Syndicated bank loans and capital structure

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Abstract

Purpose – The purpose of this study is to examine the impact of interest rates on the size and the maturity choice of a syndicated bank loan. In addition, it attempts to determine the long-run impact of a syndicated loan on the borrower's capital structure.

Design/methodology/approach – The paper uses a sample of 6,903 syndicated bank loans in the USA, covering the period 1984-2004. First, all syndicated loans are categorized into two groups: loans in periods of increasing interest rates, and loans in periods of decreasing rates. Then, non-parametric tests are performed to compare the characteristics of the two groups, including the proceeds from the loans, and robust regressions are used to examine the impact of the interest rates on the maturity choice. Finally, robust regressions are employed to examine the long-run impact of the interest rates on the borrowers' leverage ratios.

Findings – On the whole, the results reject the market timing theory of capital structure for syndicated bank loans. Firms in the two groups borrow in similar amounts, and in the long run, the difference between the two groups' leverage ratios is statistically insignificant. On the other hand, firms tend to choose longer maturities when the interest rates are low compared to the rates two or three years ago.

Originality/value – To the best of the author's knowledge, this is the first study that links debt market conditions to the leverage ratios of firms that borrow in the syndicated bank loan market. In other words, this is the first study that tests the market timing theory of capital structure for syndicated bank loans.

Keywords Syndicated bank loans, Debts, Interest rates, Capital structure, Leverage

Paper type Research paper

1. Introduction

This paper examines the capital structure implications of syndicated bank loans. It contributes to the literature by answering these three main questions:

(1) Do firms borrow more when market conditions (i.e. the interest rates) are more favorable compared to the recent years?

(2) Do firms choose longer maturity loans when market conditions are more favorable compared to the recent years?

(3) Is there any difference in the long run between the capital structures of "favorable market" (i.e. periods of low rates) and "unfavorable market" (i.e. periods of high rates) borrowers?

Until recently, studies on capital structure have focused on two competing theories: the pecking-order theory, and the tradeoff theory. The pecking-order theory was introduced by Myers (1984), based in part on the argument in Myers and Majluf (1984). According to this theory, companies' financing choice depends on the relative cost of each method of financing. Firms prefer to use internal funds first since it is the cheapest form

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of financing. When internal funds are inadequate, they prefer debt financing. Equity financing is used only as a last resort (i.e. when it becomes too costly to borrow more money from the creditors).

The tradeoff theory, on the other hand, assumes that observed capital structures are the result of individual firms trading off the tax benefits of increased debt usage against the increasingly severe financial distress costs that result as debt ratios approach critical levels. This theory implies that, in order to maximize its value, each firm adjusts gradually toward an optimal debt ratio. If a random event bumps the firm away from its target debt level, it will try to return to its original target level.

Starting with Shyam-Sunder and Myers (1999), there is a stream of literature that specifically focuses on empirically testing these two theories. Shyam-Sunder and Myers (1999), Chirinko and Singha (2000), Frank and Goyal (2003), Fama and French (2002), Loof (2004), Lemmon and Zender (2004), Hennessy and Whited (2004), Mihov (2004), Leary and Roberts (2004) and Autore and Kovacs (2006) compare the pecking-order and tradeoff theories with empirical data. These studies find that each of these two theories is superior to the other in specific cases. The tradeoff theory explains the observed corporate debt levels fairly well, and it can better explain how taxes, bankruptcy costs, security issuance costs, and the investment opportunity set of a firm influence that firm's actual debt ratio. On the other hand, the pecking-order theory offers a superior explanation for observed capital structure changes, especially those involving security issues. It can better explain the types of securities firms choose to issue and market responses to these issues. More specifically, the pecking-order theory can explain:

- why debt ratios and profitability are inversely related;
- why markets react negatively to all new equity issues and why managers seem to make such choices only when they either have no choice or they feel the firm's shares are overvalued; and
- why managers choose to hold more cash and issue less debt than either the tradeoff theory or common sense suggest they should.

More recently, Baker and Wurgler (2002) shed a new light on the capital structure issue. In their influential study, Baker and Wurgler (2002) find a strong relationship between the timing of corporate equity offerings (i.e. equity market timing) and the capital structures of the issuers in the long run, and name their theory as "the market timing theory of capital structure". Since then, the market timing theory has challenged both the tradeoff and the pecking-order theories.

More specifically, Baker and Wurgler (2002) suggest that, in order to increase their market values, firms try to reduce their cost of capital by issuing equity when their market values (or share prices) are high relative to book and past market values, and by repurchasing equity when their market values (or share prices) are low. In the first part of their study, Baker and Wurgler (2002) empirically show that firms time the equity markets by offering IPOs and SEOs when their market valuations are high compared to the recent historical values. In the second part of their study, Baker and Wurgler (2002) show that equity market timing has a persistent (i.e. at least a ten year) impact on the issuer's capital structure. They empirically show that low leverage firms are those that raised funds when their market valuations were high, as measured by the market-to-book ratio. In other words, according to Baker and Wurgler (2002), firms do permanently lower their leverages when they time their equity offerings.

Interestingly, more recent studies (Korajczyk and Levy, 2003; Alti, 2006; Flannery and Rangan, 2005; Hovakimian, 2005; Kayhan and Titman, 2007; Huang and Ritter, 2009; Elliott *et al.*, 2007; O'Brien *et al.*, 2007) do only partially support Baker and Wurgler (2002) findings. Managers seem to issue equity when market valuations of their firms are high and issue debt otherwise. However, as opposed to Baker and Wurgler (2002), these studies find that, within a period of two years, the impact of equity market timing on capital structure disappears.

On the other hand, the literature on debt market timing dates back to Taggart (1977). Taggart (1977) and Marsh (1982) examine the relation between the level of interest rates and the amount borrowed in debt markets. They find that the level of debt issues is sensitive to various measures of interest rates. When it is costlier for firms to issue debt (i.e. the interest rates are high), firms tend to borrow in smaller amounts in the debt markets.

Later, Guedes and Opler (1996) examine the relation between the term premium (the difference between the yields of long- and short-term government debt) and the debt maturity choice of new issues during 1982-1993 period. They observe that higher quality firms tend to borrow at both ends of the maturity spectrum, while lower quality firms tend to borrow at middle maturities. They find that debt maturities tend to be shorter when the term premium is higher.

Barclay and Smith (1995) and Stohs and Mauer (1996) also examine the relation between the maturity choice and term premium. Both of these studies use balance sheet data rather than new issue data. Like Guedes and Opler (1996), Barclay and Smith (1995) and Stohs and Mauer (1996) find that the average maturity of a firm's combined debt outstanding is negatively related to the term premium. Their results imply that, to reduce their cost of capital in the long run, firms tend to issue longer maturity debt when the rates are low.

Two recent surveys done by Graham and Harvey (2001) and Bancel and Mittoo (2004) reveal interesting results regarding the debt issuance decisions of US and European financial managers, respectively. The survey results by Graham and Harvey (2001) reveal that a large fraction of chief financial officers prefer short-term debt "when short-term interest rates are low compared to long-term rates" and when they are "waiting for long-term interest rates to decline". Bancel and Mittoo (2004) find similar results from their survey of European financial managers.

Baker *et al.* (2003) find that firms tend to issue long-term debt when future excess bond returns are predictably low. The authors argue that managers try to time the debt market using publicly available market conditions (e.g. inflation, the real short-term rate, and the term spread) as a guide to their maturity decisions. In other words, corporations time the bond market by the choice of short- versus long-term debt and the debt maturity choice is associated with future excess bond returns.

Butler *et al.* (2004) show that, contrary to existing evidence, corporate managers cannot successfully time the maturity of their debt issues to reduce their cost of capital. They argue 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. In other words, firms are just reacting to (as opposed to forecasting) the increase in the relative cost of long-term debt (due to the monetary and fiscal policy of the US Government during the early 1980s) by issuing more short-term debt. The authors show that after accounting for this structural shift, 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.

Barry *et al.* (2008) analyze US public debt offerings and find that managers cannot successfully time future interest rates (i.e. managers do not issue more debt or higher maturity debt before rate increases, or less debt or shorter maturity debt before rate declines). Instead of forward-looking market timing, they find evidence of backward-looking market timing. They find that the level of interest rates relative to historical levels strongly affects debt issuance and debt maturity choice. When the rates are low compared to the historical levels, firms tend to borrow more at longer maturities. However, there is one weakness in their analyses. The previous capital structure studies have shown that firm characteristics like size, market-to-book ratio, pre-issue leverage, profitability, and tangibility are important determinants of capital structure. Barry *et al.* (2008) do not control for these firm characteristics in their analyses.

Hovakimian (2005) shows that, three years after the offering, the leverage ratios of debt issuers are significantly higher than their pre-issue levels. He argues that both debt issues and debt reductions have a significant long-lasting effect on capital structure, but he does not focus on debt market timing in his analysis. In other words, he does not differentiate between "market timers" and the other firms. He just compares the leverage ratios of "all issuers" before the issue, and three years after the issue. In fact, none of the studies mentioned above relates debt market timing to the borrower's capital structure. In other words, none of these studies examine the long-run impact of debt market timing on the borrowing firms' leverage ratios.

In this study, I extend the literature on market timing and its impact on capital structure in the following ways. First, to test for debt market timing, instead of using corporate public debt offerings data, I employ a detailed sample of 6,903 new syndicated bank loans over 1984-2004. Denis and Mihov (2003) show that, in dollar terms, bank debt is as important as public debt for companies, and non-bank private debt also constitutes a significant portion (i.e. more than 10 percent) of total debt financing. The timing behavior of public debt issuers has already been documented in the previous studies. My purpose in this study is to concentrate on the potential timing behavior in the syndicated bank loan market. Are firms really successful in timing the market? Are their efforts concentrated on maturity timing, proceeds timing, or both? Are market conditions important determinants of firms' borrowing activities? Answering these questions will provide us with valuable insights into the firms' financing activities in this specific debt market. To the best of my knowledge, this is the first study that examines the market timing behavior of borrowers in the syndicated loan market. Second, I examine the relationship between debt market conditions at the time of the borrowings and the leverage ratios of the borrowers in the long run. As mentioned above, previous studies have examined the link between equity market timing and capital structure. However, there is still no consensus on the persistency of the impact of equity market timing on capital structure. While Baker and Wurgler (2002) find that equity market timing has a persistent impact on capital structure, subsequent studies find only a short-run (i.e. two or three year) impact. With regard to debt markets, none of the previous studies examine the relation between market timing and capital structure. If firms try to reduce their cost of capital by borrowing more in periods of low interest rates, they would have relatively higher debt ratios compared to the firms that do not time the market just after the transaction. Hence, if market timing exists, there would be a significant difference in the short run between the debt ratios of the market timers and the other firms. But, is market timing's impact on leverage just a short-run impact or is it a persistent one? This is the question that will be answered in this paper.

In this article, I examine the relationship between the interest rates at the time of the borrowing and the leverage ratios of the borrowers in the long run (i.e. up to five years after the borrowing). Is there really a link between debt market timing and capital structure? Do firms permanently alter their capital structures when they borrow more in periods of low interest rates? In this study, I try to find the answer to this question. I attempt to see if the "market timing theory of capital structure" holds for syndicated bank loans. To the best of my knowledge, this is the first study that links debt market conditions at the time of the borrowings to the capital structures of the borrowers in the long run.

An evidence of a long-run impact would mean that a company's current capital structure is a result of its past debt market timing attempts. In other words, it would mean that firms do permanently alter their leverages when they time the debt markets successfully. In that case, my results would have important implications for firms' capital structure strategies. At the same time, a persistent market timing impact on capital structure would imply a minimal role for traditional determinants of capital structure, like adjusting toward a target, or following a financing hierarchy. On the other hand, an evidence of a short-run impact would mean that firms' debt market timing attempts alter their leverage ratios only for a short period of time. This would imply a secondary role for market timing compared to the more established models of the tradeoff and the pecking-order theories. In other words, a short-run impact would be consistent with a modified version of either the traditional tradeoff theory or the pecking-order theory, one that includes market timing as a short-term factor.

As mentioned above, my first objective is to see if firms attempt to lower their cost of capital by timing the market. Since firms can time the debt markets in terms of both the amount borrowed and the maturity of the loan, I focus on both types of timing activities. Using observed interest rates as my proxy for market conditions, first I examine the relationship between the interest rates and the amount borrowed, and then I investigate the link between the interest rates and the maturity choice. My second objective in this study is to see if firms alter their leverages permanently by borrowing more money in periods of low interest rates. To achieve that objective, I examine the relation between the interest rates and the leverage ratios of the borrowers in the long run.

I use the Securities Data Corporation (SDC) "New Issues Database" to collect the syndicated bank loan data. In order to collect all other financial data that are necessary for my analyses, I use the Compustat database.

The remainder of the paper is organized as follows. Section 2 includes the hypotheses that are tested. Section 3 describes the data and the methodology. The results of the empirical analyses are presented in Section 4. Section 5 concludes.

2. Hypotheses

In the first part of the study, I test for backward-looking market timing that states that managers do successfully time the markets by borrowing more money at longer maturities when interest rates are low relative to the past rates.

My hypotheses of interest are:

H1. Firms borrow more money in the syndicated bank loan market when interest rates are low relative to recent historical levels.

H2. Firms borrow at longer maturities in the syndicated bank loan market when interest rates are low relative to recent historical levels.

In the second part of the study, I examine the long-run impact of timing in the syndicated bank loan market on the borrower's capital structure. In fact, this is the first study that tests for the market timing theory in the syndicated bank loan market.

So, the hypothesis of interest here is:

H3. Firms that borrow in the syndicated bank loan market when interest rates are low have low leverage ratios in the long run (i.e. up to five years after the borrowing).

3. Data and methodology

3.1 Sample selection

The initial sample consists of all syndicated bank loans between 1 January 1984 and 31 December 2004 reported by the Securities Data Company (SDC). I restrict the sample to exclude unit offers, financial firms with SIC codes between 6000 and 6999, and firms with book values of assets below $10 million in 2004 dollars at the end of the last issue quarter. Following the previous literature, and to minimize the influence of outliers, observations with a market-to-book ratio greater than 10, book leverage (D/A) greater than 1, and earnings before interest, taxes, and depreciation scaled by assets (EBITDA/A) greater than 1 are dropped. Since financing choices of subsidiary companies may be motivated by the parent companies' own needs, all subsidiary companies are dropped from the sample. After excluding the financial firms, the subsidiaries, the outliers, and the observations without the required Compustat data, I am left with 6,903 syndicated bank loan agreements.

3.2 Methodology

A problem with syndicated bank loans is the difficulty in finding the yield data for the entire period. I need the yields in order to calculate my interest rate variables, but unfortunately, Moody's does not have the yield data.

Denis and Mihov (2003) have shown that the average new debt rating for non-bank private debt is "B" (S&P rating). They also show that the average credit quality for borrowers of bank debt is close to the average credit quality for borrowers of non-bank private debt, which is a "B" rating. Since the individual yields are not available, after considering Denis and Mihov (2003) findings, I have decided to use a rough measure for all syndicated loans: I have decided to collect the public debt yield data from Securities Data Company's "New Issues" database, and then use the "B" level corporate debt yields in each quarter as a proxy for syndicated loan yields. It is not a perfect measure, but it is in line with Denis and Mihov (2003) findings.

Using these "B" level corporate public debt yields for all syndicated loans, I create the interest rate variables H2, H4, H6, H8, and H12 for each quarter. "H2" is the difference between the current interest rates and the rates two quarters ago, "H4" is the difference between the current interest rates and the rates four quarters ago, "H6" is the difference between the current interest rates and the rates six quarters ago, "H8" is the difference between the current interest rates and the rates eight quarters ago, and "H12" is the difference between the current interest rates and the rates 12 quarters ago.

To test for market timing, first I classify all syndicated loan borrowers into two categories:

(1) firms that have borrowed when debt market conditions are less favorable compared to six months ago (i.e. H2 is positive, the yields have gone up); and

(2) firms that have borrowed when debt market conditions are more favorable compared to six months ago (i.e. H2 is negative, yields have come down).

Then, I perform a Mann-Whitney-Wilcoxon two-sample test that compares the characteristics of the borrowers in the two groups. Since previous literature confirms firm size, profitability, tangibility, pre-issue leverage, and market-to-book ratio as determinants of capital structure, I focus on these variables. I also compare the issue size (i.e. proceeds scaled by assets), the time to maturity, and the interest rate variables H2, H4, H6, H8, and H12.

To test for timing of the maturity of the syndicated loans, the following regression model is used:

$$\begin{aligned} Years\_to\_maturity = {} & c_0 + c_1 \Delta Yield \\ & + c_2\left(\frac{M}{B}\right)_{t-1} + c_3\left(\frac{EBITDA}{A}\right)_{t-1} + c_4(\log S)_{t-1} \\ & + c_5\left(\frac{PPE}{A}\right)_{t-1} + c_6\left(\frac{D}{A}\right)_{t-1} + \varepsilon_t \end{aligned} \tag{1}$$

where the dependent variable is the number of years to maturity for each syndicated loan, the independent variable, "ΔYield", is H2, H4, H6, H8, or H12 (i.e. the increase in the yields over the last two quarters, four quarters, etc.) in each model, "$(M/B)_{t-1}$" is market-to-book ratio at the end of the previous quarter, "$(EBITDA/A)_{t-1}$" is EBITDA scaled by assets at the end of the previous quarter, "$(\log S)_{t-1}$" is natural logarithm of sales at the end of the previous quarter, "$(PPE/A)_{t-1}$" is net property, plant, and equipment scaled by assets at the end of the previous quarter, and "$(D/A)_{t-1}$" is debt-to-asset ratio at the end of the previous quarter (i.e. pre-issue leverage).

In order to test for the long-run impact of market timing on capital structure, the following regression model is used, and the results are shown in Table V:

$$\begin{aligned} Y_t = {} & c_0 + c_1 H2 + c_2\left(\frac{M}{B}\right)_{t-1} + c_3\left(\frac{EBITDA}{A}\right)_{t-1} + c_4 \log(s)_{t-1} \\ & + c_5\left(\frac{PPE}{A}\right)_{t-1} + c_6\left(\frac{D}{A}\right)_{t-1} + \varepsilon_t \end{aligned} \tag{2}$$

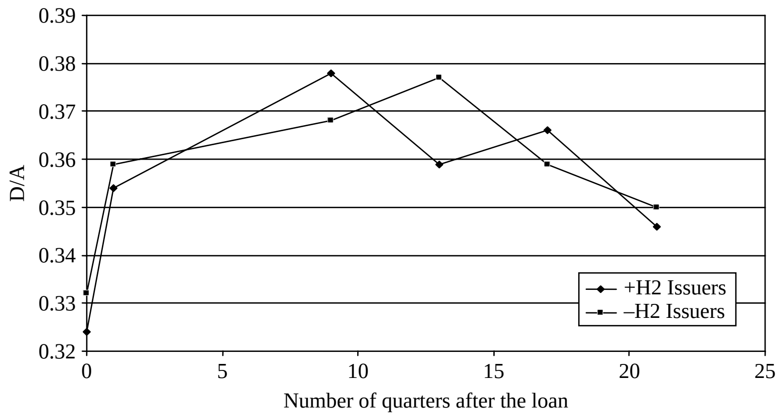
where the dependent variable Y_t is the cumulative change in book leverage from the last day of the pre-issue quarter through the end of quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20 in panel A, or the level of book leverage on the last day of quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20 in panel B. In other words, in panel A, the impact of timing on the change in leverage over the next two, three, four, and five years are estimated, and in panel B, the impact of timing on the level of leverage at the end of the second, third, fourth, and fifth years are estimated. I use the "H2" variable as the interest rate variable in these regressions. All other explanatory variables are as explained previously.

In both panels, while the first four columns show the results for all syndicated loans in the sample, the last four columns show the results for only the loans that will not mature over the stated period. For example, in the last column, all loans that will mature over the next five years are dropped from the sample; in the previous column, all loans that will mature over the next four years are dropped from the sample, etc.

Finally, in Figure 1, I plot the leverage ratios of "high-yield" (i.e. H2 is positive) versus "low-yield" (i.e. H2 is negative) borrowers over time (i.e. up to five years after the loan).

3.3 Descriptive statistics

The characteristics of the syndicated loan firms are shown in Table I. While the median maturity of a syndicated loan is 3.60 years, the mean maturity is 3.74 years. The median firm size (i.e. natural logarithm of sales) is 5.03 and the median value of tangibility (i.e. net property, plant and equipment scaled by assets) is 0.32. The median values of profitability (i.e. EBITDA scaled by assets), market-to-book ratio (i.e. M/B), and pre-issue leverage ratio (i.e. debt to asset ratio) are 0.26, 0.83, and 0.32, respectively. For the sample firms, the median value of proceeds scaled by assets (i.e. the issue size) is 0.15.



	Pre-issue quarter	Issue qtr	Issue + 8	Issue + 12	Issue + 16	Issue + 20
All issues	0.327	0.361	0.387	0.383	0.375	0.356
+H2 borrowers	0.324	0.354	0.378	0.359	0.366	0.346
–H2 borrowers	0.332	0.359	0.368	0.377	0.359	0.350

Note: Significant at: *10, **5 and ***1 percent levels for the Mann-Whitney-Wilcoxon two-sample test comparing the leverage ratios of syndicated bank loan borrowers in periods of increasing yields versus decreasing yields at the end of the pre-issue quarter, the issue quarter, and eight, 12, 16, and 20 quarters after the issue

Figure 1.
Leverage ratios of "high-yield" versus "low-yield" borrowers over time

Variable	Median	Mean	SD	Skewness	Kurtosis
Size	5.03	5.08	1.88	− 0.18	0.46
Tangibility	0.32	0.38	0.25	0.54	− 0.82
Profitability	0.26	0.29	0.18	1.18	1.56
M/B	0.83	1.18	1.17	3.01	12.37
Leverage	0.32	0.33	0.19	0.42	0.15
H2	0.00	− 0.15	0.87	− 0.83	0.59
H4	0.00	− 0.12	1.42	− 0.78	1.48
H6	0.12	0.02	1.55	− 0.39	0.74
H8	0.12	0.14	1.59	− 0.31	0.38
H12	0.37	0.23	1.89	− 0.77	0.30
Proceeds/A_t	0.15	0.35	4.86	40.94	1,768.43
Years to maturity	3.60	3.74	2.38	1.65	11.17
Observations	6,903				

Notes: The sample covers syndicated bank loans from January 1984 through December 2004; "size" is the natural logarithm of sales (item 2); "tangibility" is measured as net property, plant, and equipment (item 42)/total assets (item 44); "profitability" is EBITDA (item 21)/total assets (item 44); the "market-to-book ratio" is the (total assets − book value of equity + market value of equity)/total assets; "leverage" is long-term debt (item 51) + short-term debt (item 45)/total assets; "H2" is the difference between the current interest rates and the rates two quarters ago, "H4" is the difference between the current interest rates and the rates four quarters ago, "H6" is the difference between the current interest rates and the rates six quarters ago, "H8" is the difference between the current interest rates and the rates eight quarters ago, and "H12" is the difference between the current interest rates and the rates 12 quarters ago; "Proceeds/A_t" is the "total debt proceeds" from the debt transaction scaled by end-of-quarter total assets; the "total debt proceeds" is defined as the money borrowed from a creditor; "years to maturity" is the total number of years until the maturity date of the issue; except for Proceeds/A_t, all variables are measured at the end of the previous quarter (t − 1)

Table I. Summary statistics for syndicated bank loans

I have five interest rate variables in Table I. "H2" is the difference between current interest rates and the rates two quarters ago, "H4" is the difference between current interest rates and the rates four quarters ago, "H6" is the difference between current interest rates and the rates six quarters ago, "H8" is the difference between current interest rates and the rates eight quarters ago, and "H12" is the difference between current interest rates and the rates 12 quarters ago. The construction of these variables is explained in more detail in the next section.

Table II presents the Pearson's correlation coefficients among the explanatory variables in equation (1). Judge *et al.* (1985) point out that correlation coefficients below 0.8 should not create multi-collinearity problems. Table II shows fairly low correlations (i.e. the highest one in absolute value is − 0.33). The correlation coefficients for H4, H6,

Variable	Size	Tangibility	Profitability	M/B	Leverage	H2
Size	1.00					
Tangibility	0.06	1.00				
Profitability	0.01	− 0.33	1.00			
M/B	− 0.16	− 0.16	0.11	1.00		
Leverage	0.03	0.17	− 0.24	− 0.33	1.00	
H2	− 0.10	0.01	0.08	0.06	− 0.04	1.00

Table II. Pearson's correlation coefficients

H8, and H12 (which are not reported) are similar to the coefficients reported here for H2. The variance inflation factors range from 1 to 1.18.

4. Empirical results

4.1 Timing of syndicated loans

The first three columns of Table III show the characteristics of firms that have borrowed in the syndicated bank loan market when debt market conditions are less favorable compared to a year ago (i.e. increasing yields), and the next three columns show the corresponding values for firms that have borrowed when debt market conditions are more favorable compared to a year ago (i.e. decreasing yields). I will call the first group the "high-yield borrowers", and the second group the "low-yield borrowers", from this point on. The last column shows the results of the Mann-Whitney-Wilcoxon two-sample test that compares the characteristics of the two groups.

The table shows that there is no significant difference between the two groups of firms in terms of size, market-to-book ratio, profitability, tangibility, and degree of leverage. The loan maturities are also not significantly different from each other. The table also shows that the two groups borrow in similar amounts. The median value of proceeds scaled by assets is 0.15 for both groups. This finding implies that there is no evidence of timing in the syndicated loan market in terms of the amount borrowed. As mentioned in the introduction, Taggart (1977), Marsh (1982) and Barry *et al.* (2008) use either a sample of public debt offerings or the total debt data from Compustat and show that firms tend to borrow less in periods of high interest rates. Here, in this study, I find that there is no statistically significant relationship between the historical interest rates and the amount borrowed in the syndicated loan market.

In Table IV, the years to maturity of each syndicated bank loan is regressed against the five firm-specific control variables, and an interest rate variable (i.e. H2, H4, H6, H8, or H12)

	Increasing yields			Decreasing yields			Wilcoxon two-sample test
Variable	Median	Mean	SD	Median	Mean	SD	*p*-value
Size	4.96	5.09	1.85	5.06	5.07	1.90	0.5918
Tangibility	0.31	0.38	0.25	0.32	0.38	0.25	0.4117
Profitability	0.26	0.29	0.18	0.25	0.29	0.19	0.5266
M/B	0.83	1.19	1.18	0.82	1.17	1.17	0.5398
Leverage	0.33	0.33	0.19	0.32	0.33	0.19	0.1577
H2	0.59	1.34	1.81	−0.73	−1.12	1.34	<0.0001
H4	0.58	1.16	2.21	−1.06	−1.21	1.98	<0.0001
H6	0.57	0.71	2.30	−0.51	−0.88	2.06	<0.0001
H8	0.57	0.77	2.68	−0.78	−0.66	1.25	<0.0001
H12	0.36	0.65	2.40	−0.50	−0.94	1.64	<0.0001
Proceeds/A_t	0.15	0.21	0.23	0.15	0.45	6.33	0.8930
Years to maturity	3.54	3.75	2.49	3.67	3.73	2.31	0.4985
Observations	2,834			4,069			

Notes: All syndicated loans are allocated into two subgroups: (1) all loan agreements that are made in periods of increasing yields compared to a year ago (i.e. H2 is positive), and (2) all loan agreements that are made in periods of decreasing yields compared to a year ago (i.e. H2 is negative); in order to compare the two groups' characteristics, the Mann-Whitney-Wilcoxon test is performed

Table III.
Comparison of syndicated bank loans in periods of increasing yields versus decreasing yields

Model	Dependent variable: years to maturity (1)	(2)	(3)	(4)	(5)
H2	−0.002 (0.91)	–	–	–	–
H4	–	0.002 (0.89)	–	–	–
H6	–	–	−0.004 (0.76)	–	–
H8	–	–	–	−0.071 (0.00)	–
H12	–	–	–	–	−0.125 (0.00)
$(M/B)_{t-1}$	0.075 (0.01)	0.075 (0.01)	0.075 (0.01)	0.072 (0.02)	0.070 (0.02)
$(EBITDA/A)_{t-1}$	0.331 (0.10)	0.331 (0.10)	0.333 (0.09)	0.326 (0.10)	0.270 (0.17)
$(\log S)_{t-1}$	−0.190 (0.00)	−0.190 (0.00)	−0.190 (0.00)	−0.184 (0.00)	−0.180 (0.00)
$(PPE/A)_{t-1}$	−0.174 (0.24)	−0.173 (0.24)	−0.175 (0.23)	−0.198 (0.17)	−0.255 (0.08)
$(D/A)_{t-1}$	2.309 (0.00)	2.309 (0.00)	2.313 (0.00)	2.342 (0.00)	2.375 (0.00)
R^2	0.04	0.04	0.04	0.05	0.06
n	5,236	5,236	5,236	5,236	5,236

Notes: For the dependent variable years to maturity, this table reports the coefficients of regressions of the form:

$$\text{Years to Maturity} = c_0 + c_1\Delta\text{Yield} + c_2(M/B)_{t-1} + c_3(EBITDA/A)_{t-1} + c_4(\log S)_{t-1} + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \varepsilon_t$$

The time subscript t denotes the issue quarter; Robust p-values are in parentheses; the dependent variable is the number of years to maturity for each syndicated loan; the independent variable, ΔYield, is H2, H4, H6, H8, or H12 (i.e. the increase in the yields over the last two quarters, four quarters, etc.) in each model; all other variables are as explained in Table I

Table IV. The impact of yields on the choice of maturity

in each of the five models. The goal here is to see if firms try to lower their cost of capital by borrowing at longer maturities in periods of low interest rates. I expect to find negative coefficients for the interest rate variables since these variables are measured as the difference between the current rates and the past rates.

In the first model where H2 is included in the regression, market-to-book ratio, size, and leverage are all significant predictors of years to maturity of syndicated bank loans. While market-to-book ratio and leverage each has a positive and significant impact on years to maturity, size has a negative and significant impact on years to maturity. The regression coefficients for market-to-book ratio and leverage are 0.075 (p-value = 0.01), and 2.309 (p-value = 0.00), respectively. The regression coefficient for size is −0.190 (p-value = 0.00). In this first model, profitability and tangibility are not significant predictors of years to maturity.

In this first model, the regression coefficient for H2 is insignificant (coefficient = −0.002, p-value = 0.91). So, we can conclude from the first model that the difference between the current interest rates and the rates two quarters ago is not a significant predictor of the maturity of new syndicated bank loans.

The results for models 2 and 3 are similar to model 1 results. H4 and H6 are not significant predictors of maturity. In models 2 and 3, the regression coefficients for H4 and H6 are 0.002 (p-value = 0.89), and −0.004 (p-value = 0.76), respectively.

Interestingly, in Table IV, the results for the control variables are not different from one model to another. In each model, while market-to-book ratio, size, and leverage are significant predictors of years to maturity, profitability, and tangibility are insignificant.

Finally, models 4 and 5 show the results for H8 and H12. In these models, the regression coefficients for H8 and H12 are −0.071 (p-value = 0.00), and −0.125 (p-value = 0.00), respectively. These results indicate that there is some evidence of backward-looking market timing for the maturity of syndicated loans. When interest rates are low compared to the rates two or three years ago, managers tend to borrow at longer maturities.

To summarize, we can conclude that there is some evidence of backward-looking market timing for the maturity of new syndicated loans. Firms tend to borrow at longer maturities when current rates are low compared to the rates two or three years ago. This finding is in line with Barclay and Smith (1995), Guedes and Opler (1996), Stohs and Mauer (1996), Graham and Harvey (2001), Baker *et al.* (2003), Bancel and Mittoo (2004) and Barry *et al.* (2008) findings.

4.2 The long-run impact of "high-yield" versus "low-yield" loans on leverage

To see the capital structure implications of borrowing in "high-yield" versus "low-yield" periods, I run two sets of regressions. The results of these regressions are shown in Table V. In panel A, I regress the cumulative changes in the leverage ratios of the syndicated loan borrowers over the next two, three, four, and five years after the loan against the five firm-specific control variables (size, M/B, profitability, tangibility, and pre-issue leverage) and the "H2" variable. The results are shown in the first four columns. For example, the first column "Issue + 8" shows the results when the "change in leverage over the next eight quarters" is regressed against the independent variables, the second column "Issue + 12" shows the results when the "change in leverage over the next 12 quarters" is regressed against the independent variables, etc.

The last four columns in panel A exclude loans that will mature over the next eight, 12, 16, and 20 quarters. My objective here is to take out the effects of the new loans themselves. I want to see how firms deal with their capital structures after the loan, and to see that more clearly, I have to exclude the impact of the maturing original loan (if it matures over that time frame).

In panel B, I want to see the impact of "high-yield" versus "low-yield" loans on the leverage ratios of the borrowers instead of the changes in their leverage ratios. So, in panel B, instead of using the "change in leverage" over the next two, three, four, and five years as my dependent variables, I use the leverage ratios themselves (at the end of the second, third, fourth, and fifth years) as my dependent variables. More specifically, in panel B, the dependent variable is the level of book leverage at the end of quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20, and the independent variables are size, M/B, profitability, tangibility, and the "H2" variable. Here, I am excluding the pre-issue leverage, since my dependent variable is highly correlated to pre-issue leverage.

In panel A, in the first column that shows the results of the regression where the dependent variable is the difference between the leverage ratio at the end of quarter Issue + 8 and the leverage ratio at the end of the pre-issue quarter, the coefficient for the H2 variable is 0.00 and it is insignificant (p-value = 0.19). This result shows that, on average, the "high-yield borrowers" and the "low-yield borrowers" have similar debt ratios two years (i.e. eight quarters) after the loan. We know from Table III that the "high-yield borrowers" and the "low-yield borrowers" have similar debt ratios just before the issue, and they borrow in similar amounts at the time of the loan agreement.

Table V. The long-run impact of "high-yield" versus "low-yield" loans on capital structure

Var.	All issues (z) Issue + 8	Issue + 12	Issue + 16	Issue + 20	Issues that will not mature over the period (z) Issue + 8	Issue + 12	Issue + 16	Issue + 20
Panel A: dependent variable: $(D/A)_z - (D/A)_{t-1}$								
H2	0.00 (0.19)	0.00 (0.91)	0.01 (0.04)	0.02 (0.00)	0.01 (0.25)	0.01 (0.24)	0.01 (0.12)	0.01 (0.72)
$(M/B)_{t-1}$	−0.00 (0.01)	−0.01 (0.01)	−0.01 (0.00)	−0.01 (0.01)	−0.00 (0.20)	−0.00 (0.27)	−0.02 (0.00)	−0.02 (0.02)
$(EBITDA/A)_{t-1}$	−0.02 (0.22)	−0.02 (0.18)	−0.02 (0.12)	−0.01 (0.67)	−0.03 (0.07)	−0.06 (0.02)	−0.05 (0.13)	−0.09 (0.13)
$(logS)_{t-1}$	−0.01 (0.00)	−0.01 (0.00)	−0.00 (0.02)	−0.00 (0.97)	−0.02 (0.00)	−0.02 (0.00)	−0.02 (0.00)	−0.02 (0.00)
$(PPE/A)_{t-1}$	0.02 (0.06)	0.05 (0.00)	0.08 (0.00)	0.12 (0.00)	−0.01 (0.69)	−0.01 (0.53)	0.04 (0.06)	0.11 (0.01)
$(D/A)_{t-1}$	−0.25 (0.00)	−0.33 (0.00)	−0.43 (0.00)	−0.46 (0.00)	−0.32 (0.00)	−0.39 (0.00)	−0.49 (0.00)	−0.56 (0.00)
R^2	0.06	0.08	0.11	0.13	0.10	0.13	0.13	0.16
n	4,318	3,908	3,573	3,339	2,334	1,634	1,308	472
Panel B: dependent variable: $(D/A)_z$								
H2	0.00 (0.64)	−0.00 (0.46)	0.01 (0.09)	0.02 (0.00)	0.01 (0.26)	0.01 (0.34)	0.02 (0.10)	0.01 (0.44)
$(M/B)_{t-1}$	−0.04 (0.00)	−0.03 (0.00)	−0.03 (0.00)	−0.03 (0.00)	−0.04 (0.00)	−0.04 (0.00)	−0.04 (0.00)	−0.05 (0.00)
$(EBITDA/A)_{t-1}$	−0.12 (0.00)	−0.12 (0.00)	−0.12 (0.00)	−0.09 (0.00)	−0.14 (0.00)	−0.14 (0.00)	−0.11 (0.00)	−0.15 (0.02)
$(logS)_{t-1}$	−0.01 (0.00)	−0.01 (0.00)	−0.01 (0.00)	−0.00 (0.44)	−0.02 (0.00)	−0.03 (0.00)	−0.02 (0.00)	−0.02 (0.00)
$(PPE/A)_{t-1}$	0.05 (0.00)	0.09 (0.00)	0.10 (0.00)	0.15 (0.00)	0.01 (0.53)	−0.01 (0.55)	0.02 (0.42)	0.07 (0.14)
R^2	0.07	0.07	0.08	0.09	0.07	0.07	0.06	0.05
n	4,324	3,913	3,578	3,344	2,337	1,637	1,311	473

Notes: For each variable Y_t, panels A and B report the coefficients of regressions of the form:

$$Y_t = c_0 + c_1 H2 + c_2(M/B)_{t-1} + c_3(EBITDA/A)_{t-1} + c_4(\log S)_{t-1} + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \varepsilon_t$$

Both panels A and B show the results for all quarters in my sample period; the time subscript t denotes the issue quarter; Robust p-values are in parentheses; in panel A, the dependent variable Y_t is the cumulative change in book leverage from the last day of the pre-issue quarter through the end of quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20; in other words, the impact of a syndicated bank loan on the borrowing firm's book leverage over the next 2, 3, 4, and 5 years are estimated; all explanatory variables are as explained in the previous sections; 0 while the first four columns show the results for all syndicated loans in our sample, the last four columns show the results for only the loans that will not mature over the stated period; for example, in the last column, all loans that will mature over the next 22 quarters are dropped from the sample; in the previous column, all loans that will mature over the next 18 quarters are dropped from the sample, etc.; in panel B, the dependent variable is the level of book leverage on the last day of quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20; these regressions exclude the pre-issue book leverage

The result here in Table V indicates that, two years after the loan, the difference between the two groups' leverage ratios is still insignificant.

In the first column, four of the control variables are significant predictors of the change in leverage. While M/B, size, and pre-issue leverage have a negative and significant impact on the cumulative change in leverage, tangibility has a positive and significant impact on the change in leverage. The regression coefficients for M/B, size, pre-issue leverage, and tangibility are -0.00 (p-value $= 0.01$), -0.01 (p-value $= 0.00$), -0.25 (p-value $= 0.00$), and 0.02 (p-value $= 0.06$), respectively.

The results for the quarters Issue + 12, Issue + 16, and Issue + 20 are shown in columns two, three, and four. The coefficient for the H2 variable is 0.00 and insignificant (p-value $= 0.91$) for quarter Issue + 12, 0.01 and significant (p-value $= 0.04$) for quarter Issue + 16, and 0.02 and significant (p-value $= 0.00$) for quarter Issue + 20.

To summarize, the first four columns in panel A indicate that while the difference between the two groups' leverage ratios is insignificant over the next three years, it is significant at the end of the fourth and the fifth year.

The last four columns exclude the loans that will mature over the test period. The results here are somewhat similar to the results in the first four columns. The only difference is this: the difference between the leverage ratios of the two groups is insignificant over the whole five-year period. The coefficient for the H2 variable is 0.01 and insignificant for each of the quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20.

In panel B, each column shows the results of the regressions where the dependent variable is the level of leverage at the end of quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20. The results here are similar to the results in panel A.

In the first four columns where all issues are included, the coefficient for H2 is close to zero and insignificant (p-value $= 0.64$) at the end of quarter Issue + 8, close to zero and insignificant (p-value $= 0.46$) at the end of quarter Issue + 12, 0.01 and marginally significant (p-value $= 0.09$) at the end of quarter Issue + 16, and 0.02 and significant (p-value $= 0.00$) at the end of quarter Issue + 20. So, the results here are very similar to panel A results. The difference is significant only at the end of quarters Issue + 16 and Issue + 20.

In the last four columns where I exclude the loans that will mature over the test period, I find that H2 is insignificant at the end of quarters Issue + 8, Issue + 12, Issue + 16, and Issue + 20. So, here the results are also similar to the results in the last four columns of panel A.

Overall, the results in Table V indicate that the difference between the leverage ratios of the "high-yield borrowers" and the "low-yield borrowers" is insignificant for the five-year period after the loan if the maturing loan itself is excluded.

Figure 1 shows the results of the Mann-Whitney-Wilcoxon two-sample test comparing the leverage ratios of "high-yield borrowers" and "low-yield borrowers" at the end of the pre-issue quarter, the issue quarter, and eight, 12, 16, and 20 quarters after the issue.

Just before the debt offering (i.e. at the end of the pre-issue quarter), the "low-yield borrowers" have slightly higher debt ratios compared to the "high-yield borrowers", but the difference is statistically insignificant (p-value > 0.10). As we have seen in Table III, the amounts borrowed (i.e. proceeds scaled by assets) by the two groups are similar, so at the end of the issue quarter, the difference between the two groups' debt ratios is insignificant (p-value > 0.10).

Both groups continue to increase their leverages for two more years, and at the end of the second year, the difference between the two groups' debt ratios is still insignificant (p-value > 0.10). At this point, the "high-yield borrowers" have slightly higher debt ratios compared to the "low-yield borrowers".

In the third year, the "low-yield borrowers" continue to increase their leverages, while the "high-yield borrowers" reduce their debt levels. At the end of the third year, the "low-yield borrowers" have slightly higher debt ratios compared to the "high-yield borrowers" (p-value > 0.10).

In years four and five, the "low-yield borrowers" reduce their leverages, while the "high-yield borrowers" first increase, and then reduce their leverages. Still, the difference between their debt ratios is insignificant (p-value > 0.10) at the end of the fourth and fifth years.

To summarize, the results in this study show that firms do not time the syndicated bank loan market. With regard to the capital structure implications, I find no evidence of a significant relationship between the interest rates at the time of the loan and the leverage ratios of the borrowers in the long run. In other words, the difference between the debt ratios of "high-yield borrowers" and "low-yield borrowers" is insignificant over the five-year period after the loan agreement. Therefore, for syndicated bank loans, my findings here do not support the market timing theory of Baker and Wurgler (2002). On the other hand, the results here do only partially support the tradeoff theory for syndicated bank loans: on average, syndicated loan borrowers (i.e. both "high-" and "low-yield borrowers") tend to move towards their pre-issue leverage levels, but interestingly, at the end of the fifth year, they still have significantly higher debt ratios compared to their original levels.

5. Conclusion

This study contributes to the literature by answering these three main questions:

(1) Do firms tend to borrow in larger amounts in the syndicated bank loan market when market conditions (i.e. the interest rates) are more favorable?

(2) Do firms tend to choose longer maturity debt offerings when market conditions (i.e. the interest rates) are more favorable?

(3) Is there any difference in the long run between the capital structures of firms that borrow when market conditions are more favorable versus the capital structures of firms that borrow when market conditions are less favorable?

I compare the firms that borrow when market conditions are less favorable compared to six months ago to the firms that borrow when market conditions are more favorable compared to six months ago, and find no significant difference between the two groups of firms in terms of size, market-to-book ratio, profitability, tangibility, and degree of leverage. I also find that the two groups borrow in similar amounts. So, there is no evidence of market timing in terms of the amount borrowed. Barry *et al.* (2008) find evidence of market timing for public debt offerings. In this study, I do not find evidence of market timing for syndicated loans.

With regard to the loan maturities, my results confirm Barclay and Smith (1995), Guedes and Opler (1996), Stohs and Mauer (1996), Graham and Harvey (2001), Baker *et al.* (2003), Bancel and Mittoo (2004) and Barry *et al.* (2008) findings. I find a negative relation between the level of interest rates at the time of the borrowing and the loan maturity. More specifically, the results in this study indicate that firms choose longer maturities when the interest rates are low compared to the rates two or three years ago.

In my capital structure tests, I find that the leverage ratios of all borrowers go up for two years after the offering. At that point, while the "high-yield borrowers" slowly start lowering their leverage levels, the "low-yield borrowers" continue to increase their leverage levels until the end of the third year. At the end of the third year, these firms also start lowering their leverage levels. Most of my empirical tests show that, in the long run, the impact of the interest rates on leverage is statistically insignificant. Therefore, for syndicated bank loans, my results do not support the market timing theory of Baker and Wurgler (2002).

On the other hand, the results in this study offer some weak support for the tradeoff theory: on average, syndicated loan borrowers tend to move towards their pre-issue leverage levels over time, but five years after the issue, they still have significantly higher debt ratios compared to their original levels.

These findings have important implications for financial managers. After seeing these results, they will know that while the level of interest rates is important for other firms in their choices of maturity, it is not important in their choices of loan size. Knowing other firms' motivations is important for financial managers. If they can successfully predict the market activity in the coming months, they may be able to implement better strategies for their own financing needs.

I have one important limitation in this study: as mentioned above in the "methodology" section, since the yield data are insufficient, I use the "B" level corporate debt yields in each quarter as a proxy for syndicated loan yields. Here, I rely on Denis and Mihov (2003) findings. This measure is, of course, not the best proxy for each individual loan. Unfortunately, I do not have a better alternative here.

My findings raise several interesting questions for future research. First, although I examine the relation between market conditions at the time of the borrowing and leverage, I do not investigate the impact of market conditions on firm value. It would be interesting to investigate empirically the relation between the interest rates at the time of the borrowing and firm value. Second, it would be interesting to investigate whether the relations documented in this paper have changed over time. For example, do business cycles have an impact on firms' borrowing behavior? In other words, is there any difference between expansionary and recessionary economic periods in terms of firms' borrowing activities and their leverage ratios and market values in the long run? Finally, further investigation of other types of debt like public debt, private placements, and smaller, non-syndicated bank loans could enhance our understanding of debt offerings and their impacts on leverage and firm value.

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Further reading

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