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Capital Structure and Market Power Interaction and Firm Profitability: A USA Perspective

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A B S T R A C T

Using a sample of 585 U. S. firms over a period of 18 years from 1994 to 2011 and utilizing financial and stock-market data from Research Insight, this study tested the relationship between market power or product differentiation and capital structure (debt-versus-equity choice) by two way fixed effects time series cross sectional regression method; it also addressed the related proposed non-linear relation between market power and profitability of U. S. firms. Our results show a statistically significant cubic relation between two measures of Tobin's Q (market power,) namely product structure and two measures of capital structure, namely long-term debt to total assets and total debt to total assets. We also find a significant negative relation between debt ratios and lower levels of profitability, and positive relation between the two at higher levels of profitability. Further, we find a significantly positive relation between the growth rate of total assets and capital structure. Also, the relation between the natural logarithm of the number of shares and capital structure measures is positive. With regard to tangible fixed assets, we find support mostly for the trade-off hypothesis in that firms with higher fixed assets are able to use them as collateral to borrow more.

Keywords: Market Power, Capital Structure, Time Series, Firm Profitability, Asset

Ⅰ. Introduction & Statement of the Problem

Traditionally, industrial economists have concentrated their studies on the effects of production and pricing decisions on costs, competition, and profits of firms and industries. At the same time, researchers in corporate finance have exclusively focused on capital structure decisions of firms and industries such as those involving debt/ equity choices (Modigliani, 1988; Miller, 1988; Harris & Raviv, 1991). However, in recent years, interactive effects of these relationships are receiving their due attention from a survey of literature on important capital and product market interaction theories (Raviv, 1988; Harris & Raviv, 1991; Phillips, 1995; Rathinasamy et al., 2000; Pandey, 2004). Essentially, there are two main models of interaction. In the limited liability model, firms pursue policies that transfer wealth from debt holders to stock holders. In so doing, they go for higher debt levels in order to compete more aggressively. Therefore, this model predicts a positive relation between capital structure and market power: Market power refers to the degree of control exercised by the firm on price and or volume of production. Market power itself

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is manifested in terms of monopoly, oligopoly or competitive power in the market place. In the other deep purse or predation models (Brander & Lewis, 1986; Bolton & Scharfstein, 1990), capital structure affects the probability of distress and default of a firm and the competitive behavior of rival firms. This model predicts a negative relation between capital structure and market power. In a theoretical paper, Fairchild (2005) shows that firms at higher levels of product differentiation or market power will have a relatively high degree of leverage while firms at low levels of product differentiation have low leverage supporting a non-linear relationship between capital structure and market power. There have been a few empirical studies on the relationship between capital structure and market structure of U. S. corporations. In one such study, Krishnaswamy, Mangala, and Rathinasamy (1992) presented evidence of a positive linear relationship between the capital structure and market structure. Pandey (2004), using data from 208 Malaysian firms listed in the Kuala Lumpur Stock Exchange over a period from 1994 to 2000, documents a cubic relationship between market power and debt ratios. Essentially, what he found was that at relatively lower and higher levels of market power, Malaysian firms use higher debt; and in the middle range of market power, the firms use lower debt. Pandey also shows that the relation between capital structure and firm profitability is saucer shaped.

Pandey's (2004) findings are indeed novel and make lot of sense. This research is essentially a test of a non-linear relation between market power and capital expounded by Fairchild (2005) with the empirical methodology of Pandey applied to the U. S. setting. To our knowledge, this will be the first empirical study of non-linear relationship between capital structure and the market power of U. S. firms. We also plan to test for the relation between capital structure and U. S. firm profitability. Thus, this study will make very important contributions on the interaction of U. S. firms' market power, debt-equity choices, and resulting profitability.

Ⅱ. Review of Literature

This section presents a brief summary of the previous empirical research. Theoretical models which analyze the impact of product and capital markets on one another have been developed by Brander and Lewis (1986), Maksimovic (1988), Gertner, Gibbons, and Scharfstein (1988), Poitevin (1989), and Bolton and Scharfstein (1990). These theories show that both capital structure and market structure strategies affect the behavior of rival firms, and capital structure in turn affects the equilibrium strategies and payoffs. A few empirical studies like Krishnaswamy, Mangala, and Rathinasamy (1992), Chevalier (1993), and Phillips (1995) test the relation between capital structure and product market power within the U.S. In a study of a sample of international firms from 49 countries, Rathinasamy, Krishnaswamy and Mantripragada (2000) report a positive linear relationship between capital structure and market structure. De Jong, Thu Nguyen, and Van Dijk (2008) develop a theoretical model showing that the type of product market competition (Bertrand price or Cournot quantity) crucially affects the relationship between firms' leverage and market share. Naha and Roy (2011) employ panel regression analysis to consider the relationship between product markets competition and capital structure in a developing market, India. They study the three dimensions of product markets competition: market structure, conduct, and performance on both the short-term and long-term debt ratios. They find that the structure and conduct are significant in influencing only the short-term debt ratio whereas performance is consistently having a negative impact on both short-term and long-term debt ratios .

Graham and Leary (2011) provide a review of empirical capital structure research with an emphasis on recently published papers on the subject. They explain in detail how well the traditional trade-off and the pecking order theories provide a good explanation for the variation in capital structure across firms and industries over time. In an empirical study, Sheikh and Wang (2011) using a data sample of 160 firms from Pakistan's manufacturing sector find that a significant negative relationship between debt ratio and profitability and liquidity. This finding is consistent with pecking order theory of capital structure. They also find that informational asymmetry is quite relevant to the capital structure decisions. According to the study, the size of the firm has a positive relationship with the debt ratio, and it is in conformance with the trade-off theory. Risk as measured by earnings volatility has a negative relationship with debt ratio which is also consistent with the trade-off theory. The relationship between debt ratio and tangible assets is positive suggesting the agency theory may also explain capital structure decisions in Pakistan. Using a sample of 14 Amman Stock Exchange listed banks, Al-Shubri (2011) finds that at lower and higher levels of Tobin's Q, banks employ higher debt, and they use lower debt at intermediate range. In addition, evidence is uncovered showing a saucer-shaped relationship between capital structure and profitability. Amiyatosh and Rajan (2013) in their recent paper show that as growth options of a firm are exploited and converted to tangible assets, the capital structure of the firm as measured

by the leverage ratio decreases. According to them, this finding is consistent with informational an asymmetry theory of capital structure. As growth options are exercised, informational asymmetry between managers and outside investors decreases; in addition, leverage (ratio) also decreases as a majority of these projects are financed using equity rather than debt. Through empirical analysis, the authors show the causality of this relationship.

Ⅲ. Significance of the Problem

This research project documents for the first time a significant non-linear cubic relationship between capital structure choices and market power for U. S. firms. These findings will have significant impact on the debt-equity choices faced by the corporations.

Ⅳ. Methodology and Procedures

A. The Data

This study uses a sample of 585 U. S. corporations from the Research Insight (formerly COMPUSTSAT data) over an 18-year period from 1995 to 2011. The sample excludes regulated banks and other financial institutions. All necessary financial and stock market data including information on short-term and long-term debt and total assets and other data were collected from Research Insight.

B. Hypotheses

Hypothesis 1*: There is a cubic relation between capital structure/s as measured by debt ratio(s) and product market structure as measured by Tobin's Q.*

Hypothesis 2*: There is a non-linear relation between capital structure/s as measured by debt ratio(s) and a firm's profitability as measured by its basic earning power.*

This study will measure capital structure as two ratios:

1. Ratio of long-term debt to total assets
2. Ratio of total debt (sum of long-term debt and short-term debt) to total assets.

These two variables constitute the dependent variables.

Tobin's Q (Q) has been shown to be a theoretically sound measure and considered a good indicator of the degree of monopoly power (Lindenberg & Ross, 1981). Therefore, Q will be used as the measure of monopoly power in this study. Tobin's Q is calculated two different ways. First, using the Chung and Pruitt (1994) method, QA is calculated as follows:

$$QA = [MVE + PS + DEBT] / TA \quad (1)$$

Where,

MVE = market value of equity, PS = liquidating value of the firm's preferred stock,

DEBT = short-term assets minus short term liabilities plus the book value of the firm's long-term debt, and

TA = the book value of the total assets.

Second, Tobin's QB is calculated as follows:

QB = [Market Value of Equity + Book Value of the long term debt + Net Working Capital (Current Assets − Current Liabilities)] / [Book Value of Equity + Long Term Debt + Net Working Capital] (2)

C. Multiple Regression Models

Panel data is used for this study. The SAS procedure TSCSREG, with two-way fixed effects models, is used to account for the temporal effects; dummies for time variables were included. Four multiple regression models that are used to test hypotheses 1 and 2 are:

Model I

$$TOTDTA_{it} = a0 + b1QA_{it} + b2QA2_{it} + b3QA3_{it} + b4\ EBITTA_{it} + b5\ (EBITTA)2_{it} + b6(EBITTA)3_{it} + b7OPRLEVG_t + b8GROWTOT_{it} + \gamma_t + \eta_i + e_{it} \quad (3)$$

Where,

The dependent variable TOTDTA is the total debt ratio defined as the ratio of total debt to total assets for firm i at time t.

Six independent variables are listed:

1. QA - Tobin's Q measure A
2. EBITTA − Basic earning power, a measure of profitability, ratio of EBIT to Total Assets
3. OPRLEVG - Operating leverage
4. GROWTOT - Growth rate of total assets

5. TA - Total Assets, and
6. FATA - Ratio of fixed assets to total assets

Operating leverage and the growth rate of total assets are included as additional independent variables. The operating leverage tests whether firms with high financial leverage have also higher fixed operating costs since firms with higher fixed operating costs are likely to increase output. The growth rate here thus acts a proxy for future investment opportunities. A positive relation between the capital structure and the growth rate would be expected. Fixed assets are used as collateral for borrowing. Therefore, one would expect a (significant) positive relation between the ratio FATA and capital structure ratios.

Model II

$$LTDTAit = a0 + b1QAit + b2QA2\ it + b3QA3\ it + b4\ EBITTAit + b5\ (EBITTA)2it + b6(EBITTA)3it + b7OPRLEVGt + b8GROWTOTit + \gamma t + \eta i + eit \quad (4)$$

Where,
LTDTAit = Long-term debt to total assets ratio and the other variables as defined before in equation (3).

Model III

$$TOTDTAit = a0 + b1QBit + b2QB2\ it + b3QB3\ it + b4\ EBITTAit + b5\ (EBITTA)2it + b6(EBITTA)3it + b7OPRLEVGt + b8GROWTOTit + \gamma t + \eta i + eit \quad (5)$$

Where,
QB = Tobin's Q measure B, and the other variables as defined before in equation (3).

Model IV

$$LTDTAit = a0 + b1QBit + b2QB2\ it + b3QB3\ it + b4\ EBITTAit + b5\ (EBITTA)2it + b6(EBITTA)3it + b7OPRLEVGt + b8GROWTOTit + \gamma t + \eta i + eit \quad (6)$$

Where,
LTDTAit = Long-term debt to total assets ratio and
QB = Tobin's Q measure B, and the other variables as defined before in equation (3).

Ⅴ. Results & Discussion

A. Sample Statistics

Sample Statistics are presented in Table 1. As shown in the table, Tobin's QA has a mean value of 2.37 with a standard deviation of 4.67 which is fairly high. The corresponding numbers for Tobin's QB are 7.63 and 156.52 showing very high variability. With respect to leverage ratios, the mean for total debt to total assets is 0.18 with a standard deviation of 0.23; for the long-term debt to total assets, the mean ratio is 0.14 with a standard deviation of 0.21.

B. Results

Model I: The results of Tobin's Q-A version with the dependent variable d1totda, that is the first differences of total debt to total assets ratio, are presented in Table 2. First, considering the relation between capital structure, first difference of total debt to total assets ratio (d1totdta) and the product structure—the first difference of Tobin's QA — the coefficient -0.05147 is significant at the 1% level.

The change in Tobin's QA measure impacts the change in the dependent variable of total debt to total assets ratio negatively; at higher levels of Tobin's QA measure or market power, lower levels of debt as measured by the total debt to total assets ratio is employed. The same negative relation is observed for the cube of the Tobin's QA with a coefficient of -0.00002; but due to the very low value for the standard error, no statistics have been calculated. Thus, it is fair to say that the slope of the negative relation between the first difference of total debt ratio and Tobin's QA gets flatter along the non-linear curve. The relation for the d1qa2 is positive with a coefficient of 0.004326 significant at the 1% level also. At the low level of Tobin's QA, a low debt ratio is observed while at the middle level of Tobin's QA, a higher total debt to total assets ratio is observed.

Model II: The results of Tobin's Q-B version with the dependent variable d1totda, first difference of total debt to total assets ratio, are presented in Table 3. Model III: The results of Tobin's Q-A version with the dependent variable d1ltta, that is the first difference of long-term debt to total assets ratio, are presented in Table 4. Model IV: The results of Tobin's Q-B version with the dependent variable d1ltta, first difference of long term debt to total assets ratio, are presented in Table 5.

Table 1. SAMPLE STATISTICS

Variable	Label	N	Mean	Standard Deviation
Totdta	Ratio of total debt to total assets	9939	0.1763	0.2308
Qa	Tobin's Q - A Definition	9939	2.3659	4.6697
Qb	Tobin's Q- B Definition	9939	7.6276	156.5202
Ebitta	Ratio of EBIT to Total Assets	9939	0.0415	0.3357
Oprlevg	Operating Leverage	9939	-3.8629	1183.83
Growtot	Growth rate of total Assets	9939	0.1382	0.7802
Ina	Natural Logarithm of Total Assets	9939	4.3281	1.4253
Innsh	Natural Logarithm of the No. of Shares	9939	2.4392	1.0628
Fata	Ratio of Fixed assets to Total Assets	9939	0.2572	0.2248
ltta	Ratio of Long-Term Debt to Total Assets	9939	0.1355	0.21399
Qa2	Square of Tobin's Q - A	9939	27.4016	540.0245
Qa3	Cube of Tobin's Q - A	9939	2091.63	91551.48
Qb2	Square of Tobin's Q - B	9939	24554.28	1325483.36
Qb3	Cube of Tobin's Q - B	9939	185765236	14022018679
Ebitta2	Square of Ratio of EBIT to Total Assets	9939	0.1144	1.1979
Ebitta3	Cube of Ratio of EBIT to total Assets	9939	0.1692	6.6907
d1totdta	First Difference of Ratio of Total Debt to Total Assets	9939	-0.0182	0.8156
d1qa	First Difference of Tobin's Q - A	9939	-0.0098	3.8135
d1qa2	First Difference of Square of Tobin's Q - A	9939	-2.4806	528.0241
d1qa3	First Difference of Cube Tobin's Q-B	9939	-18.9063	92260.23
d1qb	First Difference of Tobin's Q - B	9939	1.5509	140.9099
d1bq2	First Difference of Square of Tobin's Q - B	9939	12320.26	1335873.39
d1qb3	First Difference of Cube of Tobin's Q - B	9939	138966532	14085429548
d1ebitta	First Difference of Ratio of EBIT to Total Assets	9939	0.0093	0.4314
d1ebbita2	Square of First Difference of Ratio of EBIT to Total Assets	9939	-0.1356	9.5723
d1ebbita3	Cube of First Difference of Ratio of EBIT to Total Assets	9939	3.2194	284.3186
d1oprlevg	First Difference of Operating Leverage	9939	0.2264	1674.40
d1growtot	First Difference of Growth in Total Assets	9939	0.0051	1.0967
d1lna	First Difference of Operating Leverage	9939	0.0089	0.6122
d1lnnsh	First Difference of Natural Logarithm of the No. of Shares	9939	-0.00258	0.4353
d1fata	First Difference of ratio of Fixed Assets to of Total Assets	9939	-0.0003	0.0945
d1ltta	First Difference of Ratio of Long-Term to Total Assets	9939	0.0001	0.1681

The results of Tobin's Q-B version with the dependent variable d1totda, first difference of total debt to total assets ratio presented in Table 3, are not significant.

The results of Tobin's Q-A version with the dependent variable d1ltta, that is the first differences of long-term debt to total assets ratio presented in Table 4, are similar to that of the Model I presented in Table 2. The relation between the first difference of the long term debt to total assets and the first difference of the Tobin's QA is very significantly negative with a coefficient of -0.00227 implying lower long term debt use at higher monopoly power. The observed positive significant coefficient of 0.000082 for the QA2 supports the use of a higher level of debt at the middle-range of Tobin's Q.

The results of Tobin's Q-B version with the dependent variable d1ltta or the the first differences of long-term debt to total assets ratio are presented in Table 5. Here also, the relation between the first difference of the QB and the first difference of long term debt to total assets is negative supporting the fact that firms use lower long-term debt at higher monopoly power.

Taken together, the results from both the total debt and long-term debt as dependent variables demonstrate a cubic relationship between the monopoly power, Tobin's Q both A and B versions, and the capital structure as measured by both the ratios of total debt to total assets and long-term

debt to total assets ratios. But, these results are more pronounced with Tobin's QA measure. It seems that QA is a better measure of monopoly power than QB.

Thus, both at the lower and higher levels of monopoly power (Tobin's Q), there is lower debt use providing support for the strategic bankruptcy or deep purse model and the investments effects models. At the middle range, where a positive relation is observed between the dependent and

Table 2. TOBIN'S Q-A VERSION

Dependent Variable: dıtotda: First Differences of total debt to total assets ratio

Variable	Variable	DF	Coefficient	Standard Error	T-Statistics	Probability of T-Statistics
Intercept		1	-0.05147	0.0892	-0.58	0.5638
d1qa	First Difference of Tobin's Q - A	1	-0.20223	0.00164	-123.56	<0.0001***
d1qa2	First Difference of Square of Tobin's Q - A	1	0.004326	0.000029	151.66	<0.0001***
d1qa3	First Difference of Cube of Tobin's Q - A	1	-0.00002	0		
d1ebitta	First Difference of Ratio of EBIT to Total Assets	1	-0.39256	0.0148	-26.60	<0.0001***
d1ebitta2	Square of First Difference of Ratio of EBIT to Total Assets	1	0.034292	0.00235	14.56	<0.0001***
d1ebitta3	Cube of First Difference of Ratio of EBIT to Total Assets	1	0.00098	0.000078	12.63	<0.0001***
d1oprlevg	First Difference of Operating Leverage	1	8.831E-8	0		
d1growtot	First Difference of Growth Rate of Total Assets	1	0.00492	0.00365	1.35	0.1777
d1lnta	First Difference of Natural Logarithm of Total Assets	1	-0.13163	0.00806	-16.33	<.0001***
d1lnnsh	First Difference of Number of Shares Outstanding	1	0.163224	0.0105	15.59	<.0001***
d1fata	First Difference of the Ratio of Fixed Assets to Total Assets	1	-0.18046	0.0414	-4.36	<.0001***

F Test for No Fixed Effects			
Num DF	Den DF	F Value	Pr > F
585	9341	0.85	0.9956

Table 3. TOBIN'S Q-B VERSION

Dependent Variable dıtotda: First Differences of total debt to total assets ratio

Variable	Variable	DF	Coefficient	Standard Error	T-Statistics	Probability of T-Statistics
Intercept		1	-0.0133	0.1745	-0.08	0.9392
d1qb	First Difference of Tobin's Q - B	1	0.000284	0.000256	1.11	0.2669
d1qb2	First Difference of Square of Tobin's Q - B	1	-5.86E-8	0		
d1qb3	First Difference of Cube of Tobin's Q - B	1	2.74E-12	0		
d1ebitta	First Difference of Ratio of EBIT to Total Assets	1	-0.69011	0.0285	-24.24	<0.0001***
d1ebitta2	Square of First Difference of Ratio of EBIT to Total Assets	1	0.096615	0.00447	21.60	<0.0001***
d1ebitta3	Cube of First Difference of Ratio of EBIT to Total Assets	1	0.003415	0.000147	23.23	<0.0001***
d1oprlevg	First Difference of Operating Leverage	1	-4.68E-7	4.371E-7	-0.11	0.9148
d1growtot	First Difference of Growth Rate of Total Assets	1	-0.04144	0.00711	-5.83	<0.0001***
d1lnta	First Difference of Natural Logarithm of Total Assets	1	-0.0862	0.0155	-5.56	<0.0001***
d1lnnsh	First Difference of Number of Shares Outstanding	1	0.142978	0.0203	7.03	<0.0001***
d1fata	First Difference of the Ratio of Fixed Assets to Total Assets	1	-0.63385	0.0808	-7.84	<0.0001***

F Test for No Fixed Effects			
Num DF	Den DF	F value	Pr > F
585	9341	1.09	0.0803

Table 4. TOBIN'S Q-A VERSION

Dependent Variable dıltta first Differences of long-term debt to total assets ratio

Variable	Variable	DF	Coefficient	Standard Error	T-Statistics	Probability of T-Statistics
Intercept		1	-0.00528	0.0396	-0.13	0.8939
d1qa	First Difference of Tobin's Q - A	1	-0.00227	0.000726	-3.13	0.0018***
d1qa2	First Difference of Square of Tobin's Q - A	1	0.000082	0.000013	6.51	<0.0001***
d1qa3	First Difference of Cube of Tobin's Q - A	1	-3.97E-7	0		
d1ebitta	First Difference of Ratio of EBIT to Total Assets	1	-0.07169	0.00655	-10.95	<0.0001***
d1ebitta2	Square of First Difference of Ratio of EBIT to Total Assets	1	0.002354	0.00104	2.25	0.0243**
d1ebitta3	Cube of First Difference of Ratio of EBIT to Total Assets	1	0.000167	0.000034	4.86	<0.0001***
d1oprlevg	First Difference of Operating Leverage	1	-2.06E-7	0		
d1growtot	First Difference of Growth Rate of Total Assets	1	0.008533	0.00162	5.27	<0.0001***
d1lnta	First Difference of Natural Logarithm of Total Assets	1	-0.00096	0.00358	-0.27	0.7893
d1lnnsh	First Difference of Number of Shares Outstanding	1	0.015361	0.00465	3.31	0.0010
d1fata	First Difference of the Ratio of Fixed Assets to Total Assets	1	0.204023	0.0184	11.11	<0.0001***

F Test for No Fixed Effects			
Num DF	Den DF	F Value	Pr >F
585	9341	0.94	0.8265

Table 5. TOBIN'S Q-B VERSION

Dependent Variable dıltta first Differences of long-term debt to total assets ratio

Variable	Variable	DF	Coefficient	Standard Error	T-Statistics	Probability of T-Statistics
Intercept		1	-0.0051	0.0396	-0.13	0.8977
d1qb	First Difference of Tobin's Q - B	1	-0.00014	0.000058	-2.41	0.0159**
d1qb2	First Difference of Square of Tobin's Q - B	1	3.19E-8	0		
d1qb3	First Difference of Cube of Tobin's Q - B	1	-144E-14	0		
d1ebitta	First Difference of Ratio of EBIT to Total Assets	1	-0.07022	0.00647	-10.86	<0.0001***
d1ebitta2	Square of First Difference of Ratio of EBIT to Total Assets	1	0.003958	0.00102	3.90	<0.0001***
d1ebitta3	Cube of First Difference of Ratio of EBIT to Total Assets	1	0.00022	0.000033	6.59	<0.0001***
d1oprlevg	First Difference of Operating Leverage	1	-2.14E-7	0		
d1growtot	First Difference of Growth Rate of Total Assets	1	0.00778	0.00161	4.82	<0.0001***
d1lnta	First Difference of Natural Logarithm of Total Assets	1	-0.00237	0.00352	-0.67	0.5014
d1lnnsh	First Difference of Number of Shares Outstanding	1	0.016889	0.00462	3.65	0.0003***
d1fata	First Difference of the Ratio of Fixed Assets to Total Assets	1	0.195012	0.0184	10.62	<0.0001***

F Test for No Fixed Effects			
Num DF	Den DF	F Value	Pr > F
585	9341	0.95	0.8002

independent variables, there is support for the output and limited liability effect model and agency theoretic risk-shifting models. Thus, there is evidence of a cubic relationship between monopoly power and capital structure ratios. It is conceivable that at the lower levels of monopoly power, firms have lower financing needs stemming from limited investment opportunities; at the middle range of monopoly power where maximum economies of scale in

production, distribution, and management are likely to be realized, the firms need more capital to expand and grow and reap monopolistic and oligopolistic powers. Beyond the middle range, diseconomies of scale may settle in forcing the firms to cut back on investments and borrowings. We believe that ours is the first study to demonstrate cubic relation between capital and product structures in the U.S. markets.

With regard to the relationship between capital structure and basic earning power, d1EBITTA, examining the results from Table 3 based on the first difference of Tobin's QB and the first difference of earnings before interest and taxes to total assets is negative with a coefficient of -0.69011 significant at the 1% level; the coefficient for the squared value of d1 EBITTA2 is positive with the coefficient of 0.096615 significant at the 1% level. The relation between EBITTA3 and the total debt to total assets ratio is also positive with a coefficient of 0.003415 significant at the 1% level. Similar consistent results are seen for all the four regression models. Thus, firms with lower levels of profitability employ less debt or more internal funds, but at both higher and middle levels of profitability, the firms employ higher debt levels. Thus, we document a cubic relation with debt levels and operating income. These results are consistent with Pandey's (2004) findings.

Considering the relation between the (first difference of) capital structure and the (first difference of) growth rate of total assets, the results from tables 2, 4, and 5 show a positive significant linear relation between the two. For example, in Table 5, the coefficient 0.00778 is significant at 1% level. Firms growing faster are resorting to higher levels of external financing to support their growth.

With regard to the between (first difference of the) capital structure measure of total debt to total assets ratio and the (first difference of) natural log of the total assets, a proxy for growth rate, the results in Tables 2 and 3 based on the Q-A models show that the relation is significantly negative; however, this relation based on long-term debt to total assets as shown in Tables 4 and 5 is not significant.

Examining the relation between (first difference of) capital structure measures and the (first difference of) fixed assets to total assets, the relation is positive and significant at the 1% level based on the Q-B model results. For example, examining the results from Table 4, we see that the coefficient between the two is 0.204023 significant at the 1% level. Firms with higher levels of fixed assets can use them as collateral and garner more debt. At the same time, the results based on Q-B models from Tables 2 and 3 show a negative relationship between these two variables, which is somewhat troublesome.

When we look at the relation between capital structure measures and the (first difference of) natural log of the number of shares outstanding, the results clearly demonstrate a significant positive relation between the two. For example, in Table 2, the coefficient between the two is 0.163224 significant at the 1% level. It shows that (more) profitable firms are able to borrow more since their debt servicing ability is bolstered by their higher profitability.

Ⅵ. Summary & Conclusions

Using a sample of 585 U. S. firms over a period of 18 years from 1994 to 2011 and utilizing financial and stock market data from Research Insight, this study tested the relationship between market power or product differentiation and capital structure (debt-versus-equity choice) by a two-way fixed effects time series cross sectional regression method; it also addressed the related non-linear relationship between market power and the profitability of U. S. firms. Our results show a statistically significant cubic relation between two measures of Tobin's Q (market power): the product structure and two measures of capital structure, 1) debt to total assets 2) total debt to total assets. We also find a significant positive non-linear relation between debt ratios and profitability. Further, we find a mostly significantly positive relation between the growth rate of total assets and capital structure. Also, the relation between the natural logarithm of the number of shares and capital structure measures is positive indicating that firms with higher debt levels are able to raise funds successfully through equity issues. With regard to tangible fixed assets for the models with long-term debt to total assets, we find support for the trade-off hypothesis in that firms with higher fixed assets are able to borrow more since the fixed assets could be used as collateral for borrowing purposes.

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