The International Journal of Business and Finance Research
Vol. 14, No. 2, 2020, pp. 37-49
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

www.theIBFR.com

MOMENTUM MARKET STATES AND CAPITAL STRUCTURE ADJUSTMENT SPEED

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ABSTRACT

It is well established in the momentum literature that market states affect momentum profit. Moreover, the market state variables employed in the momentum literature are distinctive in that they are constructed to be ex-ante observable by the investor. This study shows that these momentum market state variables also significantly affect a company's capital structure adjustment speed. Our results provide a plausible explanation of how the momentum market state variables lead to momentum profit by affecting the capital structure. Additional findings show that low leveraged firms adjust their leverage toward target capital structure faster than high leveraged firms. We also show that producer linked variables such as total industry capacity utilization and producer price index significantly affect capital structure adjustment speeds, more so than standard macroeconomic variables.

JEL: G30, G32

KEYWORDS: Momentum, Market State Indicators, Dynamic Capital Structure, Speed of Adjustment, Macroeconomic Conditions, Industry Capacity Utilization, Producer Price Index

INTRODUCTION

In the momentum literature, it is well established that past market states affect momentum profit. Examples of research documenting the relationship between momentum profits and market states. Cooper et al., (2004) provide the seminal paper concerning this effect. The authors show that momentum profits depend on the past market state where the mean monthly momentum profit following the UP market state is 0.93%, but the mean profit following the DOWN market state is -0.37%. Moreover, their results are robust to the conditioning information in macroeconomic factors.

Asem and Tian (2010) study the effects of market transitions on momentum profits following both UP and DOWN market states. They found that when the market state changes to the opposite in successive market conditions, there will be large momentum profits (gain or loss). Li and Galvani (2018) show that momentum profits for corporate bonds also depend on the market state. They find that for corporate bonds, momentum gains exclusively follow UP market state periods; in contrast, DOWN market states predict momentum losses. Huang (2006) examines the effect of past market states on momentum profits in an international context. He defined three different periods. In these periods, market return is non-negative (negative), then the market state is defined as UP (DOWN). His results show that for international data, momentum profits associate with the UP market. His study confirms, using international data, the notion that different momentum profits are associated with specific values of the market state indicator.

What is notable concerning this strand of momentum research is that the market state indicator variable used in these studies is constructed to be observable ex-ante by the investor. Cooper et al., (2004), for example, defined the UP market state as when the previous three-year market return is non-negative, and the DOWN market state as when the previous three-year market return is negative. Thus, the investor at any particular time t can observe whether he currently belongs in the UP or DOWN market state using this type of market state indicator variable specification.

The studies described above are only representative. There are now a large number of studies documenting that the returns of applying the momentum strategy on assets such as stocks and corporate bonds are state-dependent and predictable ex-ante by these types of UP, DOWN ex-ante market state indicator variables. Less is known on the effect of time variations of these momentum market states indicators on capital structure dynamics. The present study aims to fill this gap by applying the momentum market states indicators to investigate their effects on capital structure dynamics. The hypothesis is that corporate decision-makers, like investors, can also observe and make use of these ex-ante market state indicators, and this information can influence their capital structure decisions moving forward.

Our main contribution is to show that capital structure adjustment speed is considerably state-dependent, that these momentum market state variables significantly affect a company's capital structure adjustment speed. That capital structure adjustment speed is state-dependent on observable past market states is consistent with an adapted version of the behavioral theory by Daniel et al. (1998) in that aggregate market gains can induce manager overconfidence and therefore influence their capital structure decisions. Given the variety of market state indicators applied in the existing momentum literature, a market-state effect on capital structure is also consistent with the bounded rationality theory by Hong and Stein (1999), where heterogeneity in the types of information structure available to decision-makers yields gradual information diffusion.

In as much as capital structure affects a company's value, our results provide a plausible pathway of how the momentum market state variables can lead to momentum profit by first affecting a company's capital structure. The remainder of the paper is organized as follows. In the following section, we describe the relevant literature. Next, we discuss the methodology and model. This is followed by a description of the data source. Statistical analysis is presented in the test results section. The results are presented in the following section. The paper closes with some concluding comments and suggestions for future research.

LITERATURE REVIEW

The well-known MM theory holds that the value of the company has nothing to do with the capital structure but makes strong assumptions such as the absence of taxes and transaction costs (Modigliani and Miller, 1958). Subsequent research suggests the idea of joining corporate tax, personal tax, and trade-off theory. The modified MM theory describes a tax-based model that allows capital structure decisions to influence company value. When considering corporate income tax, since the interest of the liability can offset the tax expenditure, the capital cost can be reduced, and the value of the enterprise can be increased. Therefore, as long as the company's financial leverage benefits continue to increase, the company will continue to reduce its capital cost.

According to Modigliani and Miller (1963), the more liabilities, the more obvious the leverage, the higher the company's value. Kraus and Litzenberger (1973) describe a trade-off model in which companies can use debt spending to offset taxes, and companies increase their value by increasing debt. However, as the debt rises, the possibility of a company falling into financial crisis increases, and may even lead to bankruptcy. If the company goes bankrupt, bankruptcy costs will inevitably occur. It will bring additional costs to the enterprise.

According to the trade-off theory, the value of a liability enterprise equals the value of a debt-free enterprise plus tax-saving benefits, minus the present value of the expected financial constraints cost. There also exist many empirical studies showing a relation between capital structure and profitability. The studies by Roden and Lewellen (1995), Ghosh et al. (2000), Abor (2005) and Berger and Bonaccorsi di Patti (2006) are examples of research that show capital structure to be correlated with profitability.

More recently, Danis et al. (2014) propose a relationship between profitability and capital structure when firms are at or near their optimal leverage. In short, the empirical literature shows that the capital structure decision is a relevant factor explaining value created to shareholders, thus providing a link between momentum market states, firms' capital structure adjustment decisions, and momentum strategy return. This study extends the literature by analyzing the relationship between past market states and capital structure adjustment speeds, whether the ex-ante market state variables used in the momentum literature are useful in further delineating capital structure adjustment speed.

Our results support our hypothesis. We find that the capital structure adjustment speed associated with the UP market states exceeds its corresponding adjustment speed in the DOWN market states, the difference statistically significant. This study also performs analysis on the variables that can affect a company's capital structure adjustment speed. Past research on capital structure shows that firm characteristics relate to leverage ratios (e.g., Rajan and Zingales, 1995; Graham, 1996; Hovakimian et al., 2001; Harford et al., 2008). Studies have also shown that companies tend to revert faster toward the target leverage during good economic periods (e.g., Korajczyk and Levy, 2003).

There is also evidence that companies revert to a target capital structure after perturbations (e.g., Fama and French, 2002; Leary and Roberts, 2005; Flannery and Rangan, 2006; Kayhan and Titman, 2007). Researchers have also explored whether capital structure might be affected by macroeconomic conditions. Their research analyzed leverage variation under different macroeconomic conditions (e.g., Fama and French, 1989; Hackbarth et al., 2006; Levy and Hennessy, 2007).

None of these studies, however, analyze the effect of the observable ex-ante momentum market states on capital structure behavior. When the general macroeconomic conditions improve, not all industries or companies will experience better profitability at the same time, and be willing to change the company's capital structure. These studies mainly focused on the analysis of the traditional theory of capital structure but ignored the impact of the market environment on the adjustment speed of capital structure. The results of these studies show that "standard macroeconomic factors" (such as Gross Domestic Product, GDP) can have an impact on the capital structure.

Other plausible variables that can affect the company's capital structure such as Earnings Per Share (EPS) or Book to Market ratio (BM), industry characteristics such as total industry capacity utilization (TCU) and producer price index (PPI) have been largely ignored. A prominent study is Franz and Gordon (1993), and Garner (1994) provides evidence showing that the relationship between capacity utilization and inflation is stable and that capacity utilization remains a reliable indicator of future changes in inflation.

This study hypothesizes that variables such as TCU and PPI by their construction have a closer relationship with producers than the other more commonly used macroeconomic variables and thus, should also be useful in describing capital structure adjustment speed. According to the Federal Reserve Bank, "PPI is an index that characterizes the average change in selling prices from production over time. It measures price movements from the company's point of view. In other words, this index tracks changes in the costs of production for the company" (Board of Governors of Federal Reserve, 2019). The other index, "TCU represents the percentage of resources used by firms to produce goods in manufacturing, mining, and utilities. The index can be thought of as how much capacity is being used from the total available capacity to produce demanded finished products. The capacity utilization rate can describe how efficiently the factors of production (inputs in the production process) are being used" (Board of Governors of Federal Reserve, 2019).

It can be seen by the above definitions, compared to standard macroeconomic variables that have been used in the existing capital structure research; PPI and TCU, by construction, are more forward-looking and tied more closely to the actualities facing the producer. Rather than basing their capital structure decisions on measures of general economic conditions, managers may choose to make use of the information conveyed by PPI and TCU in deciding whether to adjust their company's capital structure. Also, when the input price of a manufacturer rises, this information is captured by the PPI.

In this scenario, the company will spend more on production costs, but the price of the products will also rise and, thus, increase profits. In this way, the company gains more profits and can pay off its liabilities, and managers may decide to adjust its capital structure to optimize the situation. Our results support our hypothesis and give evidence showing that TCU and PPI are indeed useful in explaining capital structure adjustment speeds.

EMPIRICAL METHODOLOGY AND MODEL

Definitions of Leverage

This paper focuses on describing changes in the capital structure. In the capital structure literature, some studies use book leverage while others use market leverage ratios. Fama and French (2002) and Thies and Klock (1992), for example, argue that book leverage should be used because book leverage ratios are independent of factors that are not under the direct control of firms. Welch (2004), on the other hand, argues that market leverage can better reflect possible agency problems between equity holders and creditors. For this study, we use both the book leverage and market leverage to do our tests and define these variables as in previous studies (e.g., Leary and Roberts, 2005; Flannery and Rangan, 2006; Cook and Tang, 2010). Precisely, the book leverage ratio is defined as:

$$BD_{i,t} = \frac{SD_{i,t}}{TA_{i,t}} \tag{1}$$

Alternatively, the market leverage ratio is defined as:

$$MD_{i,t} = \frac{(LD_{i,t} + SD_{i,t})}{(S_{i,t} * P_{i,t} + LD_{i,t} + SD_{i,t})} \tag{2}$$

$LD_{i,t} + SD_{i,t}$ denotes the sum of firm i's long- and short-term book value of interest-bearing debt at time t, $TA_{i,t}$ is the book value of the total assets. $S_{i,t} * P_{i,t}$ represents the number of common shares outstanding times the stock price per share at time t, which is equal to the market value of firm i's equity.

Dynamic Partial Adjustment Capital Structure Model

The recent literature discusses two main types of partial adjustment models, the two-stage partial adjustment model and the integrated dynamic partial adjustment capital structure model (Hovakimian et al., 2001; Flannery and Rangan, 2006; and Cook and Tang, 2010). The equations for the two-stage partial adjustment model are as follows:

Stage1:

$$D^*_{i,t} = \gamma Macro_{t-1} + \beta X_{i,t-1} \tag{3}$$

Stage 2:

$$D_{i,t} - D_{i,t-1} = \delta\left(D_{i,t}^{*} - D_{i,t-1}\right) + \varepsilon_{i,t} \quad (4)$$

In Stage1, it defines $D_{i,t}^{*}$as target leverage, which is a function of prior period macroeconomic variables and firm characteristic variables. It measures how quickly the company adjusts back toward target leverage from a position of deviation from its target leverage in Stage 2.

According to Flannery and Rangan (2006), the partial adjustment speed (the coefficient of the target leverage of the first stage regressions) is substantially smaller than predicted by theory. They advocated the use of the one-stage integrated dynamic partial adjustment capital structure model that includes the partial adjustment and firm fixed effects in one integrated capital structure model. Cook and Tang (2010) follow Flannery and Rangan (2006) and use the one-stage integrated dynamic partial adjustment capital structure model in their estimations of the impact of macroeconomic conditions on the capital structure adjustment speed.

In this study, we follow the framework of Flannery and Rangan (2006) and Cook and Tang (2010) and combine the partial adjustment and firm fixed effects into an integrated capital structure model in the calculation of the impact of macroeconomic conditions on capital structure adjustment speed. To do so, we substituting Stage1 for Stage 2 and rearrange, resulting in the following:

$$D_{i,t} = (1-\delta)D_{i,t-1} + \delta\beta X_{i,t-1} + \delta\gamma Macro_{t-1} + \varepsilon_{i,t} \quad (5)$$

$D_{i,t}$, and $D_{i,t-1}$ represent leverage for firm i in period's t and t−1, and δ represents the proportion of leverage deviation away from the firm's next period target leverage made by the firm from time t−1 to time t. δ=1 indicates that the firm fully adjusts for any deviation away from its target leverage. In the presence of adjustment costs, as in this study, we expect δ to be less than 1. We estimate capital structure adjustment using this equation across favorable and unfavorable macroeconomic conditions.

Macroeconomic Conditions and Market States

This study used the macroeconomic variables of term spread, default spread, GDP growth rate, and market dividend yield. Term spread is the difference between the 10-year Treasury-bill rate series and the 3-month g bond yield rate series. Default spread is the difference between the average yield of bonds rated Baa and the average yield of bonds rated AAA, each rated by Moody's based on bonds with maturities 20 years and above. GDP growth rate is the real GDP quarterly growth rate. Real interest rate is obtained from DataStream. It is the lending interest rate adjusted for inflation as measured by the GDP deflator.

In addition to the four macroeconomic indicators, we added three additional indicators; namely, NYSE stock index returns, TCU and PPI. We use the rolling windows calculation method to calculate the stock price index return beginning from 1987 Q1, and every five years as a cycle. We obtain the data for TCU and PPI from FRED. The PPI is the Producer Price Index for All Commodities (the value of the Index in 1982 is set equal to 100). TCU is the Total Industry Capacity Utilization, which refers to the percentage of resources used use for manufacturing, mining, and electric and gas utilities for all facilities located in the United States.

Cooper et al., (2004) and Asem and Tian (2010) examine whether conditioning on the state of the market is important to the profitability of momentum strategies. They define two market states: "UP" and "DOWN," based only information that an investor can observe in the current time and does not require the assumption that the investor can look into the future and see information that is unknown in the present moment.

In this study, we employ ex-ante versions of macroeconomic market state variables. Specifically: "UP" is when the past 12-month Center for Research in Security Prices (CRSP) value-weighted (VW) return is nonnegative, and "DOWN" is when the past 12-month CRSP VW return is negative. For robustness, we also use the Quantile method to distinguish leverage into ten quantiles for both book-leverage and market-leverage. The quantile regression methodology allows us to examine what magnitude of leverage (book and market) is most sensitive to the economic boom.

DATA DESCRIPTION

We obtain the primary data from DataStream over the period 1986 Q1 to 2012 Q4. In the estimations, we employ moving windows of 60 quarters, so that the first actual equation that can be estimated starts from 1992 Q1 and the last is in 2012 Q4, a total of 80 quarters. There are 39,186 records per quarter. Following earlier related studies, we exclude financial firms and utilities from the sample because they are usually regulated, and unique factors might need to be considered in their capital structure decisions. To minimize possible bias in the estimations, our sample did not exclude companies that went bankrupt or became private companies during our sample period.

For the stock price index variable, we use the NYSE stock index from 1986 Q1 to 2012 Q4 and calculate quarterly stock index returns using the previous five years of data. We retrieve the stock price index from 1992 Q1 to 2012 Q4 to match the sample period. We determine whether the market situation is good or bad using each of the macroeconomic variables discussed previously; the decision rule being the economy is categorized as good (bad) if the indicator variable exhibits three consecutive quarters of growth.

Following the literature, we incorporate several company-specific characteristic variables that influence leverage into our estimation model (e.g., Rajan and Zingales, 1995; Hovakimian et al., 2001; Fama and French, 2002; Flannery and Rangan, 2006). These variables include EBIT (Earnings Before Interest and Tax), BM ratio (ratio of the book value of equity to the market value of equity), EPS (earnings per share), TA (total assets), DY (dividend yield), and AD (accumulated depreciation).

EMPIRICAL RESULTS

<u>Summary Statistics</u>

Table 1 provides the summary statistics for default spread, term spread, change in GDP (percentage change), real interest rate, NYSE index value, PPI, and TCU over the sample period, 1987 Q1 to 2012Q4. Such as, the average value for the default spread is 0.99 and its standard deviation is 0.409. In our estimations, the NYSE stock price index data span from 1992 Q1 to 2012 Q4 which corresponds to 84 quarters. We use the formula $\text{return} = \ln\left(\text{index}_t \,/\, \text{index}_{t-1}\right)$ to calculate the stock index returns. Negative returns are concentrated near 2001Q1 ~ 2003Q2 following dot-com bubble of 2000 and the financial crisis in 2008 to 2009.

Table 1: Descriptive Statistics of the Economic Variables Used in the Estimations (1992/Q1-2012/Q4)

	Default Spread	Term Spread	GDP Change	Real Interest	NYSE	PPI	TCU
max	3.370	3.776	0.622	6.920	9903.855	203.800	85.000
min	0.560	-0.625	-0.606	0.505	1513.357	100.900	67.100
median	0.910	1.811	-0.031	4.741	5725.429	128.700	80.550
avg.	0.990	1.835	0.043	4.310	5176.181	141.132	79.737
std.	0.409	1.153	0.307	1.985	463.261	29.208	3.892

This table provides the summary statistics for default spread, term spread, change in GDP (percentage change), real interest rate, NYSE index value, PPI, and TCU over the sample period, 1987 Q1 to 2012Q4. Default spread is the difference between the average yield of bonds rated Baa and the average yield of bonds rated AAA. Term spread is the difference between the 10-year Treasury-bill rate series and the 3-month g bond yield rate series. GDP change is the real GDP quarterly growth rate. Real interest rate is obtained from DataStream. It is the lending interest rate adjusted for inflation as measured by the GDP deflator. NYSE is NYSE stock index returns. We obtain the data for TCU and PPI from FRED. The PPI is the Producer Price Index for All Commodities. TCU is the Total Industry Capacity Utilization.

Analysis of Adjustment Speed

Table 2 shows the computed adjustment speed of capital structure estimated by the integrated dynamic partial adjustment capital structure model using each of the seven macroeconomic variables, using quarterly data. Panel 2A gives the results for book-leverage, we find that the average value of δ estimated using TCU is the largest. Panel 2B presents the results for market-leverage. The results show that the computed δ's for all macroeconomic variables is significantly smaller than those calculated from book-leverage. However, similar to the results for book-leverage, the average computed δ for TCU is the largest.

Table 2: The Computed Adjustment Speed of Capital Structure Estimated by the Integrated Dynamic Partial Adjustment Capital Structure Model from Each of the Seven Macroeconomic Variables Using Quarterly Data

Variables	Default Spread	Term Spread	GDP Change	Real Interest	NYSE	PPI	TCU
Panel 2A: Book-Leverage							
max	0.9622	0.9566	0.9520	0.9624	0.9638	0.9637	0.9639
min	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
median	0.2393	0.2300	0.2294	0.2388	0.2383	0.2447	0.2475
avg.	0.2726	0.2607	0.2428	0.2728	0.2753	0.2772	0.2774
std.	0.1578	0.1629	0.1741	0.1570	0.1570	0.1560	0.1560
p-value	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Panel 2B: Market-Leverage							
max	0.0482	0.0336	0.0525	0.0575	0.0563	0.0536	0.0482
min	0.0062	0.0006	0.0102	0.0156	0.0259	0.0211	0.0062
median	0.0224	0.0126	0.0366	0.0347	0.0371	0.0373	0.0224
avg.	0.0225	0.0149	0.0349	0.0355	0.0382	0.0383	0.0225
std.	0.0098	0.0077	0.0082	0.0088	0.0076	0.0076	0.0098
p-value	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***

We compile all the variables into quarterly data and calculate the speed of capital-structure adjustment coefficient δ for each quarter from 1992Q1 to 2012Q4. Panel A gives the results for book-leverage, and Panel B presents the corresponding results for market-leverage. The estimated p-values of all variables are significant at the 1% level. We define all variables in the note of the table 1 and in the text of the document.

Table 3 shows the computed values for δ after controlling for market states. Panel 3A presents the results for book-leverage. The panel shows that when the market state is "good," the computed δ from PPI is the highest. The table also presents the p-values for testing whether the δ's calculated for the "good" market states are significantly different from the δ's estimated for the "bad" market states. For PPI, the δ calculated in the good market states exceeds its value for the bad market states by 0.0495 with a p-value less than 0.0001, showing that the difference is statistically significant.

Panel 3B presents the results for market-leverage. Here when the market state is good, the average δ of the TCU regressions is the highest. The average δ associated with bad market states are also shown in the table. For the TCU regressions, the average δ in the good market states exceeds the corresponding average δ in the bad market states by 0.0029. All of the reported p-values are statistically significant.

Table 3: Estimated Values for δ After Controlling for Market States

Variables	**Default Spread**		**Term Spread**		**GDP Change**		**Real Interest**		**NYSE**		**PPI**		**TCU**	
States	**Good**	**Bad**	**Good**	**Bad**	**Good**	**Bad**	**Good**	**Bad**	**Good**	**Bad**	**Good**	**Bad**	**Good**	**Bad**
Panel 3A: Book-Leverage														
max	0.9622	0.5750	0.9566	0.5711	0.3972	0.4944	0.5749	0.5165	0.9638	0.3534	0.9637	0.5539	0.9639	0.3710
min	0.0023	0.0012	0.0603	0.0012	0.0731	0.0012	0.0012	0.1136	0.0832	0.0023	0.0608	0.0012	0.0608	0.0023
avg.	0.2912	0.2640	0.2596	0.2568	0.2457	0.1717	0.2529	0.2322	0.2708	0.2703	0.2928	0.2433	0.2879	0.2346
G vs. B	0.0272		0.0028		0.0740		0.0206		0.0005		0.0495		0.0533	
p-value	<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***	
Panel 3B: Market-Leverage														
max	0.0525	0.0476	0.0398	0.0377	0.0244	0.0284	0.0525	0.0508	0.0506	0.0443	0.0563	0.0524	0.0532	0.0536
min	0.0125	0.0142	0.0073	0.0062	0.0046	0.0006	0.0174	0.0102	0.0254	0.0226	0.0273	0.0259	0.0288	0.0211
avg	0.0322	0.0305	0.0223	0.0209	0.0131	0.0153	0.0366	0.0325	0.0358	0.0338	0.0392	0.0370	0.0398	0.0369
G vs. B	0.0017		0.0014		-0.0022		0.0041		0.0020		0.0022		0.0029	
p-value	<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***	

This table presents the estimated values for δ under different market states. The market state indicators are constructed following the ideas presented in Cooper, Gutierrez, and Hameed (2004) and Asem and Tian (2010). Panel A presents the results for book-leverage. Panel B gives the results for market-leverage. The p-values shown test whether the δ's calculated for the "good" market states are significantly different from the δ's estimated for the "bad" market states. We define all variables in the note of the table 1 and in the text of the document. G vs. B means the δ of good state minus the δ of bad state. G denotes good state, and B denotes bad state.

For all of the macroeconomic variables, the average δ is higher during good market states and lower during bad market states. The only exception is the results for GDP_change, where they are reversed. This estimate, however, only provides a preliminary picture of the overall behavior of δ and does show the effect of the magnitude (size) of leverage on the relation between the macroeconomic variables and the adjustment speed parameter δ. To model the impact of the size of leverage on δ, we use the quantile regression method and partition the dataset into ten quantiles according to the size of leverage.

The results show that the capital structure adjustment speed associated with the UP market states exceeds its corresponding adjustment speed in the DOWN market states, and the difference is statistically significant. The results also show that producer linked variables such as TCU and PPI significantly affects capital structure adjustment speeds, more so than standard macroeconomic variables.

Table 4 shows the results of the quantile regressions. The results show that the average adjustment speed of the capital structure decreases with the increase in leverage and changes from a positive to a negative number as we go from the least leveraged quantile (10%) to the most leveraged quantile (90%). Regardless of whether it is book-leverage or market leverage, the average capital structure adjustment speed is significantly faster in the 10% quantile than in the 90% quantile where it becomes negative.

For the 10% book-leverage quantile, the δ for TCU is the fastest, followed by δ for PPI. The results for market-leverage is different. For the 10% market-leverage quantile, the δ for GDP change is the fastest, followed by δ for term spread. The results suggest that companies with higher leverage appear to have more difficulty in adjusting their capital structure compared to companies with low amounts of leverage. We find that the firms' capital structure adjustment speed is faster for firms' with low leverage and slower for firms with high leverage.

Table 4: Estimated Values for δ Using Quantile Regressions

Variables	**Default Spread**		**Term Spread**		**GDP Change**		**Real Interest**		**NYSE**		**PPI**		**TCU**	
quantile	**10%**	**90%**	**10%**	**90%**	**10%**	**90%**	**10%**	**90%**	**10%**	**90%**	**10%**	**90%**	**10%**	**90%**
Panel 4A: Book-Leverage														
avg.	0.3881	-0.0762	0.3630	-0.0818	0.3266	-0.0841	0.3832	-0.0814	0.3898	-0.0798	0.3946	-0.0787	0.3956	-0.0789
std.	0.2559	0.1603	0.2486	0.1641	0.2387	0.1454	0.2591	0.1591	0.2598	0.1704	0.2601	0.1713	0.2603	0.1714
10% vs. 90%	0.4644		0.4448		0.4107		0.4646		0.4695		0.4733		0.4745	
p-value	<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***	
Panel 4B: Market-Leverage														
avg.	0.1277	-0.0441	0.1488	-0.1067	0.1639	-0.1465	0.1371	-0.0519	0.1321	-0.0449	0.1298	-0.0319	0.1303	-0.0321
std.	0.0244	0.0238	0.0242	0.0316	0.0218	0.0349	0.0268	0.0370	0.0246	0.0236	0.0239	0.0140	0.0236	0.0184
10% vs. 90%	0.1718		0.2555		0.3104		0.1890		0.1770		0.1617		0.1624	
p-value	<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***	

In this table, we divide the leverage into ten quantiles from small to large. 10% denotes the least leveraged quantile, and 90% indicates the most leveraged quantile. The p-value tests for whether the average δ estimated from the least leveraged quantile is significantly different from the average δ estimated from the most leveraged quantile. Panel A presents the results for book-leverage. Panel B shows the results for market-leverage. We define all variables in the note of the table 1 and in the text of the document.

Table 5 compares whether the δ's estimated from low leverage quantile firms (least leveraged 10% quantile) are significantly different from other firms not in this quantile. The results in this table show this to be true. Regardless of whether it is book-leverage or market-leverage, the δ for low leverage quantile firms are significantly larger than the δ for firms not included in this quantile. In sum, we can conclude that companies with low levels of leverage can respond more quickly to changes in the economic environment and adjust their capital structure.

Table 5: Comparison of Whether the δ's Estimated from the Least Leveraged 10% Quantile Firms Are Significantly Different from Other Firms Not in this Quantile

Variables	**Default Spread**		**Treasure Spread**		**GDP Change**		**Real Interest**		**NYSE**		**PPI**		**TCU**	
quantile	**non-**	**10%**	**non-**	**10%**	**non-**	**10%**	**non-**	**10%**	**non-**	**10%**	**non-**	**10%**	**non-**	**10%**
Panel 5A: Book-Leverage														
avg.	0.2726	0.3881	0.2607	0.3630	0.2429	0.3266	0.2728	0.3832	0.2753	0.3898	0.2772	0.3946	0.2774	0.3956
difference	-0.11552		-0.10237		-0.08378		-0.11042		-0.11443		-0.11746		-0.11821	
p-value	<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***	
Panel 5B: Market-Leverage														
avg.	0.0326	0.1277	0.0225	0.1288	0.0149	0.1139	0.0349	0.1271	0.0355	0.1221	0.0382	0.1298	0.0383	0.1303
difference	-0.09507		-0.10626		-0.09905		-0.09217		-0.08661		-0.09169		-0.09203	
p-value	<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***		<0.0001***	

This table compares whether the δ's estimated from the least leveraged 10% quantile firms are significantly different from other companies not in this quantile. The non-quantile columns show the average δ's estimated from firms, not in the least leveraged 10% quantile. The quantile columns in this table show the average δ's estimated from companies in the least leveraged 10% quantile. Panel A presents the results for book-leverage. Panel B shows the results for market-leverage. We define all variables in the note of the table 1 and in the text of the document.

CONCLUSION

The main purpose of this study is to test the impact of non-macroeconomic factors on the adjustment of capital structure. We use the factors related to production and production to test it. TCU and PPI are used in the tests. We use the Dynamic partial adjustment capital structure model. Data used during the test 1986 Q1 to 2012 Q4. There are 39,186 records per quarter. Our findings show that low leveraged firms adjust their leverage toward target capital structure faster than high leveraged firms. We also show that producer linked variables such as total industry capacity utilization and producer price index significantly affect capital structure adjustment speeds, more so than standard macroeconomic variables.

This study analyzes the effect of the ex-ante market state indicators used in the momentum literature on capital structure adjustment speeds. The UP, DOWN market state indicators used in the momentum literature are defined to be functions of past market returns. As such, they are observable by the investor at time t. In the momentum literature, it is well established that past market states affect momentum profit. A large number of studies have documented that the returns of applying the momentum strategy on stocks and corporate bonds are state-dependent and predictable ex-ante these types of UP, DOWN market state indicator variables.

The effects of time variations of past market states on capital structure dynamics have not yet been researched. This study fills this gap by investigating the effects of the momentum market state indicators on capital structure dynamics. The hypothesis is that corporate decision-makers, like investors, can also observe and make use of these ex-ante market state indicators, and this information can influence their capital structure decisions moving forward.

Our results show that capital structure adjustment speed is considerably state-dependent, that these momentum market state variables significantly affect a company’s capital structure adjustment speed. The results support the behavioral theory of Daniel et al. (1998) in that aggregate market gains can induce manager overconfidence and therefore influence their capital structure decisions. The finding of a market-state effect on capital structure is also consistent with the bounded rationality theory by Hong and Stein (1999), where heterogeneity in the types of information structure available to decision-makers yields gradual information diffusion.

In as much as there exists much empirical literature showing that capital structure affects a company’s value, our results provide a plausible pathway of how the momentum market state variables lead to momentum profit by providing empirical evidence that they also affect capital structure adjustment speeds. Specifically, the empirical literature shows that the capital structure decision is a relevant factor explaining value created to shareholders, thus providing a link between momentum market states, firms’ capital structure adjustment decisions, and momentum strategy return. This study extends the literature by analyzing the relationship between past market states and capital structure adjustment speeds, whether the ex-ante market state variables used in the momentum literature are useful in further delineating capital structure adjustment speed.

Our results support our hypothesis. We find that the capital structure adjustment speed associated with the UP market states exceeds its corresponding adjustment speed in the DOWN market states, the difference statistically significant. Our results also show that TCU and PPI are indeed useful in explaining capital structure adjustment speed.

This study further uncovers several new results. First, regressions that use TCU and PPI provide the most reliable results for the relation between the capital structure adjustment speed and macroeconomic indicators. The results are the same for both book-leverage or market-leverage. For example, the average adjustment speeds δ associated with TCU and PPI regressions are ranked first and second by magnitude, respectively in nearly all regressions. We also find that firms adjust capital structure faster when the economic state is good. Second, when we put companies into ten quantiles according to the magnitude of leverage, we find that the firms' capital structure adjustment speed is faster for firms' with low leverage and slower for firms with high leverage. Third, when we incorporated TCU and PPI into our regression specifications, the resulting δ of other macroeconomic indicators were not as discernible (both magnitude and significance).

From this, we can conclude that managers adjust their capital structure more in line with the information captured in these two (producer related) indicator variables than with the information proxied by the more commonly used (general) macroeconomic variables. Our results show the importance of factors related to the firms' production capacity in capital structure adjustment. This result shows that composite measures of the economy, such as GDP do not reflect entirely the information that goes into manager decision to adjust the capital structure. Instead, producer related indicator variables such as TCU and PPI are found to give more tangible results in the regressions.

From this study, we suggest that managers and investors should focus on the fundamentals of the company rather than commit to macroeconomic information. Most mainstream research focuses on macroeconomic factors. There is very little research on production factors, and there are great restrictions on the choice of production factors, such as the frequency of information or the degree of relevance. Subsequent research can analyze other choices for non-macroeconomic factors.

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