

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

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ABSTRACT

This paper provides a rational explanation for the apparent ability of managers to successfully time the maturity of their debt issues. We show that a structural break in excess bond returns during the early 1980s generates a spurious correlation between the fraction of long-term debt in total debt issues and future excess bond returns. Contrary to Baker, Taliaferro, and Wurgler (2006), we show that the presence of structural breaks can lead to nonsense regressions, whether or not there is any small sample bias. Tests using firm-level data further confirm that managers are unable to time the debt market successfully.

AN IMPORTANT IMPLICATION OF THE EFFICIENT MARKETS HYPOTHESIS is that corporate managers cannot, on average, successfully predict future market returns. While managers may *try* to issue equity when they believe it is overvalued or to 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 argue that such forward-looking timing efforts may in fact correctly anticipate future market returns and lead firms to a lower cost of capital through successful market timing (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, recent evidence suggests that managers also time the maturity of their debt issues. For instance, Baker, Greenwood, and Wurgler (2003) document that, in the aggregate, managers are able to engage in successful forward-looking timing of 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

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bond returns and the ratio of long-term debt issues to total debt (the "long-term share"). They interpret this as evidence of successful forward-looking timing—that is, 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 examine an alternative explanation for this result that is consistent with the efficient markets hypothesis. Specifically, we argue that a structural shift in the time series of excess long-term bond returns can create the illusion of successful forward-looking timing.

To understand the effect that a structural break can have on a regression coefficient, consider a simple illustration. Suppose that Y and X are two random variables that both exhibit an exogenous structural break in their means, but innovations in the two series are otherwise independent. For example, suppose a trade barrier to the importation of bananas and textiles is suddenly lifted due to a newly ratified trade agreement (an exogenous shock). In response, one would expect the average price of bananas (Y) to decline and the average quantity of textiles consumed (X) to increase. Since the means of Y and X change at the same time, the two series can exhibit a significant (unconditional) correlation because Y tends to be above its sample mean during the period in which X is below its sample mean (before the trade agreement), and vice versa. Now suppose an econometrician draws a finite sample of Y and X from both the pre- and post-trade agreement periods but ignores the structural break. If she regresses Y on X , she may find a large t -statistic on the regression coefficient for X . One interpretation of this regression result might be that the quantity of textiles consumed affects the price of bananas, although there is no real causal link between them. In this spurious regression, X simply serves as a proxy for the omitted structural change (the lifting of the trade barrier) in Y .

The spurious regression induced by shifting means can also create problems in predictive regressions of the type we consider here. Continuing the bananas-textiles example, if an econometrician regresses Y on *lagged* values of X , she may find evidence that the quantity of textiles consumed predicts future prices of bananas because lagged X will also tend to be above (below) its sample mean during the period in which Y is below (above) its sample mean. Even though X does not predict Y throughout the sample, an in-sample ordinary least squares (OLS) regression could generate a spurious correlation due to the shift in means around the trade agreement. As we show in this paper, structural shifts in the data can generate the illusion of successful forward-looking managerial timing.¹

¹ The problem here is similar to the "nonsense regressions" of Hassler (2003).

In the case of excess bond returns, we find evidence of a structural break in 1982 around a significant change in U.S. monetary and fiscal policy.² 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 after 1982. Since this phenomenon causes the ratio of long-term debt issues to total debt issues to be above (below) its sample mean during the period in which the relative cost of long-term debt is below (above) its sample mean, an in-sample negative correlation could arise between the long-term share and future excess long-term bond returns. That is, even if firms only *react* to (as opposed to accurately *forecast*) 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 could generate an in-sample regression coefficient that might give the false appearance of successful forward-looking timing.

This is an important issue because previous work examining the predictive power of the long-term share uses a misspecified regression model that does not incorporate the effects of the structural break in 1982. Thus, it is possible that the previously documented negative relation between the long-term share and future excess bond returns may be spurious since the long-term share may simply be proxying for the omitted structural break. Consistent with this explanation, we find that ignoring the structural shift in the predictive regressions can significantly affect inferences about the coefficient of the long-term share. Specifically, we find that if we condition on the structural shift, the correlation between the long-term share and future excess returns disappears. That is, we find no evidence of within-regime predictability.

Although our empirical analysis suggests that the predictive power of the long-term share may be spurious, it is possible that the correlation between the long-term share and the structural shift may reflect the fact that managers predicted the break. We directly examine this explanation and find little evidence supporting it. Even in anticipation of a very large change in excess bond returns, managers do not appear to have guessed correctly the future direction of excess long-term bond returns in the years around the break.³ Thus, it seems that the correlation between the long-term share (the predictor) and the structural break is driven by managers' *reaction* to the break. That is, managers appear to have simply reacted to the structural break by issuing more short-term debt when excess bond returns were relatively high, causing the long-term share to be relatively low after the break. Overall, we find little evidence of either successful within-regime timing behavior or successful between-regime timing behavior.

² This result is consistent with numerous previous studies. For example, using a two-state Markov switching model, Baker, Taliaferro, and Wurgler (2006) also find a single structural shift in the time series of excess returns in the early 1980s.

³ However, even if managers were able to predict the break, it would still be incorrect to make inferences about predictability for the full sample because the predictive power of the long-term share would be driven solely by the observations around the break.

In addition to our analysis of aggregate data, we also examine the successful market timing hypothesis using firm-level data from Compustat. Specifically, we examine the relation between the proportion of firms with a net increase in long-term debt and future excess aggregate bond returns. The results from this analysis indicate that the proportion of firms that are net long-term debt issuers is unrelated to future excess bond returns. First, we find that, in any particular year, about half of all firms that issue new debt are net long-term debt issuers while the other half are net short-term issuers, independent of whether excess bond returns are low or high in the future. Further, we find no evidence that managers who "successfully" time the direction of future excess bond returns in a given year can repeat their performance in the future. Overall, our evidence indicates that previous evidence of successful market timing is not robust to alternative tests.

In a recent critique of our work, Baker et al. (2006) estimate whether predictive regressions of the type we consider here are affected by the small sample bias of Stambaugh (1999). They argue that the bias of Stambaugh (1999) is not severe and conclude that regression-based evidence of predictability must therefore reflect true predictive power. They also claim that the problem we identify in this paper is just another name for the bias of Stambaugh (1999). We comment on this issue directly and show that this is just not the case.⁴ While Baker et al. (2006) confirm that excess bond returns experience a structural shift in the early 1980s, they assume that there is no relation between the predictor variable and the structural shift. As we show in this paper, it is exactly this property of the data that drives the dynamic misspecification we consider here. Thus, while Baker et al. (2006) clearly show that the bias of Stambaugh (1999) is small in this case, they fail to uncover a very simple, but different, form of spurious regression.⁵

Our work is also directly related to a recent survey of corporate financial managers by Graham and Harvey (2001). They present evidence that managers react to current bond market conditions (firms issue debt when "interest rates are particularly low" (table 9, p. 220)) and may also attempt to time the maturity of their debt issues in a forward-looking sense (firms issue short-term when waiting for long-term market interest rates to decline (table 11, pp. 224–225)). 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 cannot successfully predict fluctuations in the yield curve.

The remainder of the paper is organized as follows. Section I presents a description of our sample and replicates previous results. Section II examines

⁴ In previous work, we refer to this problem as aggregate pseudo market timing. This may be a somewhat confusing term for what is generally considered spurious regression. Our motivation for this terminology is simply that evidence of market timing may be "pseudo" if it is driven only by spurious inference.

⁵ For a technical derivation of the actual bias we identify in this paper, see Butler, Grullon, and Weston (2006).

the effect of structural breaks on predictive regressions. In Section III we explore the successful managerial timing hypothesis with firm-level tests using Compustat data. Section IV reports the results of several robustness tests. Section V concludes.

I. Sample

A. Sample Description

We use the same data as Baker et al. (2003), updating the sample through 2002.⁶ We collect data on debt issues and their relative maturities from the Federal Reserve Flow of Funds and data on bond returns from Ibbotson Associates. 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 the 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 level of total 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 bond returns are $r_{GL_t} - r_{GS_t}$ and $r_{CL_t} - r_{GS_t}$, respectively. Cumulative bond returns are labeled as $R_{GL_{t+3}} - R_{GS_{t+3}}$ to denote, for instance, 3-year cumulative excess government bond returns.

We provide summary statistics for these variables in Table I. Our measures of excess government bond returns, the 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. Because our measure of excess corporate bond returns is calculated as the excess long-term bond return over Treasury bill rates rather than over commercial paper rates, our mean excess corporate bond return of 1.8% is higher than the 0.66% that Baker et al. (2003) report. However, while our measure is slightly different, our in-sample regression results do not differ qualitatively.

⁶ Following Baker, Greenwood, and Wurgler (2003) and other researchers, we start our analysis as of 1953 because the Federal Reserve pegged short-term interest rates until 1952.

Table I
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. Excess government bond returns are constructed as the returns on long-term government bonds less the returns on Treasury bills. Excess corporate bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolios with 20-year maturity and the returns 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. We collect all data on debt issues from the Federal Reserve Flow of Funds.

Variable	Description	N	Mean	Std. Dev.	ρ	5th Percentile	Median	95th 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

B. In-sample Evidence of Managerial Timing

The underlying hypothesis of successful managerial market timing is that corporate managers strategically shift between long-term and short-term debt in prescient 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 et al. (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 debt issues, we should expect the coefficients on the new long-term issues and the long-term share to be negative

and the coefficient on 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 II we replicate the results of this regression-based test with our updated sample. Following Baker et al. (2003), we standardize our debt maturity measures to have zero mean and unit variance. Our results are very similar to those in previous studies, with 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 nontrivial: A one-standard deviation increase in the long-term share is associated with a 2.4 (2.7) percentage point decrease in the next year's excess returns for long-term government (corporate) bonds. The results are stronger for excess returns 2 and 3 years ahead, as well as for the 3-year cumulative excess returns. 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 the presence of a structural break in the time series of excess bond returns can complicate interpretations of simple full-sample regressions using these data.

II. Predictive Regressions and Structural Breaks

A. *The Regime Change in U.S. Interest Rates in the Early 1980s*

There is a large and well-developed literature in both economics and finance, which finds that interest rates exhibit regime switching or structural break behavior.⁷ 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, as Granger and Newbold (1974) show, nonstationarity can have a significant effect on the parameters of an OLS regression. As we discuss below, statistical tests that do not account for the effects of structural breaks may lead to a spurious rejection of the null of no predictability.

There are several reasons to suspect that excess long-term bond returns are likely to experience structural breaks. First, as we mention above, a well-established body of statistical evidence indicates that interest rates exhibit structural breaks and regime switching behavior. Second, there are good economic reasons to expect that interest rates, term spreads, and excess bond returns exhibit structural breaks. For example, business cycle expansions and contractions, changes in monetary policy objectives, and inflation

⁷ This literature is vast. For some examples, see Taylor (1984), Blanchard (1984), Huizinga and Mishkin (1986), Antoncic (1986), Walsh (1988), Garcia and Perron (1996), Gray (1996), Bekaert, Hodrick, and Marshall (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.

Table II
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. Excess government bond returns are constructed as the returns on long-term government bonds less the returns on Treasury bills. Excess corporate bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolios with 20-year maturity and the returns 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. We collect all data on debt issues from the Federal Reserve Flow of Funds. Each regression specification is of a form similar to: $r_{GL,t+1} - r_{GSI,t+1} = a + bX_t + e_{t+1}$. Regressors are either d_{LL}/D_{t-1} and d_{SL}/D_{t-1} in the left-most columns, or $d_{LL}/[d_{LL} + d_{SL}]$ in the right-most columns; 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, and the bottom panel uses excess returns on long-term corporate bonds. t -statistics based on Newey–West standard errors are reported in parentheses below coefficient estimates. Superscripts a, b, and c denote significantly different from zero at the 1%, 5%, and 10% level, respectively.

Panel A: Excess Government Bond Returns

	<i>N</i>	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	Adjusted <i>R</i> ² (%)	<i>N</i>	<i>a</i>	<i>b</i>	Adjusted <i>R</i> ² (%)
$r_{GL,t+1} - r_{GSI,t+1}$	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
$r_{GL,t+2} - r_{GSI,t+2}$	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
$r_{GL,t+3} - r_{GSI,t+3}$	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
$R_{GL,t+3} - R_{GSI,t+3}$	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

	<i>N</i>	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	Adjusted <i>R</i> ² (%)	<i>N</i>	<i>a</i>	<i>b</i>	Adjusted <i>R</i> ² (%)
$r_{CL,t+1} - r_{CSI,t+1}$	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
$r_{CL,t+2} - r_{CSI,t+2}$	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
$r_{CL,t+3} - r_{CSI,t+3}$	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
$R_{CL,t+3} - R_{CSI,t+3}$	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

expectations all naturally exhibit regime-switching behavior, which feeds into the observed levels and changes in interest rate series. Perhaps the most frequently identified regime shift in the post-war United States is that of the "Volcker experiment" in the early 1980s, when the Federal Reserve began a zero inflation policy in order to control rising inflation. At that time, the new Chairman of the Federal Reserve, Paul Volcker, pursued a restrictive monetary policy that significantly increased interest rates.⁸ 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. economy experienced a severe contraction from July 1981 through November 1982.⁹ Since 1982, the Federal Reserve's pursuit of zero inflation has led to lower and more volatile short rates.¹⁰ Moreover, 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-Volcker period.¹¹

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 the U.S. 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, considerable economic and statistical evidence suggests 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 that we discuss in the previous section, it is possible that the time series of excess bond returns that we consider in this paper 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.¹²

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

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

⁸ See Blanchard (1984) and Taylor (1984) for additional descriptions of the economic state at the time.

⁹ Source: <http://www.nber.org/cycles/cyclesmain.html>.

¹⁰ This literature is vast. For one recent example, see Ang and Bekaert (2003).

¹¹ 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.

¹² In Section IV.B we investigate whether the series exhibits a unique structural break or more general Markov switching behavior. While we find evidence of only one break, our results are not sensitive to the inclusion of multiple break points or regime switching behavior.

where β_t evolves according to

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

where 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 this simple case, our measures of excess bond returns follow a white noise process with a constant term that (possibly) has a regime shift.¹³ Following Chow (1960), we then construct an F -statistic based on a structural break that occurs at $t = r$, that is,

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

where SSR is the sum of squared residuals from the OLS regression over each sample or subsample 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 .

In our case, the break date (r) is unknown. Therefore, we follow Quandt (1960) and Davies (1977) in measuring the maximum statistic over all r as

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

Andrews (1993) derives both the limiting distribution of the QLR test statistic when the break point is unknown and the critical values for rejection of the null hypothesis of no change. However, 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 III presents the results of our change point test for the excess bond return series. In Panel A, we test construct the QLR statistic by 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

$$\text{Excess Return}_t = \alpha + \varepsilon_t, \quad (5)$$

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

$$\text{Excess Return}_t = \alpha + \gamma I_{t \geq r} + \varepsilon_t, \quad (6)$$

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

¹³ We also consider more complicated tests in which there are time-series dependencies of various orders; but our results do not vary qualitatively.

Table III
Tests for Structural Breaks in 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:

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

where SSR is the sum of squared residuals from the OLS regression over each sample or subsample period, r is the break date, and T is the number of periods in the sample. Excess government bond returns ($r_{GL} - r_{GS}$) are constructed as returns on long-term government bonds less the returns on Treasury bills. Excess corporate bond returns ($r_{CL} - r_{GS}$) are constructed as the difference between the Ibbotson long-term corporate bond portfolios with 20-year maturity and the returns on Treasury bills. $R_{GL3} - R_{GS3}$ and $R_{CL3} - R_{GS3}$ represent 3-year cumulative excess government and corporate bond 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 at 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 the 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

Variable	Identified Break Point (r^*)	Test Statistic	Andrews p -value	Hansen Bootstrap p -value
$r_{GL} - r_{GS}$	1982	11.45	0.011	0.015
$r_{CL} - r_{GS}$	1982	11.14	0.013	0.009
$R_{GL3} - R_{GS3}$	1981	40.91	0.000	0.000
$R_{CL3} - R_{GS3}$	1981	29.72	0.000	0.000

Panel B: Structural Break Test for Excess Bond Returns Including the Lagged Long-Term Share

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
$r_{CL} - r_{GS}$	1982	10.08	0.021	0.092
$R_{GL3} - R_{GS3}$	1981	14.39	0.003	0.037
$R_{CL3} - R_{GS3}$	1981	12.08	0.008	0.022

The results presented in Panel A of Table III 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 a significant structural change point. For 3-year cumulative government and corporate bond returns, our test identifies 1981 as a significant structural change point.

In Panel B of Table III, we test whether there is evidence of a regime shift conditional on the forecasting ability of the lagged long-term share variable.¹⁴ Specifically, we test the null hypothesis that excess returns are described by

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

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

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

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

Panel B of Table III 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 that does not include a structural break in 1982 may be misspecified.

The existence of a change point in excess bond returns in 1982 is economically intuitive. This period witnessed a major 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.¹⁵ Thus, the available evidence, both statistical and economic, points to the early 1980s as a structural break in our sample.

Table IV examines the effects that the regime change had on both the maturity of debt issues and the excess returns on government and corporate bonds. The table 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. Excess corporate bond returns behaved similarly, shifting from an average (median) of -1.8% (-2.9%) to 6.5% (6.6%) after 1982. Each of these differences is statistically significant. Figure 1 depicts how this regime change affected both the long-term share and excess bond returns.

¹⁴ 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.

¹⁵ See the references cited above.

Table IV
**Excess Bond Returns and the Maturity of Corporate Debt Issues
 Before and After the Change in Monetary Policy 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. Excess government bond returns are constructed as the returns on long-term government bonds less the returns on Treasury bills. Excess corporate bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolios with 20-year maturity and the returns 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		

The evidence in Table IV and Figure 1 indicates that the negative relation between excess bond returns and the long-term share may be driven by the fact that managers started to issue more short-term debt relative to long-term debt when the relative cost of long-term debt systematically increased in the early 1980s after the change in monetary and fiscal policy. As we explain above, this structural shift can generate a 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 in which the relative cost of long-term debt



Figure 1. Average excess government long-term bond returns and average long-term share of total debt issues before and after 1982. The top line shows the average long-term share of total debt issues pre- and post-1982. The bottom line shows the average excess returns on long-term government bonds pre- and post-1982.

is low (high). Below we discuss the source of this statistical problem in more detail.

C. Shifting Means and Predictive Regressions

The evidence presented in Section II.B suggests that average excess bond returns experienced a structural shift in the early 1980s. Following our previous notation, this indicates that the data-generating process for excess bond returns appears to be best characterized (at least for our sample) by

$$y_t = \alpha + \gamma I_{t \geq 1982} + \beta X_{t-1} + \varepsilon_t, \quad (9)$$

where I_t is a dummy variable equal to one if $t \geq 1982$, zero otherwise.

However, suppose an econometrician ignores the nonstationary properties of y_t and estimates a misspecified model that does not include the structural break. Such a dynamic misspecification could lead to a spurious regression problem if the predictor is correlated with the omitted dummy for the structural break. For example, if X and y both are affected by the structural break, then the predictive coefficient on X could be biased as Hassler (2003) and Elliott (2005)

show.¹⁶ Whether this misspecification has any effect on inferences regarding β , the predictive coefficient in (9), is ultimately an empirical question that we address in Section II.D.

A recent paper by Baker et al. (2006) argues that the problem we identify is simply another name for the small sample bias identified by Stambaugh (1999). However, this is not the case. The dynamic misspecification that we identify arises from ignoring the nonstationary properties of y_t . While Baker et al. (2006) acknowledge that y experiences a structural break, their analysis falls short when they assume that the time-series properties of x_t are completely unaffected by the structural break. As we demonstrate in Table IV, the evidence does not support this strong assumption. In the case we consider, this amounts to assuming away the problem, and as a result, it is not surprising that they find little cause for concern in their simulations. While it may be true that the bias identified by Stambaugh (1999) is a minor concern in this case, it has nothing to do with the dynamic misspecification that we identify in this paper. In the following section we investigate whether the existence of the break has any real effect on the slope coefficient on the long-term share. We show that, indeed, the effect is quite large.

D. Effect of the Structural Break on the Predictive Regression

The previous discussion suggests that the evidence of predictability in Baker et al. (2003) could be different if we correct for the misspecification problem in equations (1) and (2). To test this conjecture, we augment these specifications to include a dummy variable equal to one if the observation occurs on or after 1982, zero otherwise. The new regression equations are therefore given by

$$\text{Excess bond return}_{t+1} = \alpha + \gamma I_{t \geq 1982} + \beta_1 \frac{d_{Lt}}{D_{t-1}} + \beta_2 \frac{d_{St}}{D_{t-1}} + \varepsilon_{t+1} \quad (10)$$

$$\text{Excess bond return}_{t+1} = \alpha + \gamma I_{t \geq 1982} + \beta \frac{d_{Lt}}{d_{Lt} + d_{St}} + \varepsilon_{t+1}, \quad (11)$$

where $I_{t \geq 1982}$ is the post-1982 indicator variable.

Table V 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 subsections. As expected, the inclusion of this variable has a substantial effect on the predictive ability of new debt issues to explain

¹⁶ Regardless of whether or not both X and Y exhibit similar breaks, the presence of nonstationarity or the omission of any relevant variable in (9) can lead to spurious regression in the sense of Granger and Newbold (1974), Kim, Lee, and Newbold (2004), or Noriega and Ventosa-Santaularia (2005). Further, a number of recent studies point out the importance of time-varying parameters on predictive regressions. See for example, Stock and Watson (1996), Pesaran and Timmerman (2002), Rapach and Wohar (2005), Paye and Timmerman (2005), and Goyal and Welch (2003).

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 variables remain insignificant whether we look at 1-year-ahead, 2-year-ahead, 3-year-ahead, or cumulative 3-year-ahead returns. Moreover, we find that the R^2 s from these regressions are higher than those presented in Table II. In fact, once we incorporate the structural break, the incremental R^2 s of the long-term share are less than one percentage point, which is consistent with the long-term share simply serving as a proxy for the shock. 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. This indicates that the long-term share has no within-regime predictability.

E. Is There Evidence of Successful Managerial Timing around the Structural Break?

It is important to note that the analysis in the previous subsection cannot rule out the possibility that managers predicted the break in 1982. That is, it is possible that the relationship between the long-term share and future excess bond returns is driven by the observations surrounding the structural shift. Although this would effectively reduce the evidence of predictability in Baker et al. (2003) to just one event, it may still represent real evidence of successful timing because, as we show in Table IV, the structural break was a significant event.¹⁷ However, it is also possible that the time-series properties of the long-term share are driven by managers' *reaction* to the break (rather than a *prediction* of the break). That is, in response to excess bond returns increasing after the structural break, managers may have simply reacted by issuing more short-term debt, causing the long-term share to be above its sample mean when excess bond returns were low (during the pre-break period) and below its sample mean when excess bond returns were high (during the post-break period).

Although both hypotheses predict a negative correlation between the predictor variable and the structural break dummy, we try to distinguish between these hypotheses by examining managerial behavior surrounding the structural break in 1982. If corporate managers behaved strategically and successfully predicted the large shift in excess bond returns, then we should see large movements away from long-term debt in the years before the structural break. On the other hand, if managers merely reacted to the structural shift, then we should not see such behavior in anticipation of the event.

Panel A of Figure 2 presents the time-series behavior of the long-term share (the predictive variable) and the proportion of firms with a net increase in

¹⁷ For example, between the 4 years prior to the event (1978–1981) and the 4 years afterward (1982–1985), average excess corporate bond returns went from –11% to 13.4%, a change of about 25 percentage points.

Table V
The Predictive Power of the Maturity of Corporate Debt Issues Conditional on the Structural Break in 1982

This table reports regression results for our annual data series for the sample period 1953–2002. In these regressions we condition on the structural break by including in each regression a dummy variable that takes the value of one if the time period is 1982 or later, and zero otherwise. Excess government bond returns are constructed as the returns on long-term government bonds less the returns on Treasury bills. Excess corporate bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolios with 20-year maturity and the returns 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. We collect all data on debt issues from the Federal Reserve Flow of Funds. Each regression specification is of a form similar to: $r_{GL+1} = a + b \mathbf{X}_t + cI + e_{t+1}$. 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. I denotes an indicator variable that takes the value of one for time periods after a structural break, zero otherwise. 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 based on Newey–West standard errors are reported in parentheses below coefficient estimates. Superscripts a, b, and c denote significantly different from zero at the 1%, 5%, and 10% level, respectively.

Panel A: Excess Government Bond Returns									
	<i>N</i>	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	<i>c</i>	Adjusted <i>R</i> ² (%)	<i>N</i>	<i>a</i>	Adjusted <i>R</i> ² (%)
$r_{GL+1} - r_{GSI+1}$	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)	15.91
$r_{GL+2} - r_{GSI+2}$	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)	16.96
$r_{GL+3} - r_{GSI+3}$	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)	16.52
$R_{GL+3} - R_{GSI+3}$	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)	46.25
Panel B: Excess Corporate Bond Returns									
	<i>N</i>	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	<i>c</i>	Adjusted <i>R</i> ² (%)	<i>N</i>	<i>a</i>	Adjusted <i>R</i> ² (%)
$r_{CL+1} - r_{GSI+1}$	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)	15.25
$r_{CL+2} - r_{GSI+2}$	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)	16.04
$r_{CL+3} - r_{GSI+3}$	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)	15.81
$R_{CL+3} - R_{GSI+3}$	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)	37.93

long-term debt in the years surrounding the break (from the firm-level analysis we present in the next section). Panel B of Figure 2 presents the predicted values of the annual excess corporate bond returns along with the actual values. The predicted values are obtained from the full sample OLS regressions from Section I. That is, we use the long-term share of new debt issues to predict 1-year ahead excess bond returns, ignoring the structural break.

The results in Figure 2 show no clear sign that managers predicted the shock. While there are insufficient data to draw a statistical inference about the behavior of these series over such a short interval, any economic significance of successful timing evidence is small. In anticipation of a 25 percentage point change in excess corporate bond returns, the long-term share of new issues changes very little. The only noticeable change is a modest decline in the long-term share in 1982 as managers reacted to the break. Further, the proportion of firms with a net increase in long-term debt is roughly constant at 50% over the period (we elaborate on this in Section III). In Panel B, we see that the prediction of excess corporate bond returns over this period differs substantially from the actual values, and the largest forecast errors in the sample occur exactly at the break point. Thus, corporate managers do not appear to have successfully predicted the future, even in anticipation of this very large movement in excess bond returns. Overall, there is little evidence that managers successfully predicted the structural shock of 1982.

III. Tests Using Firm-Level Data

In the previous sections, we find little evidence that managers are successful at timing the maturity structure of their debt. However, all of our analysis above is conducted at the aggregate level. At the firm level, it is almost surely the case that in any given year some managers will increase while others will decrease the maturity of their debt issues. In this section we dig deeper into firm-level variation in firms' capital structure choices in anticipation of changes in future excess bond returns. Essentially, we test how many managers successfully time their maturity structure in any given year in the sense that their security issuance decision during the year correctly anticipates future bond returns.

To determine how many firms successfully time their maturity structure each year, we use Compustat data from 1976 to 2002 to construct the annual proportion of firms that are net issuers of long-term debt for each year.¹⁸ That is, for each year we determine whether each firm increased long-term debt by more or less than any change in short-term debt. Following Baker et al. (2003), we define new issues of long-term debt as the change in the level of long-term debt (Compustat annual data item 9) plus debt due in 1 year (Compustat annual data item 44) and we define new issues of short-term debt as notes payable (Compustat annual data item 206). We then construct the proportion of firms with a net increase in long-term debt as the number of net long-term debt

¹⁸ Our choice of sample period is motivated by Baker et al. (2003), who document limitations of the Compustat data prior to this period.

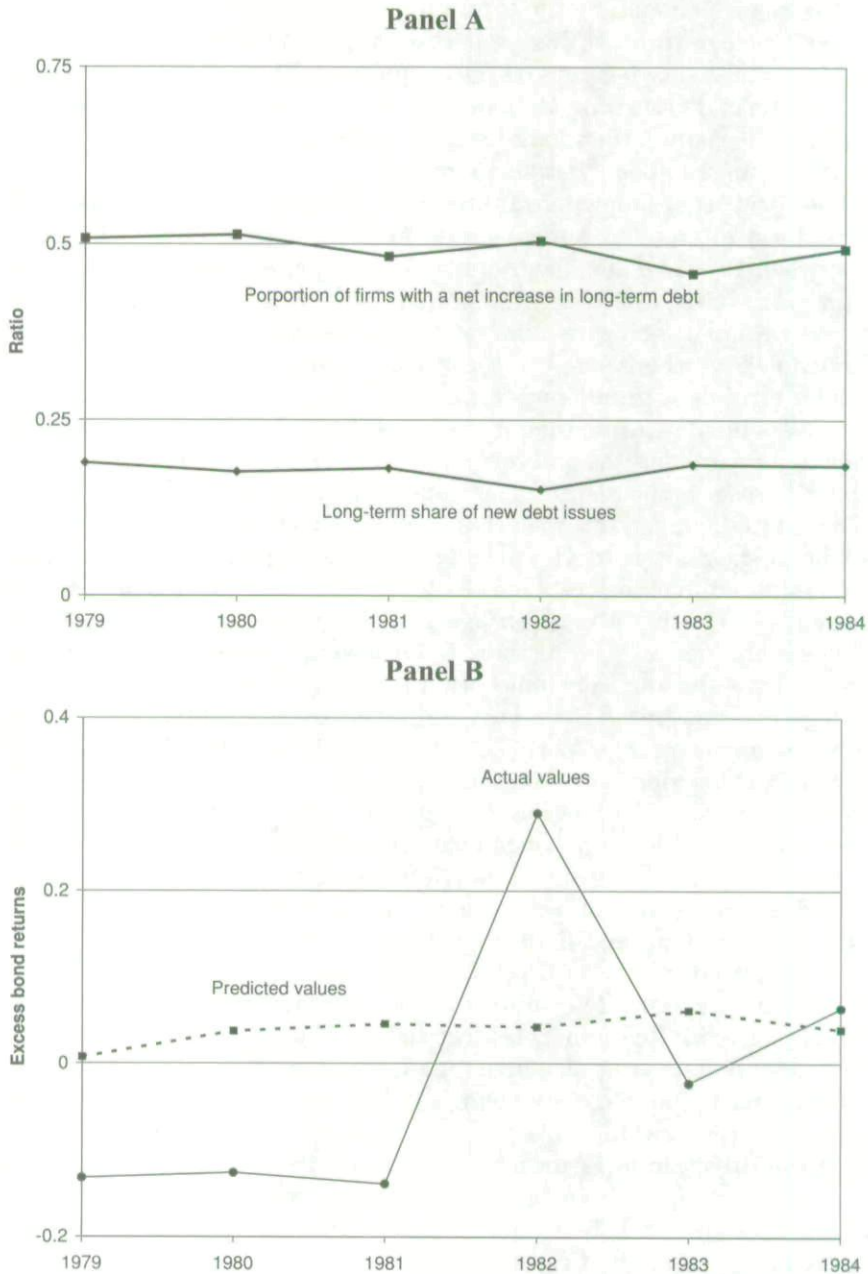


Figure 2. The behavior of debt issues and excess bond returns around the 1982 break. Panel A presents the time series of the annual proportion of Compustat firms that issue more long-term debt than short-term debt, along with the long-term share of new debt issues (constructed as aggregate new issues of long-term debt divided by total new issues of debt). Panel B presents the time series of predicted annual excess corporate bond returns along with actual value. Predicted values are obtained from the in-sample OLS regression of excess bond returns on the 1-year lagged long-term share of new debt issues.

issuers in a year divided by the total number of firms with data available for that year. One can think of this proportion as a variant of the long-term share measure in which each issuing firm gets equal weight. If more firms are shifting from short-term debt to long-term debt in a given year (the proportion of long-term issuers is rising), then long-term bonds should underperform short-term bonds in the future if, on average, managers are successful at market timing.

We perform the following analysis to test whether long-term bonds underperform after firms shift away from issuing short-term debt. For each year between 1976 and 2002, we determine whether excess bond returns in the following year were particularly low or high; accordingly, we assign each year to an above-median or below-median future excess bond return portfolio. Within each portfolio, we then compute the average proportion of firms that raised more long-term debt than short-term debt. If firms are correctly anticipating future excess bond returns, then more firms should be shifting into short-term bonds when future excess bond returns are above the median.

Table VI presents the results of our analysis. As expected, there is a considerable spread in the mean future excess bond returns between the two groups. In the 13 below-median years, 1-year-ahead excess corporate bond returns were -4.9% compared to excess returns of 12.9% in the 12 high return years. While a difference of roughly 18 percentage points between the returns of the two portfolios is economically large, there is surprisingly little difference in the proportion of firms shifting from long-term to short-term debt. For the full sample, about 51% of firms raised more long-term debt than short-term debt when returns were low in the next period compared to about 50% when returns were high in the next period. The same pattern holds true for both large and small firms (above or below the median market capitalization each year) and for high market-to-book and low market-to-book firms (above or below the median). In each case, there is no significant relationship between future excess bond returns and the proportion of firms that are net long-term debt issuers.¹⁹

Overall, the evidence in this section is inconsistent with firms generally having any abnormal ability to time the maturity structure of their debt. Such tests, of course, cannot determine whether the firms that guessed correctly were lucky or exhibited abnormal forecasting ability. To help distinguish between luck and ability, we also investigate whether there is any persistence in the performance of managers who appear to have correctly guessed the direction of future returns. In Table VII, we compute the proportion of firms that guessed the direction of future excess bond returns correctly, and then compute the proportion of those firms that guessed correctly (or incorrectly) the next time they changed their debt maturity. That is, we ask what proportion of firms consistently gets it right. As Table VII shows, conditional on correctly guessing the direction of future returns, 49.6% guess correctly the next time and 50.4% guess incorrectly the next time. Thus, there does not appear to be any persistence in performance among managers that happen to guess correctly in

¹⁹ We also replicate this analysis using only firms that issue large amounts of debt (e.g., more than 5% or 10% of their previous assets); the results are qualitatively the same.

Table VI
Firm-Level Evidence

This table presents average future (one-year ahead) excess bond returns and the average annual proportion of Compustat firms that issue more long-term debt than short-term debt during the period 1976–2002. Each year the proportion of firms with a net increase in long-term debt is determined by comparing new issues of long-term debt to new issues of short-term debt and counting the percentage of firms with a greater increase in long-term debt. New issues of long-term debt are computed as changes in long-term debt (Compustat annual data item 9) plus long-term debt due in 1 year (Compustat annual data item 44). New issues of short-term debt are computed as notes payable within 1 year (Compustat annual data item 206). Annual proportions are computed as the number of Compustat firms that issue more long-term debt than short-term debt relative to all firms issuing debt. The 1-year-ahead excess corporate bond return is classified for each year over the period 1976–2002 as above or below the median. Large and small firm portfolios are determined by restricting the sample of Compustat firms to only those firms whose market value of equity is above or below the median for that year. High and low market-to-book portfolios are constructed by restricting the sample of Compustat firms to only those firms with a market-to-book ratio (market value of equity plus book value of debt divided by total assets) that is above or below the median for that year. *p*-values are reported below differences and are based on two-tailed mean-comparison tests with unequal variances.

Future Excess Bond Return	Number of Years	Average Number of Firms per Year	Average Future Excess Bond Return	Proportion of Compustat Firms with a Net Increase in Long-Term Debt				
				All Firms	Only Large Firms	Only Small Firms	Only Low Market-to- Book	Only High Market-to- Book
Below the median	13	2,905	-0.049	0.511	0.514	0.491	0.425	0.536
Above the median	12	2,951	0.129	0.503	0.503	0.487	0.418	0.533
Difference (<i>p</i> -value)			-0.179 (0.000)	0.008 (0.585)	0.011 (0.493)	0.005 (0.781)	0.007 (0.681)	0.003 (0.867)

Table VII
Persistence in Managers' Performance

This table presents the proportion of firms whose choice between long-term and short-term debt correctly (or incorrectly) forecasts future excess bond returns. Each year, we classify all firms as correctly forecasting returns if they issue net long-term debt the year before excess bond returns are below the sample average or if they issue net short-term debt the year before excess bond returns are above the sample average. Firms that choose between long-term and short-term debt in the opposite direction are classified as incorrectly forecasting returns. We also compute the proportion of firms that correctly forecast future excess bond returns conditional on whether they correctly forecast returns the next time they issue debt. Our sample consists of all Compustat firms with a net change in debt each year during the period 1976–2002. Firms with a net increase in long-term debt are determined by comparing new issues of long-term debt to new issues of short-term debt and counting the percentage of firms with a greater increase in long-term debt. New issues of long-term debt are computed as changes in long-term debt (Compustat annual data item 9) plus long-term debt due in 1 year (Compustat annual data item 44). New issues of short-term debt are computed as notes payable within 1 year (Compustat annual data item 206).

Performance in the Current Period (Proportion of Firms)	Conditional Performance in the Following Period (Proportion of Firms)		
	Incorrectly Forecast Returns	Correctly Forecast Returns	Total
Incorrectly forecast returns	47.6%	52.3%	100%
Correctly forecast returns	50.4%	49.6%	100%

a given year. Even if some managers do exhibit the ability to lower their cost of capital through efforts to time future returns, it appears that an equal number may actually raise their cost of capital by guessing incorrectly.

In sum, the results of our tests do not support the hypothesis that the typical firm has any abnormal ability to successfully predict future movements in the yield curve.²⁰ These findings are important because they suggest that the results in Baker et al. (2003) are not robust to alternative tests. Further, these results are impervious to the criticisms of Baker et al. (2006) because there is no evidence of predictability, and thus the question of whether predictability is real or spurious is moot.

IV. Robustness

A. Changes in Maturity Structure versus Long-Term Share in New Issues

Following the methodology in prior studies, we define the change in short-term debt at time t as the level of short-term debt at time t (because short-term debt has maturity of less than 1 year) and we measure the change in long-term debt at time t as the change in the level of long-term debt from

²⁰ These results are consistent with Barry et al. (2005), who examine individual security issues from Securities Data Company and find little evidence that managers have any successful forecasting ability.

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 amounts of short-term and long-term debt that 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 et al. (2003) suggest that firms are actually decreasing the average maturity of their debt. Therefore, it is not clear that the long-term share is a good measure of the maturity structure of firms' debt.

Thus, to measure the changes in the aggregate maturity structure, we need a measure that captures only the changes in debt that move firms away from their previous maturity structure. Our previous example suggests that the net changes in short-term and long-term debt (e.g., changes in levels) capture 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 VIII we replicate the analysis in Table II using our alternative definitions for the changes in short-term 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.²¹ 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. Regime-Switching versus Structural Breaks

In Section II.B we present evidence that the time series of excess bond returns exhibits a structural break in its mean during the early 1980s. That is, the unconditional expectation of the excess bond return distribution changes from a constant of -0.023 before 1982 to a constant of 0.067 afterwards. However, it is possible that this specification masks even greater variation in the time

²¹ We find similar results if we include a dummy variable for the regime shift of 1982.

Table VIII
The Maturity of Corporate Debt Issues and the Substitution Hypothesis

This table reports regression results for our annual data series for the sample period 1953–2002 using measures of changes in aggregate debt maturity. Excess government bond returns are constructed as the returns on long-term government bonds less the returns on Treasury bills. Excess corporate bond returns are constructed as the difference between the Ibbotson long-term corporate bond portfolios with 20-year maturity and the returns 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. We collect all data on debt issues from the Federal Reserve Flow of Funds. Each regression specification is of a form similar to: $r_{GL+1} - r_{GSI+1} = a + bX_t + e_{t+1}$. 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, and the bottom panel uses excess returns on long-term corporate bonds. *t*-statistics based on Newey–West standard errors are reported in parentheses below coefficient estimates.

Panel A: Excess Government Bond Returns						
	<i>N</i>	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	Adjusted <i>R</i> ² (%)	Adjusted <i>R</i> ² (%)
$r_{GL+1} - r_{GSI+1}$	49	0.016 (1.14)	0.003 (0.18)	-0.011 (-0.71)	-3.16	-1.02
$r_{GL+2} - r_{GSI+2}$	48	0.015 (1.01)	-0.001 (-0.05)	-0.011 (-0.61)	-3.35	-1.39
$r_{GL+3} - r_{GSI+3}$	47	0.016 (1.05)	-0.008 (-0.51)	0.014 (1.16)	-2.35	-0.07
$R_{GL+3} - R_{GSI+3}$	47	0.041 (1.09)	-0.009 (-0.33)	0.001 (0.03)	-4.26	-2.17
Panel B: Excess Corporate Bond Returns						
	<i>N</i>	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	Adjusted <i>R</i> ² (%)	Adjusted <i>R</i> ² (%)
$r_{GL+1} - r_{GSI+1}$	49	0.018 (1.29)	-0.003 (-0.21)	-0.011 (-0.68)	-3.01	-1.38
$r_{GL+2} - r_{GSI+2}$	48	0.017 (1.19)	-0.0003 (-0.04)	-0.004 (-0.28)	-4.25	-2.04
$r_{GL+3} - r_{GSI+3}$	47	0.018 (1.22)	-0.004 (-0.29)	0.019 (1.54)	-0.82	1.17
$R_{GL+3} - R_{GSI+3}$	47	0.045 (1.27)	-0.010 (-0.43)	0.012 (0.48)	-3.77	-1.52

series if the mean excess bond return is itself a Markov process. For example, Gray (1996) provides a comprehensive analysis of regime switching behavior in interest rates and shows that interest rates switch back-and-forth between regimes. To test whether excess bond returns exhibit regime switching behavior beyond the single break in 1982, we estimate a regime switching model that incorporates time-varying state-dependent parameters.

To accommodate a stochastic process for the mean excess bond return, we estimate a two-state regime switching model following Hamilton (1989), where the mean excess bond return belongs to either a high or low excess bond return state and the transition between states is stochastic. The *ex post* smoothed state probabilities (for example, the probability that the excess bond return is in the high return state) are computed following Kim (1994).

To estimate the parameters of the regime switching model, we use monthly data on excess bond returns from Ibbotson. Our sample period of monthly observations extends from January 1953 to December 2002. We use the estimated parameters of the model to classify each annual observation into either a high or low excess bond return regime by averaging the monthly *ex post* smoothed state probabilities each year. If the average probability is above 0.5, then we classify the year as a high return regime year.

Our results (untabulated) are consistent with the structural break analysis presented above. A two-state regime switching model of the annual mean excess bond return shows one transition in 1982, from a low excess bond return regime to a high excess bond return regime. This result is also confirmed by Baker et al. (2006). In more complicated regime switching models (for example, allowing for GARCH specifications for the variance process, or allowing for more than two regimes), the results still point to the early 1980s as a significant change point with strong persistence. In alternative specifications, at the monthly frequency there is some evidence of high regime excess returns during the Oil Crisis of the early 1970s and the stagflation period of the mid 1970s. Also, there is evidence that some months in the latter part of the sample (post-1995) exhibit low excess bond return regime behavior. In all specifications, there is not enough persistence in these short-lived regime switches to substantively affect the annual averages. That is, allowing for the possibility of multiple breaks leaves our results qualitatively unchanged. Thus, the basic patterns in the data support a single structural break in the annual series of excess bond returns.

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 in recent years examine whether managers can accurately time market movements in their equity and debt issuance decisions, and/or take advantage of market inefficiencies in timing their capital structure and payout decisions. Our evidence shows that,

in the aggregate, managers are unable to successfully time securities issuance around fluctuations in the yield curve.

Our results question the meaning of managerial market timing. There is no clear consensus in the literature as to what managerial market timing means (see Barry et al. (2005) for a discussion of different views of market timing). If "timing" means that managers use current and past information to successfully forecast future price changes (what we refer to as *successful* market timing), then our findings do not support theories of managerial market timing. On the other hand, if managerial market timing is only meant to imply that managers *try* to predict future price changes, but may or may not fare any better than other market participants (what we refer to as *unsuccessful* market timing), then our results do support managerial market timing. Unfortunately, support for the unsuccessful managerial market timing theory is somewhat less satisfying since it essentially predicts that quantity should respond to price.

We show that the macroeconomic regime shift caused by 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 condition on the structural shift could easily infer, apparently 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. More broadly, our paper highlights the importance of properly accounting for nonstationarities such as macroeconomic shifts in time-series analysis. As in Butler, Grullon, and Weston (2005), we find that major shocks or regime changes can simultaneously affect many economic variables, thereby creating the illusion of predictability.

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