	4,478	24	19.1 (19.7)	7.34 (7.27)	0.73	0.02
0 v. 90	0.00	0.00	0.00	0.00	0.00	0.00
L v. H	0.00	0.00	0.00	0.00	0.00	0.00
All deciles	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 7
Issuance Activity across Historical Rate Deciles and Rate Levels at Issuance

The table presents the monthly amount issued across historical interest rate categories and interest rate levels at issuance. The issuance sample consists of 14,623 public straight debt issues by US non-financial firms during 1970-2001. Amount issued is in millions of constant (January 2001) dollars. In each issuance month, we compare the level of the respective interest rate to its level during the preceding 120 months, and classify it into historical distribution yield or rate categories. “Low” indicates that the rate falls into the lowest three deciles. “Medium” indicates that the rate falls into deciles four to seven. “High” indicates that the rate falls into the highest three deciles. Baa is the Moody’s Seasoned Baa Corporate Bond Yields. G10 is the 10-Year Treasury Constant Maturity Rate.. The levels of interest rate (measured in percent) at issuance are grouped into integer bins. Below the rate categories, we report the p-value from the t-test for equality between the means of the lowest three deciles as a group (“Low”) and the highest three deciles as a group (“High”), and from Kruskal-Wallis test for equality across all three categories.

G10 historical rate category	Rate level											
	4	5	6	7	8	9	10	11	12	13	14	15
	Monthly Amount issued											
Low	11,667	12,865	10,356	10,099	6,709	6,309						
Medium		10,141	8,931	3,945	3,739	7,071	5,811	3,578				
High		5,391	4,596	5,636	4,175	4,111	3,732	2,566	3,804	3,243	2,740	4,738
<i>Low v. High</i>		0.00	0.00	0.00	0.00	0.31						
<i>All categories</i>		0.00	0.00	0.00	0.00	0.07	0.05	0.07				

BAA historical rate category	Rate level										
	7	8	9	10	11	12	13	14	15	16	17
	Monthly Amount issued										
Low	11,756	9,862	8,383	7,026							
Medium	9,110	8,043	3,402	8,790	7,154	5,843	4,036				
High		5,310	4,935	5,571	4,513	6,035	2,901	3,234	3,585	3,263	1,326
<i>Low v. High</i>		0.00	0.00	0.16							
<i>All categories</i>	0.37	0.00	0.00	0.08	0.17	0.81	0.08				

TABLE 8
Issuance Activity across Historical Rate Deciles and Market-wide Growth Measures

The table presents the monthly amount issued across historical interest rate deciles, and market growth measures. The issuance sample consists of 14,623 public straight debt issues by US non-financial firms during 1970-2001. Amount issued is in millions of constant (January 2001) dollars. In each issuance month, we compare the level of the respective interest rate to its level during the preceding 120 months, and classify it into historical distribution yield or rate categories. “Low” indicates that the rate falls into the lowest three deciles. “Medium” indicates that the rate falls into deciles four to seven. “High” indicates that the rate falls into the highest three deciles. Baa is the Moody's Seasoned Baa Corporate Bond Yields. G10 is the 10-Year Treasury Constant Maturity Rate. We sort issuance into the quartiles of price earnings ratio, and the share market-to-book ratio, respectively, of the S&P 500 index at the time of issuance.

	S&P500 P/E Quartile				S&P 500 M/B Quartile			
	1	2	3	4	1	2	3	4
G10 historical rate category								
	Monthly Amount issued							
Low		5,894.6	8,559.5	12,255.9		8,352.2	8,375.1	11,595.1
Medium	3,519.7	5,259.1	5,734.1	9,894.2	3,284.7	5,561.0	5,708.7	8,757.0
High	3,899.1	4,446.6	5,169.9		3,913.2	4,887.9	4,780.9	
Baa historical rate category								
	Monthly Amount issued							
Low		5,748.6	7,824.4	12,243.3		8,270.5	8,000.4	10,883.0
Medium	3,311.5	5,345.6	6,888.9	11,035.9	3,405.1	6,149.4	6,235.1	11,610.7
High	3,986.6	4,446.0	5,718.0	16,400.6*	3,964.1	4,948.2	5,406.9	16,400.6*

* There is only one monthly observation that these four cells represent. It occurred in May 2000, when Baa was 8.9% (8th decile), the S&P 500 M/B ratio was 4.9, and its P/E ratio was 27

Table 9
Multivariate Analysis

This table presents OLS regression results of monthly amount of debt issued as a function of the historical distribution of interest rates, interest rate levels, and control variables. All independent variables are measured as of the month immediately preceding the month of issuance. Baa is the Moody's Seasoned Baa Corporate Bond Yield. G10 is the 10-Year Treasury Constant Maturity Rate. Panel A presents results with respect to G10, while panel B presents results with respect to Baa. Term spread is the difference between G10 and the yield on 90-day T-bills. Credit spread is the difference between Baa and G10. We present the parameter estimates with p-values in parentheses.

	Amount issued per month			
Panel A: G10				
Intercept	3,772.783	0.012	6,083.68	0.000
Historical decile rank of G10	-405.134	0.000	-467.981	0.000
Level of G10 at issuance, %	-196.335	0.063	-332.452	0.001
Credit spread	1,703.713	0.000	1,944.887	0.000
Term spread	-235.600	0.083	-95.723	0.510
S&P 500 P/E ratio	229.283	0.000		
S&P 500 Market/Book ratio			1,012.627	0.000
Adjusted R-square	0.485		0.469	
Number of observations	374		374	
Panel B: Baa				
Intercept	3,018.441	0.033	5,174.745	0.000
Historical decile rank of Baa	-360.908	0.000	-411.017	0.000
Level of Baa at issuance, %	-257.552	0.014	-397.893	0.000
Credit spread	2,336.833	0.000	2,754.460	0.000
Term spread	-263.894	0.057	-100.801	0.497
S&P 500 P/E ratio	249.420	0.000		
S&P 500 Market/Book ratio			1,179.143	0.000
Adjusted R-square	0.483		0.464	
Number of observations	374		374	

TABLE 10
Timing of Net Issuances vs. Refinancings

Panels A and B present the monthly amount of debt issued across historical interest rate deciles and use of proceeds. Amount issued is in millions of constant (January 2001) dollars. “Low” indicates that the G10, the 10-Year Treasury Constant Maturity Rate, falls into the lowest three deciles relative to the preceding 120-months. “Medium” indicates that the rate falls into deciles four to seven. “High” indicates that the rate falls into the highest three deciles. We classify issuances as debt refinancings if the net amount of debt by the firm for the fiscal year (as per Compustat) was negative; otherwise we classify issuances as net debt issues. Among the net debt issues, we classify those cases where the net debt was lower than the annual amount issued as “some refinancing”. We further classify debt issuances by net stock repurchasers if the net amount of stock issued by the firm for the fiscal year (as per Compustat) was negative; otherwise we classify issuances as net stock issuers. We present in parentheses t-statistics for the test that the mean in category “Low” is equal to the mean in category “High”.

Panel A: Net Debt Issuances vs. Refinancings

G10 Relative Category	Debt Refinancing	Net Debt Issuers, Some Refinancing	Net Debt Issuers
Low	1,336.0	2,862.3	1,527.4
Medium	580.7	1,626.5	1,157.2
High	77.4	1,042.2	547.7
T-test: Low vs. High	(11.93)	(10.53)	(8.74)

Panel B: Net Debt and Stock Issuances vs. Refinancings

G10 Relative Category	Debt Refinancing		Net Debt Issuers, Some Refinancing		Net Debt Issuers	
	Negative stock issuance	Positive Stock Issuance	Negative stock issuance	Positive Stock Issuance	Negative stock issuance	Positive Stock Issuance
Low	784.8	419.4	1,583.1	1,057.0	863.0	529.2
Medium	369.3	154.3	760.9	750.9	517.2	490.3
High	29.2	46.9	302.0	713.1	173.1	365.7
T-test: Low vs. High	(10.48)	(7.85)	(13.79)	(3.32)	(8.12)	(3.15)

Appendix

This Appendix reports the annual characteristics of a sample of 14,623 public straight debt issues by US non-financial firms during January 1970-April 2001 reported by Thompson Financial. Amounts are in millions of constant (January 2001) dollars. T-bill 90 is the 90-day T-bill Rate. G10 is the 10-Year Treasury Constant Maturity Rate. Effective maturity equals maturity for issues without call or put features and equals the time to earliest call or put date for issues with those features. For the fraction of callable issues, fraction of puttable issues, and effective maturity, the sample is from January 1976 – May 2001 since SDC did not collect data on callability, puttability, call and put dates consistently until 1976.

Year	Number of Issues	Total Amount Issued	Average (Median) Maturity	Average (Median) Effective Maturity	Fraction of callable issues	Fraction of puttable issues	Average (Median) Yield to Maturity,	Mean (Median) T-bill 90 yield	Mean (Median) G10 yield
1970	408	86,027	20.7 (24.26)	N.A. N.A.	N.A.	N.A.	9.2 (9.1)	6.39 (6.48)	7.35 (7.39)
1971	373	75,002	23.4 (24.78)	N.A. N.A.	N.A.	N.A.	7.9 (7.8)	4.33 (4.33)	6.16 (6.13)
1972	268	45,931	23.4 (24.90)	N.A. N.A.	N.A.	N.A.	7.5 (7.5)	4.07 (3.95)	6.21 (6.16)
1973	185	37,997	24.8 (29.07)	N.A. N.A.	N.A.	N.A.	8.0 (7.9)	7.03 (7.21)	6.84 (6.77)
1974	291	71,372	20.2 (24.17)	N.A. N.A.	N.A.	N.A.	9.5 (9.4)	7.83 (7.84)	7.56 (7.56)
1975	398	85,772	18.4 (19.27)	N.A. N.A.	N.A.	N.A.	9.7 (9.5)	5.78 (5.56)	7.99 (8.06)
1976	276	54,803	22.3 (25.00)	8.6 (8.00)	0.738	0.000	8.8 (8.7)	4.97 (4.96)	7.61 (7.74)
1977	259	41,940	21.9 (24.88)	8.2 (5.09)	0.765	0.004	8.5 (8.4)	5.27 (5.11)	7.42 (7.40)
1978	211	31,799	22.9 (20.31)	7.7 (5.02)	0.831	0.005	9.7 (9.3)	7.19 (6.87)	8.41 (8.42)
1979	203	38,415	21.4 (20.00)	7.0 (5.01)	0.877	0.025	10.8 (10.5)	10.07 (9.50)	9.44 (9.15)
1980	318	56,341	18.6 (14.99)	7.1 (5.02)	0.840	0.006	12.8 (12.5)	11.43 (11.81)	11.46 (11.49)
1981	261	42,409	16.4 (10.24)	7.8 (5.01)	0.885	0.011	15.8 (15.7)	14.03 (14.72)	13.91 (13.70)
1982	287	38,715	15.9 (11.66)	6.7 (5.02)	0.850	0.056	14.5 (14.7)	10.61 (11.72)	13.00 (13.74)
1983	221	28,550	19.0 (18.46)	6.7 (5.02)	0.828	0.081	12.5 (12.5)	8.61 (8.70)	11.11 (11.12)
1984	216	39,433	14.1 (10.02)	6.1 (5.00)	0.704	0.093	13.9 (13.6)	9.52 (9.72)	12.44 (12.42)
1985	386	65,455	15.7 (10.04)	6.3 (5.02)	0.772	0.044	12.2 (11.8)	7.48 (7.20)	10.62 (10.35)
1986	707	149,317	17.3 (11.99)	6.6 (5.02)	0.748	0.038	9.9 (9.4)	5.98 (5.95)	7.68 (7.44)
1987	441	89,786	15.3 (10.03)	6.6 (5.01)	0.700	0.052	10.4 (9.9)	5.78 (5.68)	8.38 (8.53)
1988	356	77,638	13.8 (10.01)	6.1 (5.01)	0.801	0.067	10.8 (10.0)	6.67 (6.60)	8.85 (8.94)
1989	340	76,242	15.6 (10.06)	6.5 (5.00)	0.644	0.159	10.7 (9.9)	8.11 (8.03)	8.50 (8.24)
1990	293	52,163	15.4 (10.06)	9.5 (7.00)	0.314	0.041	9.8 (9.8)	7.49 (7.63)	8.55 (8.54)
1991	605	100,033	13.6 (10.01)	10.0 (7.04)	0.188	0.046	9.0 (9.0)	5.38 (5.52)	7.86 (7.97)
1992	852	151,290	13.2 (10.01)	9.0 (7.02)	0.344	0.141	8.3 (8.1)	3.43 (3.43)	7.01 (6.95)
1993	1,049	181,645	15.1 (10.02)	9.7 (9.02)	0.410	0.189	7.5 (7.1)	3.00 (3.01)	5.87 (5.89)
1994	497	72,288	10.7 (9.99)	7.6 (5.03)	0.306	0.215	8.4 (8.0)	4.25 (4.24)	7.08 (7.21)
1995	612	91,909	13.5 (10.01)	10.7 (9.97)	0.196	0.113	7.7 (7.3)	5.49 (5.45)	6.58 (6.39)
1996	739	105,412	12.6 (10.00)	10.2 (7.01)	0.165	0.146	7.7 (7.2)	5.01 (5.01)	6.44 (6.52)
1997	1,003	110,239	13.3 (9.99)	11.5 (8.01)	0.062	0.077	7.1 (6.9)	5.06 (5.05)	6.35 (6.36)
1998	1,152	169,736	12.3 (10.00)	10.0 (7.02)	0.131	0.082	6.6 (6.5)	4.78 (4.96)	5.26 (5.48)
1999	680	146,687	9.4 (7.02)	7.8 (5.02)	0.128	0.063	7.0 (6.9)	4.64 (4.56)	5.64 (5.85)
2000	518	126,397	7.8 (5.02)	6.5 (4.99)	0.257	0.050	7.9 (7.8)	5.82 (5.78)	6.03 (6.02)
2001	218	64,134	9.7 (9.97)	7.5 (5.02)	0.349	0.041	6.9 (6.8)	4.58 (4.65)	5.07 (5.12)
All years	14,623	2,604,877	15.2 (10.03)	8.6 (5.51)	0.418	0.087	9.0 (8.4)	6.61 (5.81)	8.15 (7.57)