

Can Managers Successfully Time the Maturity Structure of Their Debt Issues?

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ABSTRACT

This paper shows that, contrary to existing evidence, corporate managers cannot successfully time the maturity of their debt issues to reduce their cost of capital. Our results indicate that the negative correlation between future excess long-term bond returns and the ratio of long-term debt issues to total debt issues is driven by aggregate pseudo market timing. We show that a structural shift in U.S. monetary and fiscal policy during the early 1980s induces a pseudo market timing effect in the in-sample tests of bond return predictability. After accounting for this structural shift, we find no evidence that corporate managers are able to predict future variations in excess long-term bond returns or to strategically choose the maturity of their debt.

One of the most important implications of the efficient market hypothesis is that managers cannot successfully time the market when they issue new securities. While managers may *try* to issue equity when they believe it is overvalued or issue long-term debt when they believe that future long-term bond returns will be low, they cannot do so with any systematic success when capital markets are complete and efficient. However, a number of recent studies challenge these predictions and find that such managerial timing may in fact lead firms to a lower cost of capital (see, for example, Ritter (1991), Loughran and Ritter (1995), Spiess and Affleck-Graves (1995), and Baker and Wurgler (2000)).

Although most of the existing studies examine the ability of managers to time equity issues, there is recent evidence suggesting that managers also time the maturity of their debt issues. Baker, Greenwood, and Wurgler (2003) document that, in the aggregate, managers are able to successfully time fluctuations in the yield curve by judicious choice of the maturity structure of their firms' debt. Specifically, these authors find a negative correlation between future excess long-term bond returns and the ratio of long-term debt issues to total debt issues (long-term share). They interpret this result as evidence that managers tend to issue more long-term debt relative to short-term debt when they predict that future excess long-term bond returns will be relatively low. This result is surprising since most purchasers of corporate debt are sophisticated investors (for example, banks, insurance companies, and pension funds) who are unlikely to make naïve investment decisions.

While it is provocative to think that corporate managers may be better able to predict interest rate movements than other market participants, we provide an explanation for this result that is consistent with the efficient market hypothesis—aggregate pseudo market timing. The concept of pseudo market timing is based on Schultz's (2003) simple argument that firms'

financing decisions are driven by current market conditions. In the case of equity issues, Schultz argues that firms are more likely to issue equity after their stock price has increased. If indeed firms are more likely to issue equity when their stock prices go up, this phenomenon causes equity issues to cluster around what turn out, ex post, to be market peaks. This means that periods of hot IPO markets are naturally followed by bear markets. Of course, if markets are efficient, this relation between prices and equity issues is only apparent ex post, not ex ante. The result, however, is that due to this clustering a researcher should *expect* to observe abnormal long-run underperformance measured in event time. That is, if a corporate decision is endogenous to the firm's recent performance, then some "abnormal" performance following the event is normal and consistent with market efficiency. Thus, what may appear to be accurate market timing by managers is actually "pseudo" market timing since the stock price underperformance is driven by an ex post correlation between prices and issues, and not by any real ex ante managerial ability.

While Schultz's argument focuses on the problems with event time studies of firm-level long run performance, pseudo market timing can also pollute in-sample tests of *aggregate* return predictability. For example, Butler, Grullon, and Weston (2004) show that the in-sample predictive power of aggregate equity issues documented in Baker and Wurgler (200) is driven by pseudo market timing. Specifically, they find that large unpredictable macroeconomic shocks such as the Oil Crisis and the Great Depression can create the illusion of successful market timing by managers. Since equity issues are positively correlated with current equity prices, equity issues go down dramatically during these unexpected market declines, making the pre-shock equity issuance look relatively high just before and the post-shock equity issuance look relatively low just after the market crashes. Thus, a researcher could easily reach the erroneous

conclusion that equity issues “predict” returns, when in fact both are affected by the same exogenous factor. After controlling for unexpected shocks to current market conditions, Butler, Grullon, and Weston (2004) find no evidence that managers can predict aggregate equity market returns.

In this paper we show that pseudo market timing can also explain the apparent predictability of excess bond returns. Again, the appearance of managerial market timing ability is driven by a large macroeconomic shock. In this case, the spurious inference stems from the significant change in the monetary and fiscal policy of the U.S. government during the early 1980s. This structural shift in monetary and fiscal policy systematically increased the relative cost of long-term debt, creating an incentive for firms to issue more short-term debt relative to long-term debt. Since this phenomenon causes the ratio of long-term debt issues to total debt issues to be high (low) during the period when the relative cost of long-term debt is low (high), a spurious in-sample negative correlation arises between debt maturity and future excess long-term bond returns. That is, since firms are just reacting to (as opposed to *forecasting*) the increase in the relative cost of long-term debt by issuing more short-term debt, the structural shift in the excess long-term bond returns in the early 1980s generates aggregate pseudo market timing.

We show that after accounting for this structural shift in excess bond returns, there is no evidence that corporate managers are able to predict future variations in bond returns or to successfully lower their cost of capital by timing the maturity of their debt issues. As in Butler, Grullon, and Weston (2004), we find that small changes in the empirical specification that account for structural breaks and economic shocks can lead to very different conclusions about the ability of managers to consistently fool the market.

These findings are robust. For example, we examine alternative measures of changes in the maturity structure of firms' debt and find no evidence of managerial market timing. Further, we find no out-of-sample evidence that managers can predict future excess bond returns in real time. Overall, these findings raise serious doubts that managers are able to predict market upturns and downturns in bond markets better than other market participants.

Our work is directly related to a recent survey of corporate financial managers by Graham and Harvey (2001). They present evidence that managers attempt to time the maturity of their debt issues to lower their cost of capital. In fact, many of the financial managers surveyed state this as an important goal. Further, Barry, et al. (2003) find evidence that managers appear to be trying to time the market when they issue new debt. Of course, there is an important difference between managers *trying* to lower their cost of capital, and managers *successfully* lowering their cost of capital through such timing efforts. Thus, while managers may try to time the market, our results suggest that the average corporate manager is incapable of implementing this strategy successfully.

This is an important result for a number of reasons. First, our findings lend support to the Modigliani and Miller (1958) theory (at least with respect to the maturity of debt issues) and are inconsistent with behavioral alternatives. Further, our results are a natural extension to the bond market of Schultz's pseudo market timing argument. Finally, our findings are directly related to developments in the term structure literature which highlight the importance of modeling regime changes in U.S. interest rates. Our findings show how major macroeconomic events can have a dramatic effect on the results and interpretation of in-sample predictive regressions.

The remainder of the paper is organized as follow. Section I presents a description of our sample and a replication of previous in-sample tests. Section II presents evidence on aggregate

pseudo market timing and structural breaks in U.S. interest rates. Section III reports the results of several robustness tests, including out-of-sample tests. Section IV concludes.

I. Sample

A. Sample description

We use the same data as Baker, Greenwood, and Wurgler (2003), updating the sample through 2002.¹ We collect data on debt issues and their relative maturities from the Federal Reserve Flow of Funds and on bond returns from Ibbotson Associates (2003). We measure aggregate short-term debt issued at time t , d_{St} , as the year-end total short-term credit market debt outstanding. Short-term debt is the sum of “commercial paper,” “bank loans not elsewhere classified,” and “other loans and advances.” The level of long-term debt at time t , D_{Lt} , is defined as the sum of “industrial revenue bonds (municipals),” “corporate bonds,” and “mortgages.” All of the above come from the Federal Reserve Flow of Funds data (Table L.102). To compute annual long-term debt issues, d_{Lt} , from year-end levels, we compute the gross change in long-term debt level and add 10% of the previous year’s long-term debt level to reflect an assumed average maturity of 10 years. The total debt outstanding at time t , D_t , is the level of total short-term debt ($D_{St} = d_{St}$) plus the total level of long-term debt, D_{Lt} . Our primary variable of interest, the share of long-term debt issues in total issues (the “long-term share”), is $d_{Lt} / [d_{St} + d_{Lt}]$.

We gather data for several interest rate measures from Ibbotson Associates (2003). The return on short-term treasuries, r_{GS_t} , is calculated as the total return on U.S. treasury bills in year t . The long-term treasury rates, r_{GL_t} , and long-term corporate bond rates, r_{CL_t} , are based on returns on bond portfolios with constant 20-year maturities. Excess government and corporate

¹ Following Baker, Greenwood, and Wurgler (2003) and other researchers, we start our analysis at 1953 because the Federal Reserve pegged short-term interest rates until 1952.

bond returns are $r_{GLt} - r_{GS_t}$ and $r_{CLt} - r_{GS_t}$, respectively. Cumulative bond returns are labeled as $R_{GLt+3} - R_{GS_t+3}$ to denote, for instance, three-year cumulative government excess returns.

We provide summary statistics in Table 1 for these variables. Our measures of excess government bond returns, long-term share of new issues, and scaled long-term and short-term debt issues are all very similar to those reported in previous studies. Our measure of corporate bond excess returns is calculated as the excess long-term bond return over treasury bill rates rather than over commercial paper rates, which is why our mean excess corporate bond return of 1.8% is higher than the 0.66% that Baker, Greenwood, and Wurgler (2003) report. While our measure is slightly different, our in-sample regression results do not differ qualitatively.

B. In-sample evidence of managerial timing

The underlying hypothesis of managerial timing is that corporate managers strategically shift between long-term and short-term debt in anticipation of future excess bond returns. That is, when managers expect future excess long-term bond returns to be low (i.e., when they expect long-term yields to rise relative to short-term yields), they naturally prefer to issue long-term debt today. If managers can successfully predict future excess long-term bond returns, then the maturity of new debt issues today should be related to future excess long-term bond returns. Baker, Greenwood, and Wurgler (2003) test this hypothesis by regressing future excess long-term bond returns on new long-term issues and new short-term issues or, alternatively, on the long-term share of new issues:

$$\text{Excess long-term bond return}_{t+1} = \alpha + \beta_1 \frac{d_{Lt}}{D_{t-1}} + \beta_2 \frac{d_{St}}{D_{t-1}} + \varepsilon_{t+1} \quad (1)$$

$$\text{Excess long-term bond return}_{t+1} = \alpha + \beta \frac{d_{Lt}}{d_{Lt} + d_{St}} + \varepsilon_{t+1} \quad (2)$$

If managers can time the maturity of their equity issues, we should expect the coefficients of the new long-term issues and the long term-share to be negative and the coefficient of the new short-term issues to be positive. That is, according to the managerial timing hypothesis, we expect managers to issue more long-term debt when they expect future excess long-term returns to be low and to issue more short-term debt when they expect future excess long-term returns to be high.

In Table 2 we replicate the results of this regression-based test with our updated sample. Following Baker, Greenwood and Wurgler (2003), we standardize our debt maturity measures to have zero mean and unit variance. Our results are very similar to previous findings and show an in-sample statistically significant negative relation between the maturity of new debt issues and subsequent excess long-term bond returns. The economic magnitude of this relationship is non-trivial—a one standard deviation increase in the long-term share is associated with a 2.4 percentage point decrease in the next year’s excess returns for long-term government bonds and with a 2.7 percentage point decrease in the next year’s excess returns for long-term corporate bonds. The results are stronger for excess returns two and three years ahead, as well as for the three-year cumulative excess returns.² Taken at face value, these results suggest that the long-term share has predictive power for future excess long-term bond market returns. However, in the following section, we show that accommodating the presence of a structural break in the time series of excess bond returns can lead to a significantly different interpretation of the data.

II. Pseudo Market Timing and Structural Breaks

A. The regime change in U.S. interest rates in the early 1980s

² This result is puzzling because it suggests that the forecasting ability of managers improves as the forecasting horizon increases. As we discuss below, this phenomenon is the result of aggregate pseudo market timing.

There is a large and well-developed line of research in both economics and finance which finds that interest rates exhibit regime-switching behavior.³ In this section, we test whether the excess long-term bond return series that we consider also exhibit structural breaks over our sample period. This is an important issue because any form of nonstationarity can have a significant effect on the parameters of an OLS estimation. As we show in the next sub-section, ignoring structural breaks is equivalent to omitting a relevant explanatory variable. As a result, any statistical test that does not account for such effects, such as those presented above in section I.B, may lead to a spurious rejection of the null of no predictability.

There are several reasons why we suspect that excess long-term bond returns are likely to experience structural breaks. First, as we mention above, there is well established body of statistical evidence that interest rates exhibit structural breaks and regime switching behavior. Second, and more importantly, there are good economic reasons why one might expect interest rates, term spreads, and excess bond returns to exhibit structural breaks. For example, business cycle expansions and contractions, changes in monetary policy objectives, and inflation expectations all naturally exhibit regime switching behavior which feed into observed levels and changes in interest rate series. Perhaps the most frequently identified regime shift in the post-war U.S. is the “Volcker experiment” in the early 1980s when the Federal Reserve changed operating procedures in order to control rising inflation and began a zero inflation policy. At this time, the new Chairman of the Federal Reserve, Paul Volcker, enacted a significant contraction of the monetary base coinciding with a dramatic rise in interest rates.⁴ The results of the change in policy were dramatic. Inflation fell from over 13% in 1980 to 6.2% by 1982 and the U.S.

³ The literature on this issue is vast. For some examples, see Taylor (1984), Blanchard (1984), Huizinga and Mishkin (1986) Antoncic (1986), Walsh (1988), Garcia and Perron (1996), Bekaert, et.al. (2001), Bansal and Zhou (2002), and Fink (2004). Duffy and Engle-Warnick (2004) provide a nice summary of the current literature on regime changes in monetary policy and U.S. interest rates.

economy experienced a severe contraction from July 1981 through November 1982.⁵ Since 1982, the Federal Reserve's pursuit of zero inflation has led to lower and more volatile short rates.⁶ Finally, in addition to changes in monetary policy, fiscal policy also has a significant impact on the shape and movement of the term structure. For example, there is evidence that the large and sustained federal budget deficits throughout the 1980s and early 1990s caused long-term rates to exceed short term rates by a wider margin than they did throughout the Pre-Volker period.⁷

Given these basic economic patterns, it is possible that excess bond returns experience structural breaks as well. One obvious candidate for a structural break is the drastic change in US monetary and fiscal policy during the early 1980s. Although a full treatment of the history, causes, and consequences of monetary and fiscal policy and their impact on U.S. interest rates is beyond the scope of this paper, we simply want to point out that there is considerable economic and statistical evidence that both monetary and fiscal policy exhibit regime switching behavior with a large shock occurring in the early 1980s.

B. Structural shifts in excess bond returns

Given the evidence for structural breaks in the time series of U.S. interest rates discussed in the previous section, it is possible that the time series of excess bond returns that we consider here also exhibits structural breaks. In this section, we test whether excess bond returns exhibit similar shifts over the sample period by employing standard change-point tests for a structural break.

⁴ See Blanchard (1984) and Taylor (1984) for additional description of the economic state at the time.

⁵ Source: <http://www.nber.org/cycles/cyclesmain.html>.

⁶ This literature is vast. See, for one recent example, Ang and Bekaert (2003).

⁷ See Gale and Orszag (2003) for a recent survey of the large literature on the relationship between budget deficits and the crowding out effect on long-term bond yields.

In the case of a simple structural parameter break, consider a dynamic relation between X and y given by

$$y_t = X_{t-1}\beta_t + \varepsilon_t$$

where β_t evolves according to

$$\beta_t = \beta, t \leq r \quad \text{and} \quad \beta_t = \beta + \gamma, t > r$$

and r is the structural break point for $\gamma \neq 0$. That is, the parameter β_t changes in time period r from β to $\beta + \gamma$. In the simplest case, we model each of our measures of excess bond returns as following a white noise process with a constant term that (possibly) has a regime shift.⁸

Following Chow (1960), we construct an F-statistic based on a structural break which occurs at $t=r$,

$$F_T \left(\frac{r}{T} \right) = \frac{SSR_{1,T} - (SSR_{1,r} + SSR_{r+1,T})}{(SSR_{1,r} + SSR_{r+1,T}) / (T - 2k)} \quad (3)$$

where SSR is the sum of squared residuals from the OLS regression over each sample or sub-sample period, r is the break date, and T is the number of periods in the sample. Intuitively, the F -statistic given in (3) measures whether the errors from estimating the relationship between X and y are smaller when the parameters are allowed to change at point r .

However, since the break date (r) may be unknown (as in our case), we follow Quandt (1960) and Davies (1977) in measuring the maximum statistic over all r as:

$$QLR = \max_{r=r_0, \dots, r_1} F_T \left(\frac{r}{T} \right) \quad (4)$$

⁸ We also consider more complicated tests where there are time-series dependencies of various orders, but our results do not vary qualitatively.

Andrews (1993) derives the limiting distribution of the QLR test statistic when the break point is unknown and derives the critical values for rejection of the null hypothesis of no change.

Further, Hansen (2000) shows that the asymptotic critical values used by Andrews (1993) may be biased downward in the presence of nonstationarity, in either the mean or variance of the regressors. Since our series may exhibit nonstationarity, we also compute critical values for the statistic given in (4) using the Hansen (2000) heteroskedastic fixed-regressor bootstrap procedure.

Table 3 presents the results of our change point test for the excess bond return series. In Panel A, we test construct the QLR statistic by simply testing whether there is a change in the unconditional mean in excess bond returns over the sample period. That is, we test the null hypothesis that excess bond returns are constant over the sample as in:

$$Excess\ Return_t = \alpha + \varepsilon_t \quad (5)$$

against the alternative hypothesis that the mean excess bond return changes at period r :

$$Excess\ Return_t = \alpha + \gamma I_{t>r} + \varepsilon_t \quad (6)$$

where $I_{t>r}$ is a dummy variable equal to one if $t>r$, zero otherwise.

The results presented in Panel A of Table 3 show that we can reject the null hypothesis that the unconditional mean excess bond return is constant over the sample. For excess government bond returns and excess corporate bond returns, our test identifies 1982 as the only structural change point. For three-year cumulative government and corporate bond returns, our test identifies 1981 as the only structural change point.

In Panel B of Table 3, we test whether there is evidence of a regime shift conditional on the forecasting ability of the lagged long-term share variable.⁹ That is, we test the null hypothesis that excess returns are described by

$$\text{Excess bond return}_{t+1} = \alpha + \gamma I_{t>r} + \beta \frac{d_{Lt}}{d_{Lt} + d_{St}} + \varepsilon_{t+1} \quad (7)$$

as opposed to the alternative hypothesis that there is a structural break, as in:

$$\text{Excess bond return}_{t+1} = \alpha + \beta \frac{d_{Lt}}{d_{Lt} + d_{St}} + \varepsilon_{t+1} \quad (8)$$

This is a somewhat more conservative test than the one presented in panel A, since it allows for the long-term share in new debt issues to (potentially) proxy for any regime change in the mean.

Panel B of Table 3 shows that the *QLR* statistic, again, is maximized when a break is included at 1982 and, again, we reject the hypothesis that there is a constant average excess bond return for the series. That is, even conditional on the lagged long-term share of new issues, the data suggest that a model which does not include a structural break at 1982 is misspecified.

The existence of a change point in excess bond returns at 1982 is economically intuitive. The period represents a systematic change in monetary policy, and the beginning of a long period of large federal budget deficits. Further, this period is the most commonly identified structural break in the term structure, time series, and macroeconomics literatures.¹⁰ All evidence, both statistical and economic, points to the early 1980s as the only change point in our sample.

C. The effects of the regime change

⁹ All of our results are qualitatively unchanged if we include new short-term issues of debt and new long-term issues of debt separately as conditioning variables, rather than the share of new long-term debt.

¹⁰ See the references cited above.

The existence of a structural break can have a significant effect on any number of economic variables and on any statistical inference based on those variables.¹¹ We show in Table 4 the effects that the regime change had on both the maturity of debt issues and the excess returns on government and corporate bonds. Table 4 shows that average annual short-term debt issuances increased, average annual long-term debt issuances decreased, and the share of long-term debt in all new debt issues decreased. Each of these differences in means is significant at the 1% confidence level (except for d_{Lt}/D_{t-1} , which is significant at the 10% level). At the same time, the average (median) excess government bond returns went from -2.3% (-3.0%) during the pre-1982 period to 6.7% (7.8%) during the post-1982 period. Corporate bond excess returns behaved similarly, shifting from an average (median) of -1.8% (-2.9%) to 6.5% (6.6%) after 1982. Each of these differences in means is significant at the 1% confidence level.

The evidence in Table 4 is interesting because it suggests that the relation between excess bond returns and the long term share is consistent with pseudo market timing. It appears that the negative relation between excess bond returns and the long term share is driven by the fact that both series react to a common exogenous shock. That is, managers started to issue more short-term debt relative to long-term debt when the relative cost of long-term systematically increased in the early 1980s. As we explain above, this shock generates a spurious in-sample negative correlation between debt maturity and future excess long-term bond returns because the long-term share tends to be high (low) during the period when the relative cost of long-term debt is low (high). Thus, to distinguish between managerial timing and pseudo market timing, we need to control for the structural shift in excess long-term bond returns. We turn our attention to this issue in sections II.D and II.E.

D. Simulations: Regime change and predictive regressions

¹¹ See, for example Pesaran and Timmerman (2003) for a general treatment of the issue.

In this sub-section we show how an exogenous shock like the change in monetary and fiscal policy in the early 1980s could generate a spurious correlation between two independent random variables. We do this by simulating 10,000 series of 100 observations of excess bond returns and long-term debt share. To simulate the effect of the regime shift in monetary and fiscal policy on excess bond returns, we assume that the first (last) 50 observations of the series of excess bond returns come from a normal distribution with parameters equal to the mean and standard deviation of this variable over the pre- (post-) 1982 period. We perform the same procedure to generate the series of long-term debt share. Then, using data from the simulated series, we regress the excess bond returns on the standardized lagged values of the long-term debt share over the entire simulated sample.

The results from this analysis are reported in Table 4. This table shows that the average coefficient of the 10,000 regressions of the excess bond returns on the lagged value of the long-term share equals -0.025. Note that this value is almost identical to the value of the coefficient estimated using the historical data. As shown in Table 2, the coefficient of the lagged long-term debt share is equal to -0.024. That is, we can replicate the results in Baker, Greenwood, and Wurgler (2003) by regressing two variables that by construction are conditionally independent after controlling for a common exogenous shock. This evidence reinforces our argument that the relation between future excess bond returns and the long-term share may be driven by pseudo-market timing.

E. Omitted variable bias

In this section we return our attention to the actual historical data, armed with our knowledge that there is a regime shift in bond excess returns and maturities and that ignoring this regime shift can dramatically affect inferences in predictive regressions of future excess bond

returns on the long-term debt share. In essence, the share of long-term debt serves as an instrumental variable for the structural break.

To see the intuition behind this, consider a classic omitted variables problem where y depends on both X_1 and X_2 , but the researcher incorrectly specifies the model by including only X_1 as a regressor. In this case, the estimation equation is represented by:

$$y = X_1\beta_1 + X_2\beta_2 + \varepsilon \quad (9)$$

However, the researcher incorrectly measures β_1 using the estimator given by

$$b_1 = (X_1'X_1)^{-1} X_1'y \quad (10)$$

That is, b_1 is the OLS estimate from a model that only includes X_1 . In this case, b_1 is a biased estimator of β_1 since the expected value of b_1 is given by:

$$\begin{aligned} E[b_1] &= E\left[(X_1'X_1)^{-1} X_1'y\right] \\ &= E\left[(X_1'X_1)^{-1} X_1'(X_1\beta_1 + X_2\beta_2 + \varepsilon)\right] \\ &= E[\beta_1] + E\left[(X_1'X_1)^{-1} X_1'X_2\beta_2\right] + E[\varepsilon] \\ &= \beta_1 + \gamma\beta_2 \end{aligned} \quad (11)$$

where γ is the OLS estimate of the regression coefficient from regressing X_1 on X_2 . The basic problem is that if X_1 and X_2 are correlated, then β_1 gets contaminated by β_2 if X_2 is omitted in the regression.

To see the effect that this bias can have, consider the following example. If we estimate Equation (9) using the standardized one-year ahead excess government bond return ($r_{GL}-r_{Gs}$) and we use only the long-term share of new issues as a predictor, our estimate of the b_1 coefficient given by Equation (10) is found to be -0.23. As in Table 2, this coefficient is found to be

statistically different from zero with a standard error of -0.14. The constant term may be omitted since we have standardized the dependent variable for this exercise.

In the case of predicting U.S. bond returns, one obvious candidate for an omitted variable (X_2) is the 1982 structural break already discussed. A simple way to model this shift would be to include a regime change dummy variable which is equal to one after 1981 and zero otherwise. In other words, the model should include a dummy variable for the structural break in excess bond returns. If the long-term share variable is correlated with the regime change, then the regression coefficient on long-term share, b_1 , will be biased and researchers could draw incorrect inferences based on a model that does not incorporate the change in regime.

Performing an OLS regression of X_1 on X_2 (the regime shift dummy on the lagged long-term share) yields a coefficient estimate (the γ coefficient from equation (11)) equal to -0.28 (which is significantly different from zero at the one percent level with a standard error of 0.0565 and an R^2 of 39%). Since these two variables are highly correlated, it is possible that the coefficient on the lagged long-term share is contaminated by the post-1981 dummy variable. When we estimate equation (9) including both explanatory variables, our measure of β_2 is 0.95, which is also statistically significant at the 1% level.

These results imply that, based on equation (11), the bias in β_1 is equal to $-0.28 \times 0.95 = -0.27$ if we incorrectly use equation (10). That is, even if β_1 is truly zero in population, we expect a point estimate of -0.27 on the long-term debt share when we omit the regime shift dummy. Since our actual estimate of β_1 from equation (3) is -0.23, we cannot reject the hypothesis that this coefficient is driven *entirely* by the bias in our estimate. As we show in the next sub-section, once we include the regime change dummy variable, our estimate of β_1 is no longer significantly different from zero at any traditional confidence level. Overall, this result

supports the hypothesis that the predictability of the long-term debt share stems from an omitted variable bias induced by pseudo market timing and not from any successful strategic behavior on the part of corporate managers.

F. The effect of controlling for the regime change in excess bond returns

In this section, we present the results of regression based tests of the managerial timing hypothesis guided by the results of the structural break analysis presented above. To accommodate the shift in the mean of excess bond returns over the sample period, we augment the regression specification given in (1) and (2) to include a dummy variable equal to one if the observation occurs after 1981, zero otherwise. The new regression equations are given by:

$$\text{Excess bond return}_{t+1} = \alpha + \gamma I_{t>1981} + \beta_1 \frac{d_{Lt}}{D_{t-1}} + \beta_2 \frac{d_{St}}{D_{t-1}} + \varepsilon_{t+1} \quad (12)$$

$$\text{Excess bond return}_{t+1} = \alpha + \gamma I_{t>1981} + \beta \frac{d_{Lt}}{d_{Lt} + d_{St}} + \varepsilon_{t+1} \quad (13)$$

where $I_{t>1981}$ is the post 1981 indicator variable. When the dependent variable is the three-year cumulative government or corporate bond returns, the dummy variable is equal to one if the observation occurs after 1980, zero otherwise.

Table 6 presents the results of our augmented regression analysis. In all specifications, for all excess bond return series, the coefficient on the post-1982 dummy variable is statistically significant and economically large. This is not surprising given the strong indication of the structural break identified in the previous sub-sections. As expected, the inclusion of this variable has a significant effect on the predictive ability of new debt issues to explain future excess bond returns. As the coefficients on $\frac{d_{Lt}}{D_{t-1}}$, $\frac{d_{St}}{D_{t-1}}$, and $\frac{d_{Lt}}{d_{Lt} + d_{St}}$ indicate, once we include

a simple dummy variable for the post-1982 period, there is no evidence of predictability for future excess government bond returns or future excess corporate bond returns. The insignificance of these variables does not change whether we look at 1-year ahead, 2-years ahead, 3-years ahead, or cumulative 3-years ahead returns. In short, the predictive content of the maturity structure of new debt issues vanishes after we control for the structural break in excess bond returns. These results are consistent with the simulation results and our estimate of the magnitude of the omitted variable bias.

Overall, we interpret these findings as evidence that the long term share of new debt issues has no predictive power for future bond returns. Thus, it appears that the in-sample evidence of managerial timing presented in Table 2 is completely driven by pseudo market timing. Our findings provide an efficient markets explanation for the seemingly strong ability of corporate managers to accurately time the debt market and cast significant doubt on the hypothesis that corporate managers are able to reduce their cost of capital through strategically timing the maturity of their debt issues.

IV. Robustness

A. Changes in maturity structure versus long-term share in new issues

Consistent with prior studies, we define the change in short-term debt at time t as the level of short-term debt at time t and we measure the change in long-term debt at time t as the change in the level of long-term debt from time $t-1$ to time t , plus one-tenth the level of long-term debt at time $t-1$ (the assumption here is that one-tenth of the long-term debt matures each year). Although these definitions seem to be good proxies for the amount of short- and long-

term debt firms issue to replace old debt and raise new money, they do not reflect changes in the *maturity structure* of firms' debt.

To understand this difference, consider the following example. Suppose that the amount of short-term debt at both time t and time $t+1$ is \$500 million, and that the amount of long-term debt at time t and time $t+1$ is \$200 and \$400 million, respectively. Although it is clear that the firms in this example are significantly increasing the average maturity of their debt (no change in short-term debt versus a change in long-term debt of \$200 million), the definitions in Baker, Greenwood, and Wurgler (2003) do not capture this, but rather capture only the change in maturity of marginal issues.

Thus, to measure the changes in the aggregate maturity structure, we need a measure that captures only the changes in debt that move firms from their previous maturity structure. Our previous example suggests that the net changes in short-term and long-term (e.g., changes in levels) capture the changes in maturity structure. Thus, we use these variables to investigate whether firms deviate from their previous debt maturity structure in anticipation of changes in future interest rates.

For our empirical analysis, we define the change in short-term (long-term) debt as the changes in the level of short-term (long-term) debt from time $t-1$ to time t , scaled by the level of short-term (long-term) debt at time $t-1$. We also create a variable that measures the differential in the growth rates between long-term debt and short-term debt (the change in long-term debt minus the change in short-term debt) to capture in one variable the strategic behavior of corporate managers.

In Table 7 we replicate the analysis in Table 2 using our alternative definitions for the changes in short-term debt and long-term debt. Contrary to the predictions of the managerial

timing hypothesis, we find no evidence that managers change the maturity structure of their debt to time future changes in excess bond returns.¹² None of the coefficients in this table are statistically different from zero at conventional significance levels. These results, combined without our previous evidence, cast serious doubts on the managerial timing hypothesis.

B. Out-of-sample tests

One important distinction between the managerial timing hypothesis and the aggregate pseudo market timing hypothesis relates to the out-of-sample performance of predicting future bond returns. Both aggregate pseudo market timing and managerial timing predict that the maturity structure of new issues of corporate debt and future bond returns should be correlated in-sample (ex post analysis) but only the managerial timing hypothesis predicts an out-of-sample relation (ex ante analysis). Thus, the market timing hypothesis predicts a real-time relationship that would be of use to investors, but the pseudo market timing hypothesis does not.

In this sub-section, we exploit this empirical prediction and use out-of-sample methods to evaluate the forecasting ability of the maturity structure of corporate debt as a predictor of future bond returns. To assess the out-of-sample forecasting ability of the long-term share, we follow Butler, Grullon, and Weston (2004) and use the conditional predictive ability approach in Giacomini and White (2003). We compute the one-period-ahead errors that would prevail under the two different models that we consider and then test which model makes larger errors on average. That is, we compare the out-of-sample forecasting ability of a model that uses the long-term share of new debt issues as a predictor (conditional model)

$$\text{Excess bond return}_{t+1} = \alpha + \beta \frac{d_{L_t}}{d_{L_t} + d_{S_t}} + \varepsilon_{t+1} \quad (14)$$

to the forecasting ability of a model that only contains a constant (unconditional model)

¹² We find similar results if we include a dummy variable for the regime shift of 1982.

$$\text{Excess bond return}_{t+1} = \alpha + \varepsilon_{t+1} \quad (15)$$

Since excess bond returns vary over time, we calculate the out-of-sample forecast error of each model, assuming that the parameters of the model can be time-varying. Following Giacomini and White (2003), we use a rolling scheme to allow for time variation in the parameters. Thus, the forecast at time t is based on parameters estimated using a fixed-length window of past observations.¹³

To measure the forecasting ability of each model, we calculate the out-of-sample forecast error of each model, and compare the differences in mean squared errors (MSE) and mean absolute deviation (MAD) between the conditional model and the unconditional model. We expect these average differences to be negative if the long-term share of new debt issues is a good predictor of future returns.

The results of our out-of-sample tests (not reported in a table) are consistent with all of our previous analyses. We find for all estimation windows and for all of our excess bond return series that the maturity structure of new issues of corporate debt has no out-of-sample predictive power. However, it should be noted that, with only 50 observations, the pre-estimation period used to estimate the parameters causes an acute decline in the degrees of freedom that we have to compare the two models. As a result, the power to reject the null hypothesis of no predictability is relatively weak in such a small sample. Nevertheless, these findings are consistent with the aggregate pseudo market timing hypothesis and are inconsistent with existing behavioral explanations.

V. Conclusion

Can corporate managers take advantage of market inefficiencies in the timing of their security offerings? This is an important question in the behavioral corporate finance literature. Dozens of papers have appeared in recent years examining whether managers can accurately time market movements in choosing their equity issues, their debt issues, and/or take advantage of market inefficiencies in timing their capital structure decisions. Our evidence shows that, in the aggregate, managers are unable to successfully time fluctuations in the yield curve. Coupled with the evidence in Butler, Grullon, and Weston (2004) that managers are unable to accurately time the aggregate equity market, this raises serious doubts that managers are as prescient or that the market is as inefficient as some previous studies claim.

More broadly, our paper highlights the importance of properly accounting for macroeconomic shifts in time-series analysis. Major shocks or regime changes can simultaneously affect many economic variables, thereby creating the illusion of causal relationships among them. We show that just such a phenomenon can occur when examining the relation between the share of long-term debt issues in total new debt issues and future excess bond returns. The macroeconomic regime shift caused by the changes in monetary and fiscal policy in the early 1980s affected both the maturities of new bond issues and the excess returns on long-term government and corporate bonds. A researcher failing to control for the structural shift could easily infer, incorrectly, that corporate managers are able to forecast movements in the yield curve better than other market participants and to time their debt issues accordingly. Our results suggest that the maturity of new debt issues cannot predict excess bond returns and corporate managers cannot successfully time the maturity of their debt issues.

¹³ Our results are not sensitive to what window length or method we use to construct the ex ante parameter estimates.

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Table 1
Summary Statistics

This table reports summary statistics for our annual data series for the sample period 1953-2001. Summary statistics are based on annual time series variation for each series. The government excess bond return is constructed as the return on long-term government bonds less the return on treasury bills. Corporate excess bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolio with 20 year maturity and the return on treasury bills. The long-term share of new debt issues is constructed as new issues of long-term debt divided by total new issues of debt. Long-term debt includes industrial revenue bonds, corporate bonds, and mortgages. Total debt also includes commercial paper, bank loans not elsewhere classified, and other short-term loans and advances. All short-term debt is assumed to be new short-term issues. The change in long-term debt plus one-tenth of lagged long-term debt is assumed to be new long-term issues. All data on debt issues are collected from the Federal Reserve Flow of Funds.

Variable	Description	N	Mean	Std. Dev.	ρ	5 th percentile	Median	95 th percentile
$r_{GLt+1} - r_{GSt+1}$	Excess Gov. Bond Returns	49	0.016	0.103	-0.13	-0.129	-0.001	0.216
$r_{CLt+1} - r_{GSt+1}$	Excess Corp. Bond Returns	49	0.018	0.096	-0.01	-0.132	0.026	0.205
$d_{Lt}/[d_{Lt} + d_{St}]$	Long-term share of new issues	49	0.219	0.041	0.59	0.151	0.224	0.286
d_{Lt}/D_{t-1}	Scaled long term debt	49	0.115	0.021	0.37	0.079	0.113	0.153
d_{St}/D_{t-1}	Scaled short term debt	49	0.414	0.059	0.89	0.319	0.416	0.519

Table 2
The Predictive Power of the Maturity of Corporate Debt Issues

This table reports regression results for our annual data series for the sample period 1953-2002. The government excess bond return is constructed as the return on long-term government bonds less the return on treasury bills. Corporate excess bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolio with 20 year maturity and the return on treasury bills. The long-term share of new debt issues is constructed as new issues of long-term debt divided by total new issues of debt. Long-term debt includes industrial revenue bonds, corporate bonds, and mortgages. Total debt also includes commercial paper, bank loans not elsewhere classified, and other short-term loans and advances. All short-term debt is assumed to be new short-term issues. The change in long-term debt plus one-tenth of lagged long-term debt is assumed to be new long-term issues. All data on debt issues are collected from the Federal Reserve Flow of Funds. Each regression specification is of a form similar to: $r_{GLt+1}-r_{GSt+1} = a + \mathbf{b}'\mathbf{X}_t + e_{t+1}$. Regressors are either d_{Lt}/D_{t-1} and d_{St}/D_{t-1} in the left-most regressions, or $d_{Lt}/[d_{Lt}+d_{St}]$ in the right-most regressions; each regressor is standardized to have zero mean and unit variance. The top panel uses excess returns on long-term government bonds as the dependent variable, the bottom panel uses excess returns on long-term corporate bonds. T-statistics are corrected for heteroskedasticity and for time-series dependence up to three lags. a, b, and c denote significantly different from zero at the 1%, 5%, and 10% level, respectively.

Panel A: Excess Government Bond Returns

	N	a	b ₁	b ₂	R ²	N	a	b	R ²
$r_{GLt+1}-r_{GSt+1}$	49	0.016 (1.26)	-0.011 (-0.71)	0.025 ^b (2.29)	3.11%	49	0.016 (1.25)	-0.024 ^c (-1.80)	3.65%
$r_{GLt+2}-r_{GSt+2}$	48	0.015 (1.29)	-0.018 ^c (-1.83)	0.029 ^a (2.98)	7.00%	48	0.015 (1.28)	-0.032 ^a (-3.01)	7.49%
$r_{GLt+3}-r_{GSt+3}$	47	0.016 (1.35)	-0.019 (-1.40)	0.035 ^a (3.18)	10.73%	47	0.016 (1.32)	-0.037 ^a (-2.90)	10.57%
$R_{GLt+3}-R_{GSt+3}$	47	0.038 (1.44)	-0.054 ^b (-2.32)	0.091 ^a (4.50)	35.64%	47	0.039 (1.41)	-0.101 ^a (-4.71)	31.51%

Panel B: Excess Corporate Bond Returns

	N	a	b ₁	b ₂	R ²	N	a	b	R ²
$r_{CLt+1} - r_{GSt+1}$	49	0.018 (1.42)	-0.016 (-1.29)	0.023 ^b (2.22)	5.04%	49	0.018 (1.41)	-0.027 ^b (-2.48)	5.65%
$r_{CLt+2} - r_{GSt+2}$	48	0.017 (1.46)	-0.015 (-1.49)	0.028 ^a (3.27)	7.14%	48	0.017 (1.44)	-0.030 ^a (-2.89)	7.43%
$r_{CLt+3} - r_{GSt+3}$	47	0.018 (1.46)	-0.013 (-0.97)	0.033 ^a (2.94)	9.35%	47	0.018 (1.43)	-0.031 ^b (-2.41)	8.24%
$R_{CLt+3} - R_{GSt+3}$	47	0.044 (1.63)	-0.050 ^b (-2.44)	0.086 ^a (4.08)	32.92%	47	0.044 (1.59)	-0.094 ^a (-4.40)	28.43%

Table 3
Structural break tests for excess bond returns.

This table presents the results of structural break tests for annual excess bond returns. The sample includes annual excess bond returns between 1952 and 2002. The structural break test statistic is constructed following Quandt (1960) as the maximum F statistic over r given by:

$$\text{Max}_{r=r_0, r_1, \dots, r_T} \left[F_T \left(\frac{r}{T} \right) = \frac{\text{SSR}_{1,T} - (\text{SSR}_{1,r} + \text{SSR}_{r+1,T})}{(\text{SSR}_{1,r} + \text{SSR}_{r+1,T}) / (T - 2k)} \right]$$

where SSR is the sum of squared residuals from the OLS regression over each sample or sub-sample period, r is the break date, and T is the number of periods in the sample. The government excess bond return ($r_{GL}-r_{GS}$) is constructed as the return on long-term government bonds less the return on treasury bills. Corporate excess bond returns ($r_{CL}-r_{CS}$) are constructed as the difference between the Ibbotson long-term corporate bond portfolio with 20 year maturity and the return on treasury bills. $r_{GL3}-r_{GS3}$ and $r_{CL3}-r_{CS3}$ represent three-year cumulative government and corporate excess returns, respectively. The long-term share of new debt issues is constructed as new issues of long-term debt divided by total new issues of debt. Long-term debt includes industrial revenue bonds, corporate bonds, and mortgages. Total debt also includes commercial paper, bank loans not elsewhere classified, and other short-term loans and advances. All short-term debt is assumed to be new short-term issues. In Panel A, we compute the test statistic based on the null hypothesis that the series has a constant intercept against the alternative hypothesis that the intercept changes a point r . In Panel B, we include the lagged long-term share of new debt issues as an additional regressor to test whether there is a structural break in the mean of each annual excess bond return series. The Identified break point is defined as value of r that maximizes the test statistic. Andrews p-values are constructed based on the asymptotic distribution of the test statistic following Andrews (1993). Hansen bootstrap p-values are constructed following Hansen (2000).

Panel A: Structural Break test for excess bond returns: constant model				
	Identified Break Point (r^*)	Test statistic	Andrews P-value	Hansen Bootstrap P-value
$r_{GL}-r_{GS}$	1982	11.45	0.011	0.015
$r_{CL}-r_{CS}$	1982	11.14	0.013	0.009
$r_{GL3}-r_{GS3}$	1981	40.91	0.000	0.000
$r_{CL3}-r_{CS3}$	1981	29.72	0.000	0.000
Panel B: Structural break test for excess bond returns including the lagged ratio				
Variable	Identified Break Point (r^*)	Test statistic	Andrews P-value	Hansen Bootstrap P-value
$r_{GL}-r_{GS}$	1982	8.65	0.041	0.078
$r_{CL}-r_{CS}$	1982	10.08	0.021	0.092
$r_{GL3}-r_{GS3}$	1981	14.39	0.003	0.037
$r_{CL3}-r_{CS3}$	1981	12.08	0.008	0.022

Table 4
Excess Bond Returns and the Maturity of Corporate Debt Issues Before and After the
Regime Shift of 1982

This table reports summary statistics for our annual data series for the sample period 1953-2002. We break the summary statistics into two groups – before 1982 and after 1982. Summary statistics are based on annual time series variation for each series. The government excess bond return is constructed as the return on long-term government bonds less the return on treasury bills. Corporate excess bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolio with 20 year maturity and the return on treasury bills. The long-term share of new debt issues is constructed as new issues of long-term debt divided by total new issues of debt. Long-term debt includes industrial revenue bonds, corporate bonds, and mortgages. Total debt also includes commercial paper, bank loans not elsewhere classified, and other short-term loans and advances. All short-term debt is assumed to be new short-term issues. The change in long-term debt plus one-tenth of lagged long-term debt is assumed to be new long-term issues. All data on debt issues are collected from the Federal Reserve Flow of Funds.

	Pre-1982	Post-1982	Difference (Post – Pre)	p-value
$r_{GLt+1} - r_{GSt+1}$				
Mean	-0.023	0.067	0.090	0.0016
Median	-0.030	0.078	0.109	0.0032
Std. Dev.	0.071	0.117		
$r_{CLt+1} - r_{GSt+1}$				
Mean	-0.018	0.065	0.083	0.0019
Median	-0.029	0.066	0.095	0.0011
Std. Dev.	0.077	0.101		
$d_{Lt}/[d_{Lt}+d_{St}]$				
Mean	0.238	0.191	-0.047	0.0001
Median	0.240	0.187	-0.053	0.0000
Std. Dev.	0.032	0.035		
d_{Lt}/D_{t-1}				
Mean	0.119	0.108	-0.011	0.0726
Median	0.115	0.102	-0.013	0.0307
Std. Dev.	0.018	0.024		
d_{St}/D_{t-1}				
Mean	0.383	0.457	0.074	0.0001
Median	0.389	0.454	0.065	0.0000
Std. Dev.	0.047	0.047		

Table 5
Simulation Results

This table reports results from generating 10,000 series of 100 observations of excess bond returns and long-term debt share. To simulate the effect of the regime shift in monetary policy on excess bond returns, we create the first (last) 50 observations of the series of excess bond returns come using a normal distribution with parameters equal to the mean and standard deviation of this variable over the pre- (post-) 1982 period. We perform the same procedure to generate the series of long-term debt share. Then, using data from the simulated series, we regress the excess bond returns on the standardized lagged values of the long-term debt share over the entire simulated sample. Summary statistics over the 10,000 trials for the regression coefficient are reported here.

Model	Number of Simulations	Mean	Std. Dev.	5 th Percentile	Median	95 th Percentile
Without Dummy for Structural Shift	10,000	-0.025 ^a	0.010	-0.043	-0.026 ^a	-0.008
With Dummy for Structural Shift	10,000	0.000	0.012	-0.020	0.000	0.029

Table 6
The Predictive Power of the Maturity of Corporate Debt Issues Controlling for the Regime Shift of 1982

This table reports regression results for our annual data series for the sample period 1953-2002. In these regressions we control for the change in monetary and fiscal policy in 1982 by including in each regression a dummy variable that takes a value of one if the time period is 1982 or later, and zero otherwise. The government excess bond return is constructed as the return on long-term government bonds less the return on treasury bills. Corporate excess bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolio with 20 year maturity and the return on treasury bills. The long-term share of new debt issues is constructed as new issues of long-term debt divided by total new issues of debt. Long-term debt includes industrial revenue bonds, corporate bonds, and mortgages. Total debt also includes commercial paper, bank loans not elsewhere classified, and other short-term loans and advances. All short-term debt is assumed to be new short-term issues. The change in long-term debt plus one-tenth of lagged long-term debt is assumed to be new long-term issues. All data on debt issues is collected from the Federal Reserve Flow of Funds. Each regression specification is of a form similar to: $r_{GLt+1}-r_{GSt+1} = a + \mathbf{b}'\mathbf{X}_t + e_{t+1}$. Regressors are either d_{Lt}/D_{t-1} and d_{St}/D_{t-1} in the left-most regressions, or $d_{Lt}/[d_{Lt}+d_{St}]$ in the right-most regressions; each is standardized to have unit variance. The top panel uses excess returns on long-term government bonds as the dependent variable, the bottom panel uses excess returns on long-term corporate bonds. T-statistics are corrected for heteroskedasticity and for time-series dependence up to three lags. a, b, and c denote significantly different from zero at the 1%, 5%, and 10% level, respectively.

Panel A: Excess Government Bond Returns

	N	a	b ₁	b ₂	c	R ²	N	A	b	c	R ²
$r_{GLt+1}-r_{GSt+1}$	49	-0.028 (-1.36)	0.001 (0.08)	-0.009 (-0.56)	0.103 ^a (2.76)	14.33%	49	-0.026 (-1.34)	0.005 (0.33)	0.097 ^a (2.70)	15.91%
$r_{GLt+2}-r_{GSt+2}$	48	-0.032 (-1.15)	0.001 (0.09)	-0.009 (-0.39)	0.107 ^b (2.13)	15.31%	48	-0.029 (-1.32)	0.005 (0.28)	0.100 ^b (2.65)	16.96%
$r_{GLt+3}-r_{GSt+3}$	47	-0.022 (-0.94)	-0.003 (-0.24)	0.004 (0.19)	0.085 ^c (1.88)	14.61%	47	-0.023 (-1.20)	-0.004 (-0.23)	0.088 ^b (2.53)	16.52%
$R_{GLt+3}-R_{GSt+3}$	47	-0.039 (-0.88)	-0.022 (-1.15)	0.025 (0.84)	0.186 ^b (2.67)	45.39%	47	-0.044 (-1.16)	-0.027 (-1.19)	0.199 ^a (3.38)	46.25%

Panel B: Excess Corporate Bond Returns

	N	a	b ₁	b ₂	c	R ²	N	a	b	c	R ²
$r_{CLt+1} - r_{GS+1}$	49	-0.020 (-0.81)	-0.006 (-0.44)	-0.006 (-0.33)	0.088 ^c (1.97)	14.02%	49	-0.017 (-0.77)	-0.001 (-0.09)	0.082 ^c (1.97)	15.25%
$r_{CLt+2} - r_{GS+2}$	48	-0.024 (-0.82)	0.001 (0.12)	-0.005 (-0.23)	0.094 ^c (1.77)	14.20%	48	-0.022 (-0.95)	0.003 (0.21)	0.091 ^b (2.28)	16.04%
$r_{CLt+3} - r_{GS+3}$	47	-0.020 (-0.82)	0.002 (0.19)	0.002 (0.11)	0.085 ^c (1.84)	13.91%	47	-0.023 (-1.13)	0.003 (0.19)	0.090 ^b (2.64)	15.81%
$R_{CLt+3} - R_{GS+3}$	47	-0.012 (-0.25)	-0.026 (-1.48)	0.039 (1.20)	0.135 ^c (1.76)	37.58%	47	-0.023 (-0.54)	-0.035 (-1.52)	0.160 ^b (2.52)	37.93%

Table 7
The Predictive Power of the Changes in Aggregate Debt Maturity

This table reports regression results for our annual data series for the sample period 1953-2002 using measures of changes in aggregate debt maturity. The government excess bond return is constructed as the return on long-term government bonds less the return on treasury bills. Corporate excess bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolio with 20 year maturity and the return on treasury bills. The long-term share of new debt issues is constructed as new issues of long-term debt divided by total new issues of debt. Long-term debt includes industrial revenue bonds, corporate bonds, and mortgages. Total debt also includes commercial paper, bank loans not elsewhere classified, and other short-term loans and advances. All short-term debt is assumed to be new short-term issues. The change in long-term debt plus one-tenth of lagged long-term debt is assumed to be new long-term issues. All data on debt issues is collected from the Federal Reserve Flow of Funds. Each regression specification is of a form similar to: $r_{GLt+1}-r_{GST+1} = a + \mathbf{b}'\mathbf{X}_t + e_{t+1}$. Regressors are either $(d_{Lt} - d_{Lt-1}) / d_{Lt-1}$ and $(d_{St} - d_{St-1}) / d_{St-1}$ in the left-most regressions, or $(d_{Lt} - d_{Lt-1}) - (d_{St} - d_{St-1})$ in the right-most regressions; each is standardized to have unit variance. The top panel uses excess returns on long-term government bonds as the dependent variable, the bottom panel uses excess returns on long-term corporate bonds. T-statistics are corrected for heteroskedasticity and for time-series dependence up to three lags.

Panel A: Excess Government Bond Returns

	N	a	b ₁	b ₂	R ²	N	a	b	R ²
$r_{GLt+1}-r_{GST+1}$	49	0.016 (1.14)	0.003 (0.18)	-0.011 (-0.71)	-3.16%	49	0.016 (1.15)	0.011 (0.76)	-1.02%
$r_{GLt+2}-r_{GST+2}$	48	0.015 (1.01)	-0.001 (-0.05)	-0.011 (-0.61)	-3.35%	48	0.015 (1.02)	0.009 (0.58)	-1.39%
$r_{GLt+3}-r_{GST+3}$	47	0.016 (1.05)	-0.008 (-0.51)	0.014 (1.16)	-2.35%	47	0.016 (1.06)	-0.015 (-1.15)	-0.07%
$R_{GLt+3}-R_{GST+3}$	47	0.041 (1.09)	-0.009 (-0.33)	0.001 (0.03)	-4.26%	47	0.041 (1.10)	-0.004 (-0.18)	-2.17%

Panel B: Excess Corporate Bond Returns

	N	a	b ₁	b ₂	R ²	N	a	b	R ²
$r_{CLt+1} - r_{GSSt+1}$	49	0.018 (1.29)	-0.003 (-0.21)	-0.011 (-0.68)	-3.01%	49	0.018 (1.30)	0.008 (0.60)	-1.38%
$r_{CLt+2} - r_{GSSt+2}$	48	0.017 (1.19)	-0.0003 (-0.04)	-0.004 (-0.28)	-4.25%	48	0.017 (1.20)	0.003 (0.27)	-2.04%
$r_{CLt+3} - r_{GSSt+3}$	47	0.018 (1.22)	-0.004 (-0.29)	0.019 (1.54)	-0.82%	47	0.018 (1.23)	-0.018 (-1.38)	1.17%
$R_{CLt+3} - R_{GSSt+3}$	47	0.045 (1.27)	-0.010 (-0.43)	0.012 (0.48)	-3.77%	47	0.045 (1.28)	-0.015 (-0.65)	-1.52%