Industry Structure of Debt and Market Share Leadership Persistence

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Abstract

This study investigates the relationship between the industry structure of debt and market share leadership persistence using a large sample of firms spanning the years 1961-2012. We construct unique variables that measure the structure of industry leverage and conduct tests for the relationship between these variables and the likelihood that firms retain market share leadership from year to year. Results show that firms in industries with high capital structure diversity are more likely to maintain market share leadership over time, indicating that heterogeneity in capital structure among industry incumbents facilitates the strategic use of leverage to secure and maintain a leadership position. We also find that firms with higher and more stable leverage ratios are more likely to maintain their leadership, suggesting that firms use debt financing to invest in market share growth. The results highlight the importance of firm- and industry-level debt structures in product market leadership positioning and provide a new perspective on intra-industry rivalry.

Keywords: Capital structure, Leverage, Market share, Industry structure, Leadership

1. Introduction

This study investigates how industry-level leverage structures influence firms' market share leadership persistence. MacKay and Phillips (2005) and Campello (2003, 2006)) find that market share growth is related to the degree to which firm-level financing policies differ from industry peers in the cross-section. This indicates that firms can gain product market advantages through strategic use of financing policy, and informs our more detailed investigation into overall industry capital structure effects on persistence in market share leadership. Recent evidence in DeAngelo and Roll (2014) documents significant industry-level time series variation in capital structures. This evidence indicates that there are changes over time in within-industry capital structure dynamics. In this context, we argue that the degree to which firms are able to *persist* in market share leadership is related to both cross-sectional *and* time-series variation in industry-level leverage structures.

Our specific contribution to the literature is to provide new evidence on how industry capital structure dynamics are related to the likelihood that firms maintain market share leadership over time. We hypothesize that firms are more likely to maintain market share leadership in industries in which there are distinct differences in leverage ratios among firms (high leverage diversity), stable industry leverage structures over time (low industry dispersion in leverage changes) and distinct differences in leverage between leaders as a group and followers as a group (high leader-follower leverage gap). Firms in high leverage diversity industries distinguish themselves from each other based on leverage. To the extent that leverage is used as a tool to secure a market share advantage, as evidence in Campello (2006) and others indicates, leaders in such industries are more likely to maintain their market share position over time. Thus, we expect that a high industry leverage diversity environment will facilitate stable leadership positioning over time. We also expect that if such leverage structures are sticky over time, leadership shifts are less likely. Further, if high leverage diversity implies strategic interaction among industry incumbents with respect to the use of leverage to pursue growth, we expect that in industries with a higher leverage gap, firms are also more likely to maintain their leadership position.

The analysis is conducted in a large sample of publicly traded U.S. firms from 93 unique industries over the period 1961 to 2012, comprising 202,131 firm-years. Our investigation focuses on how the industry structure of debt influences the probability of maintaining industry leadership, conditioned on firm and industry characteristics. We conduct sub-sample analysis for three distinct periods in which leaders have similar leverage as followers (period 1, 1960-1974), lower leverage than followers (period 2, 1975-1988) and higher leverage than followers (period 3, 1989-2012).

We construct two unique variables to describe the industry structure of debt. The first is *Industry Leverage Diversity*, which is the yearly standard deviation of leverage within an industry scaled by industry mean leverage. This variable

measures the degree to which there are distinct debt policies by firms in an industry in a given year. The second is *Industry Dispersion of Leverage Changes*, which is the standard deviation of within-industry two-year leverage change. This variable measures the degree to which the industry structure of leverage changes over time. We also construct a firm-level variable that measures the stability of a firm's debt ratio over time. The variable *Time Series Leverage Dispersion* is the standard deviation in leverage for the firm over the most recent 10 years. To the best of our knowledge, these three measures are unique descriptive variables for industry and firm structure of financial leverage.

Results indicate that firms with relatively higher debt ratios and stable capital structures, denoted by low time series leverage dispersion, are more likely to maintain a market share leadership position. We also find that firms are more likely to maintain leadership in industries with high industry leverage diversity, high dispersion of leverage changes, and high leader-follower leverage gap. These results suggest that firms use high leverage to pursue strategies that secure market share leadership, and are able to maintain this leadership in industries where there is heterogeneity in capital structures. Thus, the use of debt financing to secure market share advantages appears to be a function of the degree of heterogeneity or homogeneity in capital structures among industry peers.

These results highlight the importance of the industry structure of debt in explaining market share leadership position over time. The typical definition of industry structure is based on relative share of industry sales. We demonstrate that another important aspect of industry structure is the degree to which incumbents persist in distinguishing from each other in their financing policies. In so doing we extend and complement existing evidence that firms have higher sales growth relative to industry peers when their capital structure is distinct from these competitors (e.g., Campello, 2006).

The rest of the paper is organized as follows. The next section discusses related literature and testable hypotheses. Section 3 describes the sample formation and provides summary statistics. Section 4 presents results of tests for the relationship between the industry structure of debt and market share leadership persistence, and Section 5 contains a concluding discussion.

2. Literature, Hypotheses, and Test Variables

There is a large theoretical and empirical capital structure literature, primarily building on trade-off theories proposed in Modigliani and Miller (1958) and pecking order theories in Myers and Majluf (1984). Relevant studies for the purpose of our analysis focus on how capital structure affects product market competition. Opler and Titman (1994) find that highly levered firms in distressed industries lose market share to their peers with lower leverage. Lyandres (2006) develops a theoretical model that proposes a positive relationship between firms' optimal debt and the extent of competition in output markets. In his empirical analysis he finds that, regardless of the type of competition in output markets, interaction among peers positively affects their optimal debt and provides them with a strategic advantage.

Chevalier (1995) studies the impact of leveraged buyouts (LBOs) on product market competition in the supermarket industry. She finds that the impact of LBOs on product pricing is mediated by the capital structures of rivals; when rivals of the LBO firm have relatively lower leverage, prices tend to decrease. This evidence suggests that relatively low debt with respect to rivals facilitates predatory pricing. Chevalier and Scharfstein (1996) develop a theoretical model in which firms that are financially constrained exhibit counter-cyclical pricing behavior compared to their less constrained rivals and find empirical support for their predictions.

Campello (2003) investigates the relationship between competitive performance and capital structure. Building on Chevalier and Scharfstein (1996), he uses macroeconomic shocks to aggregate demand (recession, boom) as instrumental variables for the endogenously given factors that affect firms' capital structure choices and competitive performance. He finds that during recessions, high debt harms firm sales growth in industries where rivals have lower levels of debt. This is consistent with evidence in Zingales (1998) who studies the impact of deregulation in the trucking industry. He finds that a conservative financing policy relative to rivals increased the probability that firms survived the deregulation shock. Campello (2006) studies firms' capital structure relative to industry rivals and finds that debt can boost or hurt performance depending on the rivals' debt level. Firms enjoy superior sales growth if they have higher long term debt than the industry average and increase debt at the margin. But after some point, this relationship is reversed and additional increases in debt can hurt a firm's performance if it has very high levels of debt relative to peers. The study also finds that in concentrated industries, leaders do not perform well when their debt levels go above the industry average. Yet, in the same industries, less indebted leaders can improve their performance if they take on more debt.

MacKay and Phillips (2005) consider the relationship between technology, risk, and leverage dispersion. They find that industries in which firms have very different technologies also tend to have different capital structures. They also find that a firm in the bottom leverage quintile for a certain industry will adjust its leverage only when other firms within

that same quintile adjust their leverage. Their results suggest that it is important to consider more than firms' debt ratios and external economic influences. It is important to also consider rivals' strategies since firms tend to adjust their own debt policy with the respect to rivals' policies as well. MacKay and Phillips (2005) result that financial leverage is higher and less dispersed in concentrated industries is in contrast to Campello (2006) who finds that financial leverage is more dispersed in concentrated industries.

Our contribution to this literature on the interactions between capital structure and product market competition is to investigate the relationship between industry leadership persistence and firm- and industry-level structure of debt. We define firm and industry level variables to study the relationship between individual firms' capital structure and market performance within the respective industry. We use two variables, *Leverage* and *Time-Series Leverage Dispersion,* to describe the nature of each individual firm's capital structure.   *Leverage* is a ratio of short-term and long-term debt over total assets.   *Time-Series Leverage Dispersion* is the standard deviation of the firm leverage during the preceding 10 years. This variable represents the historical culture of firm with respect to use of leverage and is the point of departure for the current and future debt policies.

Individual firms' decisions and policies pertaining to capital structure can be influenced by rivals' capital structure strategies within the respective industries. Three variables are designed to capture within-industry capital structure effects.   *Industry Leverage Diversity* is the coefficient of variation of leverage computed as the cross-sectional standard deviation of leverage across firms within industry at time t scaled by corresponding industry mean leverage at time t. This variable measures the variability of debt policies across firms in each industry in a given year.   *Industry Dispersion of Leverage Changes* is constructed in two steps. First, we define annual changes in leverage for each firm in each industry from time t-2 to time t. Next, we compute annual industry level standard deviation of these changes in leverage within each industry. Low values of the variable *Industry Dispersion of Leverage Changes* can be generated when firms within the industry have similar changes in leverage during the preceding two periods. This measure represents the dynamic nature of the industry's debt structure over time and incorporates the contributions of each individual firm's change in leverage to the industry dynamics. Finally, *Leader-Follower Leverage Gap* is computed as the average leverage of the firms in the top 10% of market share in the industry dividend by the average leverage of firms in the bottom 90% of market share.

The main hypotheses of our paper concern the impact of the industry structure of leverage on leadership persistence. Our underlying assumption is that firms use a specific leverage strategy to establish and maintain their market share leadership. Thus, from an industry perspective, we expect firms will be more likely to maintain their position relative to rivals if there is high cross-sectional variation in capital structures.   This is especially likely to be the case where market share leaders have a capital structure that is different from the rest of the industry. Such an industry structure of leverage implies that firms are differentiating from each other based on leverage, and presumably, in their ability to pursue growth and maintain or attain market share leadership.

> H1: Market share leaders in industries with high capital structure diversity are more likely
> to maintain their leadership position.

> H2: Market share leaders in industries where leaders have a distinct capital structure from
> followers are more likely to maintain their leadership position.

We also consider that if debt is indeed used to secure a market share advantage, then changes over time in the industry structure of debt will influence the likelihood of maintaining market share positions. Specifically, we expect that significant variation in the way individual firms adjust their capital structures within an industry will decrease the probability that incumbent leaders maintain their position. Our reasoning is as follows. High variation in leverage changes suggests that the industry structure of debt is changing. If capital structure is used as a leadership positioning tool by which firms exploit investment opportunities strategically with either debt or equity issuance, then changes in the industry structure of debt could result in changes in market share leadership positions.

> H3: Firms in industries with low industry dispersion in leverage changes are more likely to
> maintain their market share leadership.

We also consider the association between firm-level debt structure and leadership persistence. If leader firms have a specific capital structure target ratio (either high or low debt) that facilitates pursuit of growth opportunities, then we would observe a positive association between stable capital structures over time and market share leadership persistence.

> H4: Firms with low time series leverage dispersion are more likely to maintain their market
> share leadership.

We note that our examination of the interactions between industry debt structure and market share leadership do not explicitly consider the impact of investment policy on market share leadership. We do recognize, however, that financing policy supports the firm's investment needs, and that the issue and invest decision to a large extent drives the evolution of capital structure over time. Thus, we acknowledge that differences in debt ratios at any point in time reflect firms' financing choices as they exploit growth opportunities.

3. Sample and Summary Statistics

The sample includes firms listed in Compustat from 1961to 2012, excluding financial institutions and regulated firms.   All financial data are CPI-deflated and include total assets, long- and short-term leverage, and sales. In total we have 202,131 firm-years in 93 three-digit SIC industries. We define a *leader* as a firm with the market share among top 10% of industry sales in the current year; *followers* are firms in the bottom 90% of industry sales. We identify these two groups by ranking all firms in the industry by market share deciles in each year. Firms that fall into top decile are identified as leaders and the bottom nine decile firms are identified as followers.

We are interested in all firms regardless of the duration of their life, since our goal is to track the likelihood and persistence of their leadership in the industry. Thus, firms are included in the sample even if they do not exist during the entire sample period. For our purposes, we assume that if a firm exits an industry, then it must have failed to keep its market position. We do recognize, however that in reality some firms could have been acquired or could have changed SIC codes due to realignment in business segments.

Several other firm- and industry-level variables are considered because of their presumed effect on the likelihood of maintaining market share leadership position. *Cash Holdings* is cash and marketable securities scaled by total assets. *Return on Assets* is operating income before depreciation scaled by total assets. *Market to Book* is year-end closing stock price multiplied by number of common shares outstanding plus total assets minus common or ordinary equity, scaled by total assets. *Capital Expenditures* and *R&D expenses* are scaled by total assets. *Firm size* is the natural log of total assets. The *Herfindahl-Hirschman Index* is used to measure industry competitiveness or concentration; higher levels of HHI represent denote few-firm, competitive industries. All control variables are lagged one period.

Table 1. Differences between Industry Leaders and Followers: Full Sample Period

	Leaders		Followers		P-Value for Difference	
	Mean	Median	Mean	Median		
	(1)	(2)	(3)	(4)	(1)-(3)	(2) -(4)
Leverage	0.2519	0.2355	0.2404	0.2053	0.0000	0.0000
Time Series Leverage Dispersion	0.0651	0.0524	0.0819	0.0603	0.0000	0.0000
Cash Holdings/Total Assets	0.1011	0.0634	0.1679	0.0813	0.0000	0.0000
Return on Assets	0.1532	0.1466	0.0546	0.1128	0.0000	0.0000
Market to Book	1.7277	1.3615	2.0049	1.3303	0.0000	0.0000
Capital Expenditures/Total Assets	0.0700	0.0563	0.0742	0.0474	0.0000	0.0000
Research & Development Expenses	0.0220	0.0000	0.0460	0.0000	0.0000	0.0000
Sales	7489.53	1681.21	667.24	65.74	0.0000	0.0000
Log of Total Assets	7.3929	7.3406	4.4049	4.2311	0.0000	0.0000
Total Assets	8954.96	1541.70	743.19	68.79	0.0000	0.0000
Number of Firm-Years	24,163		177,968			
Number of Unique Firms	2,407		17,826			
Number of Firms per year	456		3,358			

Pooled summary statistics of firm-specific variables for Industry Followers and Industry Leaders. *Industry Leaders* are firms that are in the top 10% of industry sales in the current year. *Industry Followers* are firms in the bottom 90% of industry sales at time t. The sample is comprised of firms in the Compustat database from 1960 to 2012 (excluding financial and utility firms). *Leverage* is total debt (short and long-term) scaled by total assets. *Time Series Leverage Dispersion* is standard deviation of firm leverage over the last 10 years. *Cash Holdings/Total Assets* is cash holdings

scaled by total assets. *Return on Assets* is operating income before depreciation over total assets. *Market to Book* is the ratio of (annual close price by the number of common shares outstanding plus total assets and minus common/ordinary equity) scaled by total assets. *R&D expenses* is Research and Development Expenses scaled by total assets. *Log of Total Assets* is natural log of total assets. P-values are for differences in means and medians for leader versus follower subsamples.

Table 1 provides summary statistics for differences in firm level variables for the full sample period and reveals distinct differences between industry leaders and followers. Leader firms have higher debt ratios and lower time series leverage dispersion. This is suggestive evidence that, on average, leaders use consistent leverage strategies over time, since their debt ratios are relatively sticky. Not surprisingly, industry leaders are much larger in size, have higher return on assets, and spend more on research and development. Interestingly, followers tend to have higher levels of cash holdings. At the same time, higher market-to-book for the followers suggests that they are less mature firms with greater growth opportunities, which could explain why they hold more cash.

Our hypotheses for the relationship between industry structure of debt and market share leadership persistence implicitly assume that higher market share is a good thing for investors. Evidence in Table 1 indirectly confirms this since leaders on average have higher ROA than followers. We also compute pair-wise correlations between ROA and market share in unreported analysis, and find positive and highly significant correlations, confirming that higher market share is positively associated with better operating performance.
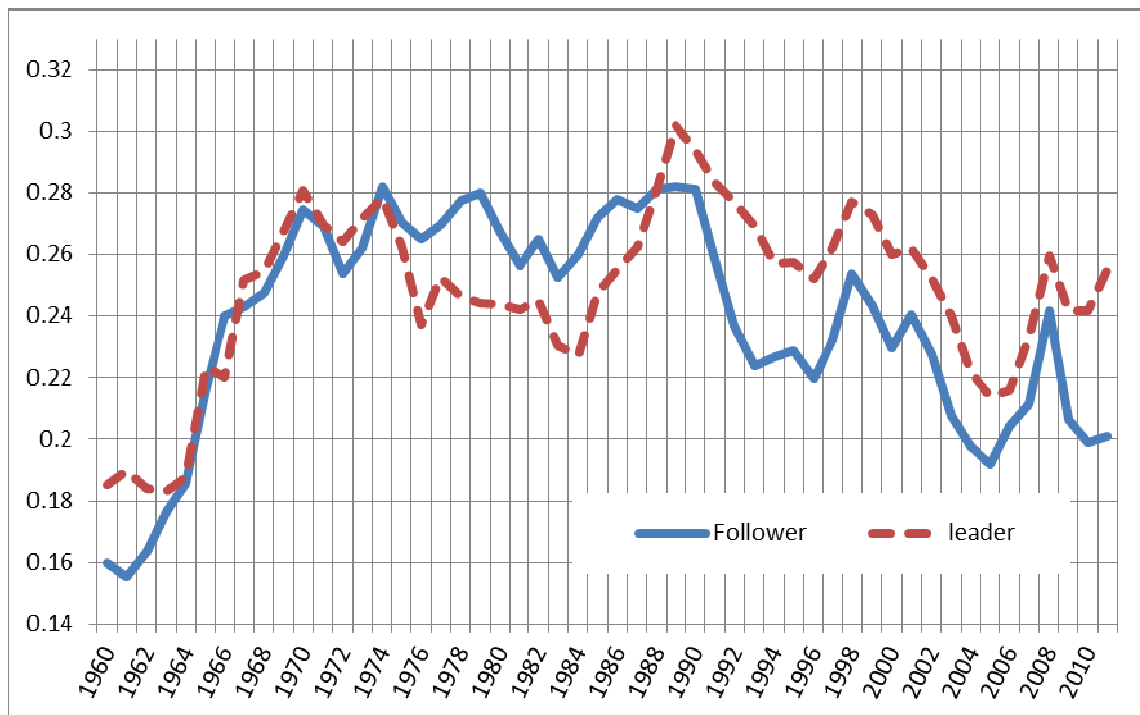

Figure I. Time-series Leverage for Industry Followers and Leaders

Pooled time-series leverage for Industry Leaders and Industry Followers. *Industry Leaders* are firms that are in the top 10% of industry sales in the current year t. *Industry Followers* are firms in the bottom 90% of industry sales at time t. Leverage is the sum of short and long-term debt and scaled by total assets. The sample includes all firms in the Compustat database from 1960 to 2012 (excluding financial and utility firms).

Figure 1 plots average annual debt ratios for leaders and followers over the entire sample period. It shows a pattern where the relative structure of debt ratios differs during three distinct time periods. For the period 1963-1974, leverage ratios for industry leaders and followers do not appear to be significantly different; from 1975-1988 followers have higher leverage than leaders; and from 1989-2012 leaders have higher leverage than followers. In light of these differences, we re-produce summary statistics from Table 1 for these three subsample time periods. Results are reported in Table 2 and confirm that the sub-period differences in leverage illustrated in Figure 1 for the middle and late periods are statistically significant. Leaders and followers have similar leverage in the early period, but in the middle period leaders have lower leverage and in the late period leaders have higher leverage. We note, however, that most of the differences in characteristics discussed above for the full sample period hold in all three subsample periods.

In later logistic regression analysis, we examine these subperiod samples separately to provide further insights on how the impact on leadership persistence of the firm- and industry-structure of leverage varies over time. We also construct an additional control variable *Leaders and Followers Leverage Gap*. It is defined as a ratio between average leverage of all leaders in the industry j at time t and average of all followers' leverage at time t and for industry j.

Table 2. Differences between Industry Leaders and Followers: Sub-Sample Periods

Panel A. Subperiod 1: 1963-1974	Leaders		Followers		P-Value for Difference	
	Mean	Median	Mean	Median		
	(1)	(2)	(3)	(4)	(1)-(3)	(2)-(4)
Leverage	0.2432	0.2341	0.2465	0.2365	0.2938	0.4820
Time Series Leverage Dispersion	0.0496	0.0371	0.0514	0.0378	0.3557	0.6010
Cash Holdings/Total Assets	0.0840	0.0616	0.0930	0.0633	0.0000	0.1290
Return on Assets	0.1593	0.1495	0.1537	0.1451	0.0000	0.0010
Market to Book	1.6134	1.2911	1.5589	1.2297	0.2305	0.0000
Capital Expenditures/Total Assets	0.0765	0.0629	0.0777	0.0585	0.4585	0.0000
Research & Development Expenses	0.0089	0.0000	0.0099	0.0000	0.0345	0.0000
Sales	1299.70	429.79	192.30	51.85	0.0000	0.0000
Log of Total Assets	5.8723	5.7838	3.9711	3.7374	0.0000	0.0000
Total Assets	1187.99	324.98	175.24	41.99	0.0000	0.0000
Number of Firm-Years	3,976		22,651			
Number of Unique Firms	626		3,817			
Number of Firms per year	265		1,510			

Panel B. Subperiod 2: 1975-1988	Leaders		Followers		P-Value for Difference	
	Mean	Median	Mean	Median		
	(1)	(2)	(3)	(4)	(1)-(3)	(2)-(4)
Leverage	0.2477	0.2281	0.2640	0.2386	0.0000	0.0000
Time Series Leverage Dispersion	0.0632	0.0506	0.0805	0.0613	0.0000	0.0000
Cash Holdings/Total Assets	0.0917	0.0591	0.1280	0.0650	0.0000	0.0000
Return on Assets	0.1597	0.1556	0.0863	0.1257	0.0000	0.0000
Market to Book	1.3358	1.1365	1.7206	1.1389	0.0000	0.6040
Capital Expenditures/Total Assets	0.0845	0.0700	0.0900	0.0590	0.0000	0.0000
Research & Development Expenses	0.0192	0.0029	0.0267	0.0000	0.0000	0.0000
Sales	3520.91	1002.30	303.84	39.17	0.0000	0.0000
Log of Total Assets	6.7382	6.7442	3.6820	3.5491	0.0000	0.0000
Total Assets	3035.19	849.12	260.55	34.78	0.0000	0.0000
Number of Firm-Years	6,852		52,288			
Number of Unique Firms	1,096		8,264			
Number of Firms per year	489		3,735			

Panel C. Subperiod 3: 1989-2012

	Leaders		Followers		P-Value for Difference	
	Mean	Median	Mean	Median		
	(1)	(2)	(3)	(4)	(1)-(3)	(2)-(4)
Leverage	0.2566	0.2402	0.2277	0.1729	0.0000	0.0000
Time Series Leverage Dispersion	0.0705	0.0573	0.0885	0.0659	0.0000	0.0000
Cash Holdings/Total Assets	0.1108	0.0670	0.2020	0.1050	0.0000	0.0000
Return on Assets	0.1481	0.1406	0.0198	0.0973	0.0000	0.0000
Market to Book	1.9612	1.5242	2.2305	1.4713	0.0000	0.0000
Capital Expenditures/Total Assets	0.0607	0.0475	0.0658	0.0396	0.0000	0.0000
Research & Development Expenses	0.0271	0.0024	0.0624	0.0000	0.0000	0.0000
Sales	11270.06	3138.66	937.16	95.66	0.0000	0.0000
Log of Total Assets	8.1571	8.0816	4.8427	4.7513	0.0000	0.0000
Total Assets	14181.44	3234.50	1089.48	115.73	0.0000	0.0000
Number of Firm-Years	13,335		103,029			
Number of Unique Firms	1,726		13,179			
Number of Firms per year	556		4,293			

Pooled summary statistics of firm-specific variables for Industry Followers and Industry Leaders. *Industry Leaders* are firms that are in the top 10% of industry sales in the current year. *Industry Followers* are firms in the bottom 90% of industry sales at time t. The Table provides comparative statistics for three time periods: 1960-1974, 1975-1988 and 1989-2012. Variable definitions are in Table 1. P-values are for differences in means and medians for leader versus follower subsamples*.*

4. Empirical Analysis

We estimate the probability of leadership persistence with a logistic regression equation with the following functional form:

Probability (Maintain Leadership)t = f(Leverage(t-1), Time Series Leverage Dispersion(t-1), Cash Holdings(t-1), ROA(t-1), Market to Book(t-1), Capital expenditure(t-1), R&D(t-1), Size(t-1), Industry Leverage Diversity(t-1), Industry Dispersion of Leverage Changes(t-1), Leader-Follower Leverage Gap(t-1), Herfindahl-Hirschman Index(t-1),Year Dummies

The dependent variable equals one for the sub-sample of firms that were leaders in the previous period and maintained leadership in the next period, otherwise it equals zero. This specification is specifically targeted at the question of the likelihood of leadership persistence, which is the central question in our paper. The right-hand-side variables of interest (predicted coefficient signs) are the industry-level variables *Industry Leverage Diversity* (positive), *Leader-Follower Leverage* Gap (positive), *Industry Dispersion of Leverage Changes* (negative) and the firm-level variable *Time Series Leverage Dispersion* (negative).

We include other variables to control for both firm and industry characteristics that are likely to affect leadership persistence. Firm level control variables are as follows. Cash holdings are included to control for their effect on leadership positioning and capital structure strategies; return on assets controls for performance; market to book, capital expenditures, and R&D control for investment opportunities, and the natural log of total assets controls for firm size. The Herfindahl-Hirschman Index controls for the degree of competition within the industry, and year dummies are included to control for time trends in the full sample period.

Table 3. Probability of Maintaining Leadership

	(1) Full Sample	(2) 1960-1974	(3) 1975-1988	(4) 1989-2012
Leverage	0.573***	0.0654	0.0683	0.8209***
	(<.0001)	(0.43)	(0.1401)	(<.0001)
Time Series Leverage Dispersion	-2.9042***	-0.9266***	-3.3998***	-3.055***
	(<.0001)	(0.0003)	(<.0001)	(<.0001)
Cash Holdings	-0.2323***	-0.1846	0.0170	-0.2946***
	(<.0001)	(0.2468)	(0.7627)	(<.0001)
Return on Assets	0.091***	0.5544***	0.0145	0.1077***
	(<.0001)	(0.0002)	(0.6968)	(<.0001)
Market to Book	0.0002	-0.0216*	-0.0032	0.0032
	(0.879)	(0.0866)	(0.4112)	(0.1753)
Capital Expenditures	-0.2157***	-0.1590	-0.0638	-0.3154***
	(0.0001)	(0.4422)	(0.4727)	(<.0001)
R&D expenses	0.000154***	0.0004	0.000163**	0.000158***
	(<.0001)	(0.326)	(0.0245)	(<.0001)
Log(Total Assets)	-0.0008	0.0405***	0.0004	-0.00543*
	(0.7389)	(<.0001)	(0.9224)	(0.0504)
Industry level variables				
Leverage Diversity	0.0796***	-0.0334	0.0050	0.109***
	(<.0001)	(0.5234)	(0.8559)	(<.0001)
Dispersion of Leverage Changes	0.0421*	-0.0331	0.0522	0.0717**
	(0.0998)	(0.7554)	(0.216)	(0.029)
Leaders-Follower Leverage Gap	0.00199***	0.0165**	0.0177**	0.00183**
	(0.0007)	(0.0253)	(0.0625)	(0.0017)
Herfindahl-Hirschman Index	0.7477***	1.0071***	0.6633***	0.763***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Intercept	-1.3714***	-1.5684***	-1.1816***	-1.3833***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Pseudo R-squared	0.0396	0.0286	0.0381	0.0497
Number of Observations (firm-years)	163,093	17,496	47,744	97,853
Frequency of Dependent Variable=1	10.94%	12.31%	10.76%	10.75%

Logit coefficient estimates for the probability that a firm maintains leadership position. The dependent variable equals one if a firm was a Leader last year remains a Leader in the current year; and equals zero for all other cases. *Leader* is a firm in the top 10% of industry sales in the current year. *Follower* is a firm in the bottom 90% of industry sales in the current year and the industry *j*. The final sample includes all firms in the Compustat database from 1960 to 2012 (excluding financial and utility firms). The Table reports results for full sample and for the three subperiods: 1960-1974, 1975-1988 and 1989-2012. All presented variables are lagged variables. Firm-level variables are defined in Table 1. *Industry Leverage Diversity* is the standard deviation of leverage within the industry j divided by the industry. *Industry Dispersion of Leverage Changes* is standard deviation of changes in leverage between t and t-2, by year and industry. *Leaders & Followers Leverage Gap* is the ratio between average leverage of all leaders in the industry j at time t and average of all followers' leverage at t and for industry *j*. All models include year dummies. P-values denoting significance of point estimates are in parentheses.

Table 3 contains logit coefficient estimates for the probability of maintaining market share leadership, with leader firms defined as having market share among the top 10% of all firms in the industry. Column (1) contains results for the full sample, and Columns (2) through (4) contain results for the separate sub-sample periods discussed above: early (1960-1974), middle (1975-1988) and late (1989-2012).

Our main hypotheses are for the impact of the industry structure of debt on market share leadership persistence. We hypothesize that high capital structure diversity, low industry dispersion in leverage changes, and high leader-follower leverage gap will increase the probability that firms maintain their market share leadership. Table 3 shows a positive coefficient on industry leverage diversity in Column (1) for the full sample, which is consistent with our first hypothesis. High industry leverage diversity indicates heterogeneity in capital structures among incumbents. The result here suggests that such an environment facilitates the use of financing policy to exploit investment opportunities and gain a strategic advantage over competitors.

Our second hypothesis is that in industries where leaders have distinct capital structures from followers, firms are more likely to maintain market share leadership positions. The positive coefficient on leader-follower leverage gap is consistent with this hypothesis. Together with the result for industry capital structure diversity and the positive coefficient on firm-level leverage, these results indicate that firms distinguish themselves from their peers by using higher leverage to secure market share advantages.

The positive coefficient on industry dispersion of leverage changes is inconsistent with our third hypothesis that high time-series variation in the industry structure of debt is negatively related to leadership persistence. Rather, it indicates that leaders are more likely to maintain leadership when there are greater changes in the structure of debt ratios within the industry over time. It is likely that changes in the industry structure of debt mirror changes in firms' ability to identify and finance investment opportunities. Firms interact over time by distinguishing from each other in terms of exploitation of investment opportunities, and in this environment, incumbent leaders are able to strategically adjust their leverage to maintain market share advantage.

Our fourth hypothesis is that firms with lower time series leverage dispersion will be more likely to maintain their market share leadership. The negative coefficient on leverage dispersion for all time periods is consistent with this hypothesis. It suggests that a stable capital structure, whether it be high or low leverage, is associated with strategies that promote market leadership. This stickiness of leverage ratios provides tentative evidence that established market share leaders tend to have book leverage targets, and the positive coefficient on leverage in Column (1) indicates that these leaders tend towards higher leverage ratios.

We note that the firm- and industry-level debt structure variables are only significantly related to leadership persistence in the late sample period (Column (4)), when leaders have higher debt than followers (Figure 1 and Table 2). Our interpretation of this is that the use of capital structure to secure a market share advantage is asymmetric in the following sense. It is only when leaders have higher leverage than followers that the structure of debt matters, likely because debt issuances are less costly than equity issuances in terms of lower transactions and signaling costs. That is to say, leaders are able to use higher debt to strategically invest in growth ahead of competitors, but do not have the same strategic advantages with equity issuance.

Our results add further insight into the relationship between capital structure and product market competition documented in papers such as MacKay and Phillips (2005) and Campello (2006). These studies find that firms have higher industry-adjusted sales growth when their financing policies differ from other industry incumbents. Our result that market share leaders are able to maintain their position when their own capital structures are stable over time and they operate in industries with high cross-sectional leverage diversity extends and complements this literature.

We perform an additional test to provide further insight into how firm-level debt structure influences market share leadership positioning. We conduct this analysis for the sub-sample of firms that were followers in the previous period and examine the likelihood of gaining versus losing market share. We do this by estimating the model specification in equation (1), except that the dependent variable equals one if one if a firm's market share increased by more than 5% from the last period and equals zero if it decreased by more than 5%. In this analysis, we are not seeking to evaluate the probability that follower firms are able to break through to top 10% market share leadership ranks. Rather, we are seeking additional insight into how firm-level leverage structure impacts on the likelihood of noticeable shifts in market share. We include the industry leverage structure variables for consistency with Table 3, however, our variable of interest in this analysis is the firm-level variable Time Series Leverage Dispersion.

Table 4. Probability of Advancing Current Position in the Industry

	(1) Full Sample	(2) 1960-1974	(3) 1975-1988	(4) 1989-2012
Leverage	-0.2372***	0.0270	-0.2649***	-0.2681***
	(<.0001)	0.7172	(<.0001)	(<.0001)
Time Series Leverage Dispersion	0.1606***	0.8277***	0.1352**	0.1537***
	(<.0001)	(<.0001)	0.0310	(<.0001)
Cash Holdings	0.0575***	-0.0341	-0.0291	0.107***
	(0.0074)	(0.8149)	(0.5306)	(<.0001)
Return on Assets	-0.00790	-0.0702	-0.0080	-0.01690
	(0.3486)	(0.594)	(0.7913)	(0.1337)
Market to Book	0.00147	-0.0415***	0.0016	0.00044
	(0.2739)	(0.0003)	(0.4495)	(0.8082)
Capital Expenditures	0.2985***	0.2999	0.4546***	0.2497***
	(<.0001)	(0.1096)	(<.0001)	(<.0001)
R&D expenses	0.00002	0.0002	-0.00017**	0.00001
	(0.2288)	(0.5908)	(0.0159)	(0.6928)
Log(Total Assets)	-0.0107***	-0.0123	-0.015***	0.00479**
	(<.0001)	(0.1121)	(<.0001)	(0.0381)
Industry level variables				
Leverage Diversity	-0.0196**	-0.0194	-0.0431*	0.0152*
	(0.0159)	(0.7089)	(0.0637)	(0.0781)
Dispersion of Leverage Changes	0.00604	0.4133***	-0.1352***	0.03760
	(0.784)	(<.0001)	(0.0005)	(0.1715)
Leaders-Follower Leverage Gap	-0.00095	-0.0117	-0.0019	-0.00086
	(0.1766)	(0.1115)	(0.799)	(0.217)
Herfindahl-Hirschman Index	-0.1103***	0.1424*	-0.1932***	-0.0923***
	(<.0001)	(0.0648)	(<.0001)	(0.0064)
Intercept	0.3032***	-0.2574***	0.3274***	0.0739***
	(<.0001)	(<.0001)	(<.0001)	(0.0004)
Pseudo R-squared	0.02610	0.0095	0.0073	0.00540
Number of Observations (firm-years)	124,338	11,756	36,139	76,443
Frequency of Dependent Variable=1	53.15%	40.56%	55.61%	53.93%

Logit coefficient estimates for the probability that a firm advances its leadership position. The dependent variable equals one if a firm's market share increased by 5% from last period; and equals zero it is decreased by 5%. The sample includes all firms in the Compustat database from 1960 to 2012 (excluding financial and utility firms) that were in the bottom 90% of market share in their industry in any year. Variable definitions are the same as in Table 3. P-values are in parentheses.

Results are reported in Table 4 and show a positive coefficient on time series leverage dispersion in all sub-periods. This indicates that changes in a firm's capital structure over time can facilitate increases market share. It also implies that firms with stable capital structures over time are more likely to experience decreases in market share. Our interpretation of this result is as follows. Significant year-to-year shifts in debt ratios, denoted by high time series leverage dispersion, suggest that firms are opportunistically issuing either debt or equity as they exploit investment opportunities. Such firms are more likely to experience increases in market share. The negative coefficient on leverage and the positive coefficient on cash holdings indicate that firms advancing in market share generally have more financial slack. This greater financial slack likely provides firms flexibility to strategically adjust their capital structures as they invest in growth.

5. Conclusion

This paper investigates the relationship between capital structure and industry leadership persistence. The current literature on debt policy and industry market share examines relations between industry concentration, market share, and debt policies. Our contribution to this literature is to developing unique variables that describe firm- and industry-level debt structures and investigate their impact on market share leadership persistence. This approach allows us to provide new insights on the relationship between debt policy and industry leadership over time.

We find that firms in industries with high capital structure diversity are more likely to maintain market share leadership persistence over time. Thus, in industries where there is heterogeneity in capital structures among incumbents, firms are able to distinguish themselves and establish leadership positions. This provides indirect evidence that differences in leverage strategies are associated with differences in firms' abilities to exploit growth prospects and secure market share advantages. We also find that established market share leaders are more likely maintain their leadership from one period to the next when they have stable capital structures over time. Our paper contributes to the literature on the interactions between capital structure and product market competition by highlighting the role of the industry structure of debt on leadership persistence.

References

Campello, Murillo. (2006). Debt financing: Does it boost or hurt firm performance in product markets? *Journal of Financial Economics* 82, pp. 135–172. http://dx.doi.org/10.1016/j.jfineco.2005.04.001

Campello, Murillo. (2003). Capital structure and product markets interactions: evidence from business cycles, *Journal of Financial Economics,* Volume 68, Issue 3, Pages 353-378. http://dx.doi.org/10.1016/S0304-405X(03)00070-9

Chevalier, Judith A. (1995). "Do LBO Supermarkets Charge More? An Empirical Analysis of the Effects of LBOs on Supermarket Pricing." *The American Economic Review* 85(3), 415-435.

Chevalier, Judith A., & David S. Scharfstein. (1996). Capital-Market Imperfections and Countercyclical Markups: Theory and Evidence, *The American Economic Review*, Vol. 86, No. 4, pp. 703-725

DeAngelo, Harry, & Richard Roll. (2014). How Stable are Corporate Capital Structures? *Journal of Finance*, forthcoming. http://dx.doi.org/10.1111/jofi.12163

Jianjun Miao, December. (2005). Optimal Capital Structure and Industry Dynamics, *The Journal of Finance*, Vol. 60, No. 6, pp. 2621-2659. http://dx.doi.org/10.1111/j.1540-6261.2005.00812.x

Lyandres, Evgeny. (September 2006). Capital Structure and Interaction among Firms in Output Markets: Theory and Evidence, *Journal of Business,* v. 79, iss. 5, pp. 2381-2421. http://dx.doi.org/10.1086/505239

MacKay, Peter and Gordon M. Phillips. (2005). How Does Industry Affect Firm Financial Structure?, *The Review of Financial Studies*, Vol. 18, No. 4, pp. 1433-1466. http://dx.doi.org/10.1093/rfs/hhi032

Modigliani, Franco, & Merton Miller. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment, *The American Economic Review* 47, 261-297.

Myers, Stewart C., & Nicholas S. Majluf. (1984). Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have, *Journal of Financial Economics* 13, 187-221. http://dx.doi.org/10.1016/0304-405X(84)90023-0

Opler, Tim C. & Sheridan Titman. (1994). "Financial Distress and Corporate Performance," *Journal of Finance*, 49, 1015–1040. http://dx.doi.org/10.1111/j.1540-6261.1994.tb00086.x

Zingales, Luigi. (1998). "Survival of the Fittest or the Fattest? Exit and Financing in the Trucking Industry." *The Journal of Finance* 53(3), 905-938. http://dx.doi.org/10.1111/0022-1082.00039