Capital Structure and Macroeconomic Conditions: Evidence from Canada

by

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ABSTRACT

This paper examines the impact of macroeconomic conditions on the capital structure adjustment speed. Using a sample of Canadian firms listed on the Toronto Stock Exchange between 1981 and 2020, I document that firms adjust their capital structure to the target more rapidly in good macroeconomic conditions than in bad macroeconomic conditions. Alternative estimation methods of macroeconomic conditions are considered, but the results stay the same. The results are also robust to different industry categories and different classifications of years into good and bad macroeconomic states.

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CHAPTER 1. INTRODUCTION

Firms operate through business cycles. The important factors faced by firms, such as cash flow, investment opportunities, and financing needs, vary across macroeconomic conditions. What role macroeconomic conditions play in capital structure decisions becomes an important question. Some studies have examined macroeconomic conditions and capital structure (Baker and Wurgler, 2002; Hackbarth, Miao, and Morellec, 2006), but research on how macroeconomic conditions influence corporations to adjust their capital structure to the optimum is still rare. In this paper, I study the impact of macroeconomic states on firms adjusting their leverage ratio to the optimum level and conclude that firms adjust their capital structure more rapidly in good macroeconomic conditions in Canada.

The widely accepted capital structure theory, trade-off theory, proposes that corporations could maximize their value by balancing benefits and costs, which means there should be a target capital structure. Graham and Harvey (2001) support this view through their empirical evidence. Their survey of CFOs finds 44% of 392 CFOs have set a strict target leverage ratio or somewhat strict targets and ranges. Conducting a similar survey in Canada, Baker, Dutta and Saadi (2011) find that Canadian managers decide their capital structure by following trade-off theory more than pecking-order theory. They also show that, compared with other studies in the U.S and Europe, more managers among the respondents of their survey in Canada tend to hold a tight or somewhat tight target leverage ratio.

In practice, companies' leverage ratios cannot always stay at the target capital structure, so deviations exist. However, various financial frictions and market imperfection leaves scholars wondering whether corporations could quickly adjust their leverage ratio to the optimal level. Nunkoo and Boateng (2010) confirm that Canadian firms have a long-term target leverage ratio and they would rebalance their capital structure, but the adjustment speed is relatively slow. Leary and Roberts (2005) state that corporations would actively adjust their leverage ratio to the optimum, but they emphasize that adjustment cost is an essential factor in firms' financing decisions.

Later, more studies are carried out on the dynamic adjustment process. One popular topic is the factors that affect capital structure adjustment. Faulkender, Flannery, Hankins, and Smith (2012) provide their finding by connecting the cash flow, transaction cost, target leverage ratio, and adjustment speed. They find that cash flow would impact the optimum capital structure and the capital structure adjustment speed. Hackbarth et al. (2006) suggest that the business cycle affects corporation operating cash flow and, hence, tax shield and the bankruptcy cost. Their results show that firms in the economic boom would adjust their debt-to-equity ratio more frequently because of lower bankruptcy cost. Drobetz and Wanzenried (2006) start to consider what kind of role macroeconomic conditions play in capital structure adjustment speed by using a small sample from Switzerland. Cook and Tang (2010) draw a more general conclusion that firms adjust their capital structure to the optimum more rapidly when macroeconomic conditions are good in their work. They obtain a large sample of U.S. data, identify the good and bad macroeconomic conditions of whole sampling periods by four macroeconomic factors and combine them with a dynamic model. Despite macroeconomic conditions being an essential factor when discussing capital structure, there is still very little discussion on how it affects adjustment speed. Macroeconomic condition is the factor that enterprises cannot avoid considering for leverage adjustment, and how it impacts the adjustment speed of capital structure should be emphasized to help corporations reach optimal capital structure as soon as possible to maximize firm valuation.

For this paper, I collected annual data of publicly listed firms on the Toronto Stock Exchange between 1981 and 2020. A sample of 1,795 firms with 17,898 observations based on book leverage ratio and 17,841 observations based on market leverage ratio is used for my analysis after filtering. As the first step, I test the relationship between leverage ratios and five important firm- and industry-level factors, including size, market-to-book ratio, profitability, tangibility, and industry median leverage ratio, by using the baseline regression model. The results are consistent with previous research that larger firms, firms have more tangible assets, and firms in industries with higher median leverage ratios tend to have a high leverage ratio. By contrast, firms with higher market-to-book ratio and higher profitability tend to maintain a low leverage ratio. Then I add lagged leverage ratios into the model to analyze the dynamic partial adjustment model. The sharp rise of the R-squared value suggests the significance of lagged leverage ratio when analyzing the dynamic adjustment process, and the invariable coefficients signs of firm- and industry-level factors indicate the stability of the relationship between them and leverage ratio.

To examine the impact of macroeconomic conditions on capital structure adjustment, two macroeconomic factors—real GDP growth rate and term spread—are employed to access macroeconomic states. I follow the empirical methodology of Cook and Tang (2010) to identify years with good and bad macroeconomic conditions by dividing the sample period into four groups. When using the annual GDP growth rate as the estimation factor, good macroeconomic conditions are ten years with the highest annual GDP growth rates, and bad macroeconomic conditions are ten years with the lowest GDP growth rates. As for term spread, good macroeconomic conditions are ten years with the highest term spreads in the sample period, and bad macroeconomic conditions are ten years with the lowest term spreads. Then, I run the dynamic partial adjustment model using subsamples from good and bad macroeconomic conditions to compare the adjustment speed in different states. By adding the dummy variable of good macroeconomic conditions and the interaction term between dummy variable and lag leverage ratio in the equation and using pooled subsamples from both good and bad macroeconomic conditions, the conclusion is confirmed. Overall, from combining the dynamic partial adjustment model and macroeconomic states, the empirical results indicate that corporations adjust their capital structure to an optimal level more rapidly in good macroeconomic conditions, which is consistent with previous research (Cook and Tang, 2010; Drobetz, Schilling, and Schröder, 2015).

To the best of my knowledge, there is no research using Canadian data that specifically investigates the role macroeconomic conditions play in the capital structure adjustment speed. Drobetz et al. (2015) use data from G7 countries, including Canada, during the period 1992–2011. However, they focus on comparing the heterogeneity of capital structure adjustment speed of market-based countries and bank-based countries, and use the pooled samples from all countries when assessing the adjustment speed under good and bad macroeconomic states. Though there are similarities between Canada and the United States, the unique characteristics of the Canadian economy make it worth studying. Moreover, the survey conducted by Baker, Dutta and Saadi (2011) has found that more Canadian managers hold tight or somewhat tight target capital structure than managers in the U.S. and Europe. Hence, it is reasonable to expect that they may be more eager to adjust their capital structure back to the target level when there is any deviation. By focusing on Canada, extending the sample period further to 2020, and using different regression models, I expect this paper can enrich relevant studies of capital structure and macroeconomic conditions in the Canadian market. This research is also expected to offer some suggestions for corporations on how to effectively adjust their capital structure and flexibly use debt and equity financing in different macroeconomic states. For example, when a firm is in bad macroeconomic conditions and its leverage ratio deviates from the target, managers do not have to fret about the low adjustment speed, instead they should focus more on carrying its operations through tough times.

The rest of the paper is as follows. Section 2 discusses traditional capital structure theories and previous work related to the relationship between capital structure and macroeconomic conditions. Section 3 describes model development, and Section 4 describes data selection and variables. Section 5 presents the empirical results. Section 6 concludes.

CHAPTER 2. LITERATURE REVIEW

In this section, I begin by reviewing three traditional capital structure theories, and then introduce the relevant studies of macroeconomic conditions and capital structure.

2.1 Traditional Capital Structure Theory

From Modigliani and Miller's (1958) seminal work, generations of researchers have developed a rich literature on how corporations choose among different kinds of financing methods and decide their capital structure. Three widely accepted and well-examined theories are trade-off theory, pecking-order theory, and market-timing theory.

2.1.1 Trade-Off Theory

Modigliani and Miller (1958) draw their basic conclusion under extreme conditions where there are no taxes, no default risk, and no agency costs. Moreover, the market is perfect, which means there are no transaction costs and information asymmetry. They state that the firm value is not affected by capital structure. However, the real market is not perfect and frictions like taxes, default risk, agency costs, and information asymmetry have to be considered. In this situation, their conclusion is not stable and practical. Later, through breaking these extreme conditions, the trade-off theory has emerged and developed.

Kraus and Litzenberger (1973) introduce the bankruptcy cost and interest tax shield in their model and prove that firm value does not always grow as debt increases. With the increase of debt, the benefits of the interest tax shield are offset by rising interest costs and potential bankruptcy costs, reaching a peak to maximize firm value. Hence, the optimal capital structure is the outcome of balancing the interest tax shield and the bankruptcy costs. Miller (1977) takes into account personal income tax and suggests that it may counteract parts of the interest tax shield associated with corporate taxes.

Agency cost is also a significant factor because corporate architecture with separation of ownership and control has been widely adopted by firms nowadays. Jensen and Meckling (1976) point out that there are two kinds of agency costs: agency costs of equity and agency costs of debt. The conflicts between managers and shareholders arise when managers work for their performance or personal interests rather than for the benefit of shareholders. They would also have strong motivation to shirk or waste corporations' resources to meet their own needs because they have to share their interests with shareholders. Shareholders are forced to bear these costs. Moreover, these conditions lead to additional costs to monitor managers' decisions and reactions or issue more stock dividends. As for the agency costs of debt, it is caused by the conflicts between shareholders and debtholders. On the one hand, firms may promise debt holders to invest in low-risk projects and put their money into high-risk projects for more profits to shareholders and shift risks to debtholders (risk shifting), while debtholders may set debt covenants to protect their rights, hence more cost for corporations. Meanwhile, firms may borrow so much money that they cannot afford more to invest in a new project (debt overhang), and the potential benefits from projects would become costs to companies.

Hence, when a firm determines its optimal capital structure, agency costs of debt and equity should inevitably be taken into consideration.

At the same time, scholars are not satisfied with this static analysis approach because relevant research and empirical studies indicate most corporations hold a target leverage ratio and firms need time to adjust. This has led to the development of the dynamic analysis of trade-off theory. Brennan and Schwartz (1984) establish their dynamic model by considering tax shields and bankruptcy costs to maximize corporation valuation. But they ignore a very important factor, adjustment costs. By considering adjustment costs, Fischer, Heinkel, and Zeehner (1989) find that optimal leverage ratio is an interval value that fluctuated around a specific amount, and corporations only adjust it when it deviates from optimal value by a certain degree. They also state that a little adjustment cost would cause a huge fluctuation of capital structure over time. The adjustment process is long term since corporations would trade off their adjustment costs and the loss suffered from not adjusting to the optimum level when deviating from the optimal leverage ratio. Corporations cannot adjust their capital structure frequently due to frictions. In this situation, the target capital structure is a range, rather than a specific level (Leary and Roberts, 2005).

In sum, trade-off theory states that a firm would determine its optimal capital structure by trading off the benefits and costs of debt. The latest studies examine the dynamic trade-off theory, which insists the firms have a target range of capital structure rather than an optimum level, and the adjustment process is quite long due to relevant costs in the financial markets.

2.1.2 Pecking-Order Theory

Different from the trade-off theory, pecking-order theory involves a pattern of decisions about choosing from different sources of financing, rather than a specific optimal leverage level. Under the premise of information asymmetry between managers and external investors, Myers and Majluf (1984) show that internal financing is better than external financing, and if firms need to raise money from the capital market, debt financing should take precedence over equity financing. Investors would consider external financing a bad sign when they don't know a firm's internal operating situation, since a firm with sufficient internal funds should not seek outside financing. Besides, using external financing would cause agency costs, no matter whether debt or equity financing is used. Hence, internal financing is preferred over external financing. Then, compared to debt financing, issuing stock may cause a drop in stock price because investors would interpret the equity issuance as a sign of overvaluation of firm shares. But debt financing will be less affected, compared to equity investors, because debtholders have priority to be repaid first and hence suffer less information asymmetry and loss when corporation valuation is estimated wrongly (Myers, 2001). Therefore, debt financing should be given priority over equity financing. Though Ross (1977) argues that a higher debt level is a good sign as companies in poor condition cannot afford the marginal bankruptcy cost, the most accepted theory is using internal financing first, then using equity financing; debt financing is the least popular.

Frank and Goyal (2003) find that the pecking-order theory worked well for American firms in the 1970s and 1980s, but performed worse in the 1990s. Graham and Harvey (2001) find that signaling effects are not a significant factor in deciding optimum capital structure, but costs of information asymmetry affect when and how firms raise their external financing.

2.1.3 Market-Timing Theory

Baker and Wurgler (2002) find that, in practice, managers would like to issue shares when the market value is higher than the book or past firm value or when investors are very enthusiastic about investing, and repurchase them when the share price is low. They believe that firms can benefit from these fluctuations of equity compared to other financing methods. They also emphasize that equity market timing has a large and lasting impact on capital structure, and capital structure can be recognized as the cumulative result of managers' past financing based on market timing. Stein (1996) also states that managers would like to catch the equity-market timing, issue more shares when the stock price is overvalued and, by contrast, issue fewer shares since firms are not benefiting. Frank and Goyal (2009) suggest that managers are not biased towards the debt and equity market and rely on current conditions to decide whether using debt or equity financing would be more favorable. If they are not satisfied with the current conditions for both markets, they would like to defer and wait until they think the market is favorable. Similarly, when the market is particularly favorable, they may raise funds even if corporations do not need extra money. In reality, managers consider the overvaluation or undervaluation of equity an essential factor for capital structure (Graham and Harvey, 2001).

Market-timing theory can explain many managers' decisions reasonably without considering the often-mentioned factors for capital structure. However, whether managers can correctly time favorable market conditions and make proper financing decisions is still an open question.

2.2 Macroeconomic Conditions and Capital Structure

Firms are operating through macroeconomic conditions, and important factors like cash flow, investment opportunities, and financing chance vary across macroeconomic conditions. What role macroeconomic conditions play in capital structure and whether they have different effects in different circumstances become important questions.

Hackbarth et al. (2006) explain why macroeconomic conditions impact capital structure. They develop a theoretical model containing the conversion of two economic conditions to study the influence of capital structure choice. Based on the trade-off theory, they argue that tax shield and bankruptcy costs are relevant to operating cash flows, which are influenced substantially by the current state of the economy. Hence, macroeconomic conditions would affect capital structure decisions significantly. More importantly, their model shows that firms in the boom period benefit from lower bankruptcy costs and lower restructuring threshold, so they can adjust their capital structure faster, compared with in the recession period. The influence of macroeconomic conditions on capital adjustment speed can be inferred from this conclusion.

Baker and Wurgler (2002) present their reason based on market-timing theory. As companies would choose their financing methods based on market conditions, it is reasonable that macroeconomic conditions play an important role in capital structure decisions.

Accepting the finding that the business cycle should play an essential role in capital structure, more empirical work is devoted to testing the impact of macroeconomic conditions on the capital structure adjustment process. Some scholars state there are observed patterns between the business cycle and capital structure adjustment. Korajczyk and Levy (2003) find that the leverage ratios of larger firms are countercyclical and smaller firms show procyclical trends by dynamic analysis. They also state that unconstrained corporations prefer to issue debt in trough circumstances while constrained corporations tend to issue debt in peak circumstances. Others tend to acknowledge the significance of the business cycle by emphasizing its impact on explaining capital structure decisions. Akhtar (2012) suggests business cycles help interpret the unexplainable part of the firm factors, as the explanatory power of firm factors is stronger after adding business cycles. Many of the long-term factors that are difficult to define can be partially solved by macroeconomic conditions.

Motivated by Hackbarth et al.'s (2006) implication that more rapid adjustment should be observed when macroeconomic conditions are good, Cook and Tang (2010) use a large sample of U.S. data over the period 1977–2006 and formulate a two-step model and an integrated dynamic partial adjustment model to test the adjustment speed in different macroeconomic conditions. They employ firm-level variables as well as macroeconomic factors including annual GDP growth rate, term spread, default spread, and market dividend yield. Moreover, they divide the sample period into five groups and only use the subsamples from good macroeconomic state years and bad macroeconomic state years to examine the influence of macroeconomic conditions. Their empirical results show that companies adjust their capital structure more rapidly in good macroeconomic states regardless of whether corporations are constrained.

Using a sample of 90 firms in Switzerland during the period 1991–2001, Drobetz and Wanzenried (2006) examine this question by using the dynamic framework and the GMM method. Different from Cook and Tang (2010), they use short-term interest rate, default spread, and TED spread as their estimation factors of macroeconomic conditions. They start their work by testing the relationship between firm factors and capital structure adjustment. They find that firms with more growth opportunities will adjust their capital structure more rapidly when they deviate further from their target leverage ratio. Then, by estimating the coefficients of the interaction terms between macroeconomic condition factors and lag leverage ratio, they suggest there is an interesting relationship between macroeconomic conditions and leverage adjustment speed. However, their results on macroeconomic conditions and the adjustment speed of capital structure are sometimes insignificant and not consistent when using different macroeconomic assessments, and this might be caused by the small sample size.

Drobetz et al. (2015) continue their previous work by collecting G7 countries' figures and focusing on the heterogeneity of capital structure adjustment speed across different countries. They use economy crises and financial system crises to assess the business cycle, then compare the speed of capital structure adjustment respectively in good and bad macroeconomic conditions for market-based and bank-based countries. They conclude that corporations adjust their capital structure more rapidly in good economic states. However, this is based on pooled samples from different countries, and the heterogeneity across market-based and bank-based subsamples is emphasized.

Baum, Caglayan, and Rashid (2017) interpret the relationship between risk, firm factors, and capital structure adjustments using U.K. data over the period 1981–2009. They suggest that in a low firm-specific risk and high macroeconomic risk circumstance, enterprises that have surplus funds and above-target leverage adjust their leverage more rapidly. When in a low firm-specific risk and low macroeconomic risk circumstance, corporations that lack available funds and with below-target leverage adjust their capital structure more quickly. It is worth noting that they identify the macroeconomic risk by using real GDP. This estimation method and the consideration of macroeconomic conditions supports the importance of business cycle to capital structure adjustment speed.

Daskalakis, Balios, and Dalla (2017) collect the data of SMEs operating in Greece from 2004 to 2014. By roughly dividing the whole sample period into growth period

(2004–2008) and recession period (2009–2014) by annual GDP growth rate, they suggest that there are different patterns in adjustment speeds for short-term and long-term debt. When the economy went into recession, long-term debt would adjust slowly, but the same adjustment pattern did not appear for short-term debt. Their work also supports the impact of macroeconomic conditions on capital adjustment speed.

Overall, based on the previous work and relevant research summarized in the literature review, capital structure decisions are important for firms, and the trade-off theory is widely followed, which indicates the importance of capital structure adjustment. Meanwhile, macroeconomic conditions have been proved to be an essential factor that influence capital structure decision and adjustment. However, there is lack of empirical study in Canada about the macroeconomic conditions and capital adjustment. Based on the theoretical prediction of Hackbarth et al. (2006), I will examine the impact of macroeconomic conditions on capital structure adjustment by testing the following hypothesis:

H1: Firms will adjust their capital structure more rapidly in good macroeconomic conditions, compared with in bad macroeconomic conditions.

CHAPTER 3. EMPIRICAL MODELS

According to the work of Flannery and Rangan (2006) and Cook and Tang (2010), the adjustment progress of capital structure can be examined through two steps. In the first, the target leverage ratio can be estimated by the firm variables and formulated as

$$LEVR^{*}_{i,t} = \beta X_{i,t-1} \qquad (1)$$

where $LEVR^{*}_{i,t}$ is the target leverage ratio for firm i at time t. $X_{i,t-1}$ includes firm variables that can be used to estimate optimal capital structure. Based on Frank and Goyal's (2009) work, firm size, market-to-book ratio, profitability, tangibility, and industry median leverage ratio are used in this paper because they impact the capital structure significantly, and their definitions are given in Section 3.2.2.

Then the partial adjustment model is estimated as follows:

$$LEVR_{i,t} - LEVR_{i,t-1} = \delta(LEVR^{*}_{i,t} - LEVR_{i,t-1}) + \boldsymbol{\varepsilon_{i,t}} \qquad (2)$$

$LEVR_{i,t}$ is the leverage ratio for firm i at time t and $LEVR_{i,t-1}$ is the leverage ratio for firm i at time t-1. δ can be interpreted as the adjustment speed of leverage ratio to the target capital structure. The larger δ is, the faster corporations adjust their capital structure to their target ratio. When δ is equal to 1, it means that corporations adjust their capital structure to the target completely in one year. But in the real capital market, corporations face information asymmetry, adjustment costs, and other problems. This idealization, which is that corporations adjust their leverage ratio to their target leverage ratio rapidly in one year, is impossible. Therefore, δ is expected to be less than 1.

Combining these equations, it is not hard to get the partial adjustment model:

$$LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}} \qquad (3)$$

In this equation, the adjustment speed (δ) is converted by the coefficient of lag leverage value, $(1-\delta)$. The smaller the coefficient of the lag leverage ratio, the faster firms adjust their capital structure. Based on past research (Hackbarth et al., 2006; Cook and Tang, 2010; Drobetz et al., 2015), I expect the adjustment speed to be faster in good macroeconomic conditions than in bad, so the coefficient of the lag leverage ratio in equation (3) in good states is expected to be smaller than in bad states.

Finally, to get a better understanding of the effect of macroeconomic conditions and compare the difference of adjustment speed in different states, I add a good dummy variable and its interaction with lagged leverage ratio in Eq. (3) to get the new equation

$$LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}} \qquad (4)$$

$GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and is equal to 0 otherwise. The interaction term is the product of this dummy variable and lag leverage ratio. The negative coefficient of the interaction term is expected to gather further evidence to support that adjustment speed is faster in good states than in bad states.

For Eq. (3) and Eq. (4), the firm fixed effects will be considered since Flannery and Rangan (2006) argue it may increase the estimates of adjustment speed. The standard errors clustered by time will be calculated at the same time to obtain unbiased standard errors across the time dimension (Peterson, 2009). Due to the classification of years into good and bad conditions, the continuity of the sample years is broken, so the data used for my regression analysis does not have a panel data structure. Equation (3) will be estimated in years with good and bad macroeconomic conditions, respectively, then equation (4) will be estimated in the pooled sample of good and bad years.

CHAPTER 4. DATA AND VARIABLES

4.1 Data

The samples are corporations listed on the Toronto stock exchange from 1981 to 2020. I exclude financial firms (SIC 6000-6999) and utilities (SIC 4900-4999) since the unique operation mode leads to the lack of reference for their capital structure. Firm-annual accounting figures are collected from the WorldScope database. Firms without data for two consecutive years are excluded, since the lag value of firm-level factors is used in the regression. Finally, the sample consists of 17,898 observations based on book leverage ratio and 17,841 observations based on market leverage ratio from 1,795 firms.

I obtained the data of GDP growth rate from the C.D. Howe Institute website.[1] Data used to calculate term spread was collected from Statistics Canada.[2]

4.2 Variables

In this section, the definition of the leverage ratio, firm factors that are used to estimate leverage ratio, and macroeconomic factors that are used to assess macroeconomic states will be identified.

[1] https://www.cdhowe.org/council/business-cycle-council
[2] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1010012201 Table 10-10-0122-01. Financial market statistics, Bank of Canada.

4.2.1 Leverage Ratio

$LEVR_{i,t}$ includes both book leverage ratio and market leverage ratio. In regard to these two methods of assessing capital structure, some scholars believe that book leverage is a better choice since it reflects the financial decisions made by managers and the target ratio they set (Drobetz and Wanzenried, 2006; Thies and Klock, 1992). However, Welch (2004) argues that book equity is just the difference between asset and liability, and it is the accumulation of past operating. Admittedly, the market leverage ratio is more volatile because it uses market equity value for calculation, which is influenced by macroeconomic conditions and financial market movements. On the other hand, book leverage ratio is relatively more stable as it only uses accounting data. I will use both methods, while book leverage ratio (BLR) is formulated by

$$BLR_{i,t} = \frac{TD_{i,t}}{TA_{i,t}}$$

$TD_{i,t}$ is the total interest-bearing debt of firm i at time t and $TA_{i,t}$ is the total assets.

And the market leverage ratio (MLR) is estimated as

$$MLR_{i,t} = \frac{TD_{i,t}}{TD_{i,t} + MVE_{i,t}}$$

$TD_{i,t}$ is the total interest-bearing debt of firm i at time t and $MVE_{i,t}$ is the market value of equity. Book leverage ratio is winsorized since it has extreme value. For market leverage ratio, the original data is within 0 and 1, so no more programs are executed.

4.2.2 Firm Factors

As mentioned in Section 2, following the findings of Frank and Goyal (2009), five firm factors will be considered as the variables that impact the leverage ratio, which are firm size, market-to-book ratio, profitability, tangibility, and industry median leverage ratio. Following the literature, these variables are winsorized at 1 and 99 percentiles to minimize the impacts of outliers.

Firm size (*SIZE*) is estimated by the natural logarithmic of total assets. Based on the trade-off theory, large-size firms prefer a high leverage ratio due to the relatively low risk of default. However, the pecking-order theory argues that large firms may choose low debt level because of abundant internal finance. Besides, some studies prefer the natural logarithmic of net sales as an empirical proxy. However, considering the possibility of drastic fluctuations in sales, the natural logarithmic of total assets is used.

Market-to-book ratio (*MB*) is calculated by the market value of equity divided by the book value of equity. According to the trade-off theory, there is a negative relationship between leverage and the market-to-book ratio. As the market-to-book ratio is the empirical proxy of growth opportunities, more growth opportunities indicate more investment, less cash flow, more financial distress costs, and more serious debt-related agency problems. Corporations at the growth level attach more attention to shareholders (Frank and Goyal, 2009). Therefore, firms prefer to reduce their leverage ratio. On the contrary, the pecking-order theory states that the debt-to-equity ratio of firms that have more growth opportunities is higher since the debt level of firms with more investment would increase over time.

Profitability (*PRO*) is estimated by earnings before interest and taxes divided by total assets. The pecking-order theory states that firms with high profitability choose less debt because they have enough internal financing for operation and investment. However, the trade-off theory predicts that there is a positive relationship between leverage and profitability as more profitable corporations, with less likelihood of default, can benefit from the higher tax shield by using more debt financing.

Tangibility (*TANG*) is calculated by the net property, plant, and equipment divided by total book assets. The pecking-order theory proposes that there is a negative relation between tangibility and leverage as shareholders suffer less cost from information asymmetry. The trade-off theory states that corporations may face less risk because the high tangibility of assets implies they have better liquidation and are more easily mortgaged.

To calculate industry median leverage ratio (*IMLR*), in each year I group firms based on their primary standard industry classification (SIC) codes into Fama–French 30 industry categories, and calculate industry median book leverage ratio (*IMBLR*) and industry median market leverage ratio (*IMMLR*) for each industry.[3] Managers might set the industry median leverage ratio as their benchmark, and it contains the common risk faced

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[3] I use primary SIC code (WC07021), which is based on the business segment providing the most revenue for a firm. Fama–French industry categories can be found at Professor Ken French's data library. https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

by the same industry, so it is usually used as the empirical proxy of target capital structure. Since the different industry classification methods may affect the sample size in each industry and the median, I also conduct a robustness check by classifying the sample into 12 industry categories. Industry median book leverage ratio is represented by *IMBLR_12* and industry median market leverage ratio is represented by *IMMLR_12*.

4.2.3 Macroeconomic factors

In this paper, macroeconomic conditions are assessed by specific macroeconomic indicators. Drobetz and Wanzenried (2006) use term spread, short-term interest rate, default spread, and the TED spread as factors to estimate macroeconomic conditions. Cook and Tang (2010) point out that the annual GDP growth rate plays an essential role in impacting the adjustment speed in their work. They also use term spread; default spread and market dividend yield as alternative methods of macroeconomic conditions assessment. Drobetz et al. (2015) adopt the business cycle date from Economic Cycle Research Institute business cycle. After considering the availability and applicability of relevant data in Canada, annual GDP growth rate and term spread are considered the key measures of macroeconomic conditions.

First, the most straightforward and traditional way to assess macroeconomic states is to assess the changing trend of the annual growth rate of real GDP. The continuous decline of the annual GDP growth rate suggests bad macroeconomic conditions. Therefore, when assessing macroeconomic conditions, the higher annual GDP growth rate is recognized as good macroeconomic conditions, and the adjustment speed is expected to be faster in these conditions.

Second, term spread is chosen as a factor for estimating macroeconomic states because it indicates the economic trend. Term spread is defined as the differences between long-term government bond yield and short-term Treasury-bill rate. Drobetz and Wanzenried (2006) emphasize that term spread is a predictive indicator. They propose that in good economic states, investors may be afraid of the coming recession and will sell short-term bonds and opt for a long-term investment with less risk. Hence, at this point, more purchasing of long-term government bonds leads to an increase in price and a reduction in yields. By the same token, the price of short-term bonds will reduce and yields will increase. It is worth noting that the term spread represents investors' predictions and expectations for the future market, so the high term spread from the previous year suggests good macroeconomic conditions. When assessing the macroeconomic states, the lag value of term spread is used for each year. For this research, term spread is calculated as the difference between the over-10 years government marketable bond average yield and the three-month Treasury-bill rate.

4.2.4 The Assessment of Macroeconomic Conditions

Following Cook and Tang (2010), I divided 40 years into four groups based on the annual GDP growth rate and term spread, respectively. According to GDP growth rate, good macroeconomic state years are ten years with the highest annual GDP growth rate and bad macroeconomic state years are ten years with the lowest GDP growth rate. When using term spread as the estimation method, years with the good macroeconomic conditions are ten years with the highest term spread in the sample period, and with the bad macroeconomic conditions are ten years with the lowest term spread. Two middle groups of years are not used in my analysis. Hence, the impact of a large reduction in sample size on the results will be taken into account when analyzing regression results.

After processing relevant factors, the results are presented in Table 1. Years with good macroeconomic conditions are marked in orange, while the years with the worst macroeconomic conditions are marked in blue. My classification of years with good and bad macroeconomic conditions is consistent with some major events in business cycles. For example, "the Great Recession"[4] for Canada, 1981 and 1982, are captured properly as years with bad macroeconomic conditions by both factors. The recession around 1990, caused by a sluggish economy, cutbacks in manufacturing, wars, and the introduction of goods and service taxation is estimated, too. Another notable recession period is around 2008, also known as the global financial crisis caused by the subprime mortgage crisis in the U.S. The latest recession appears in the year 2020, due to the effect of Covid-19. Although different criteria are used, there is an overlap of good years and bad years. Table 1 shows that 1984, 1994, 1997, 1998, and 2010 are estimated as good macroeconomic state years, while 1982, 1990, 1991, 2008, and 2020 are assessed as bad macroeconomic

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[4] All introductions of macroeconomic recession are from C.D. Howe Institute. The website is at https://www.cdhowe.org/council/business-cycle-council

condition years.

[Table 1 about here]

Table 2 provides the definitions of firm-level and macroeconomic variables used in my study.

[Table 2 about here]

CHAPTER 5. EMPIRICAL ANALYSIS

5.1 Summary Statistics

Table 3 and Figure 1 present the annual means and medians for book and market leverage ratio ratios during the period 1981–2020. The overall trends of the book leverage ratio and market leverage ratio are very similar, declining before the 2008–09 global financial crisis and moving up afterward. However, the market leverage ratio fluctuates more significantly than the book leverage ratio. This also confirms the point mentioned above that the market leverage ratio is more affected by market fluctuations. Both market and book leverage ratios rose slightly during recessions; for example, the average book leverage ratio and market leverage ratio rose from 0.226 and 0.364 to 0.257 and 0.423. The other two obvious peaks are shown for 1989–1991 and 2007–2008, and the mean values for market leverage ratio soar to 0.36 and 0.265. It may be caused by a rise in debt financing or a reduction in the book value and market value of equity. The impact is stronger for the market leverage ratio, due to the sharp decline of the share price, hence the decline of the market value of equity.

[Table 3 about here]

[Figure 1 about here]

Table 4 presents summary statistics for all firm-level variables. In general, the market leverage ratio fluctuates more than the book leverage ratio because it has a higher standard deviation. Similarly, the industry median market leverage ratio fluctuates more than the industry median book leverage ratio. For market-to-book ratio, the larger average value (1.622) compared to the median (1.053) may suggest a generally high level in the market. Regarding profitability, the mean value is -0.0371 and the 25% percentile is -0.0511, indicating some firms have suffered losses.

[Table 4 about here]

In Table 5, Panel A is the correlation matrix including industry median leverage ratio calculated for Fama–French 30 industries. The book leverage ratio is positively correlated with firm size and tangibility and negatively with the market-to-book ratio and profitability. The two measures of financial leverage, BLR and MLR, have a high correlation at 0.778. This also applies to industry median book leverage ratio and industry median market leverage ratio. Further, the high correlation efficient between lag leverage ratio and leverage ratio (0.817 for BLR and 0.840 for MLR) provides preliminary indication that firms may adjust their capital structure gradually.

It is worth noting that the market leverage ratio is positively correlated with profitability, as opposed to the book leverage ratio. As stated in Section 3.2.2, the trade-off theory states that profitability should have a positive relationship with leverage ratio as corporations with high profitability can afford more bankruptcy costs and can benefit from the tax shield, but the pecking-order theory predicts that more profitable firms should use less debt since it is not a priority over internal financing. Such opposition may be caused by the different sensitivity of book leverage ratio and market leverage ratio to market fluctuation and information asymmetry. Frank and Goyal (2009) also state the same relationship under different explanations of theory in their work, and my results are consistent with theirs. The high correlations among some variables may suggest the presence of multicollinearity. Hence, variance inflation factor analysis is employed. As shown in Panel B and Panel C, all VIF values are lower than 10, which indicates multicollinearity should not be a concern.

[Table 5 about here]

Table 6 presents the mean and median leverage ratios in different macroeconomic states. Generally, corporations take less debt in good states because, in most cases, the mean and median of leverage ratio are significantly lower in good states as estimated by term spread. For the difference between good and bad conditions assessed by GDP growth rate, the p-value is too large to get the same conclusion. This may be affected by the small sample size.

[Table 6 about here]

5.2 Regression Results

5.2.1 Baseline Regressions for the Full Sample

I first run some baseline regressions by using the full sample in order to understand the basic relationship between leverage ratios and firm characteristics in a general setting. The results are reported in Table 7, where Panel A is based on the book leverage ratio and Panel B is based on the market leverage ratio; the firm-fixed effect is considered to control for unobserved firm characteristics.

[Table 7 about here]

Column (1) in Panel A and Panel B shows the relationship between financial leverage and various firm characteristics identified in the literature. The coefficient estimates of size, tangibility, and industry median leverage ratio are positive and statistically significant at 1% level. These results indicate that larger firms, firms with more tangibility assets, and firms in industries with higher median leverage ratios are more inclined to use more debt financing, that is, to have higher leverage ratios. The coefficient estimates of market-to-book ratio (*M/B*) and profitability (*PRO*) are negative and statistically significant at 1% level, indicating that firms with more growth opportunities (as measured by higher market-to-book ratios) and higher profitability tend to use less debt financing, and hence have lower leverage ratio. These results are also consistent with the preliminary findings from the correlation matrix. Moreover, they are consistent with previous studies, as summarized in Frank and Goyal (2009). The sign of size, market-to-book ratio, tangibility, and industry median leverage ratio are consistent with the predictions of the trade-off theory, only the result of profitability is consistent with the pecking-order theory.

To consider the dynamic adjustment of capital structure as stated in Equation (3), I add the lagged leverage ratio as an additional explanatory variable in the analysis and report the results in Column (2) in Panels A and B. For the regression based on the book leverage ratio, the coefficient estimate of the lagged leverage ratio is positive (0.5955) and statistically significant at 1% level. This indicates an adjustment speed of 0.4045 (1-

0.5955). About the market leverage ratio, the coefficient estimate is 0.6049, also statistically significant at 1% level. The adjustment speed is 0.3951 (1-0.6049). Overall, the results indicate that when corporations deviate from their target capital structure, it takes them some time to adjust back to their target leverage ratio.

Adding lagged leverage ratio to the model has significant impacts on the explanatory power of other firm characteristics. In Panel A, I notice that significant levels of market-to-book ratio, profitability, and tangibility decrease to varying degrees when the lagged book leverage ratio is included in the regression model. The coefficient estimates of profitability even become insignificant when the lagged book leverage ratio (*LAGBLR*) is added (Panel A Column (1) vs. Panel A Column (2)), although these coefficient estimates keep the same signs. In Panel B, the market-to-book ratio becomes insignificant after adding the lag value of the market leverage ratio. The significant level of profitability is reduced. It's worth noting that the coefficients of industry median leverage ratio also become insignificant after adding lag market leverage ratio, but book leverage ratio did not have such a situation.

Overall, although the statistical significance of the coefficient estimates of firm factors decreases and some even become insignificant after lagged leverage ratio is added into the regression model, the positive or negative relationships between the leverage and firm factors stay the same. This confirms the findings of Flannery and Rangan (2006). Adding lag values does not change the effect of firm variables as they still hold the same sign as the previous results. More importantly, there is a large improvement in the goodness of fit of the regression model when the lagged leverage ratio is added, as shown clearly by the significant increase of R-squared values. In Panel A, the R-squared value increases from 0.065 (Column (1)) to 0.369 (Column (2)) when lagged leverage ratio is added to the regression based on the book leverage ratio. The R-squared value of Panel B also increases from 0.128 to 0.402 (Column (1)) to 0.369 (Column (2)). These indicate that lag leverage ratio is an essential variable for the capital structure adjustment model.

5.2.2 Results for Adjustment Speed in Good and Bad States

After the base regressions to analyze the relationship between various firm variables and leverage ratio as well as the speed of adjustment in the whole sample, I now examine whether the speed of adjustment would vary across years with good and bad macroeconomic conditions, defined by annual GDP growth rate and term spread, respectively.

Table 8 presents the results of Eq. (3) and Eq. (4) for years with good and bad macroeconomic conditions as defined by the GDP growth rate. As discussed in Section 4.2.4, good macroeconomic states are the years with the highest annual GDP growth, while bad macroeconomic years are estimated as the sample years with the lowest annual GDP growth rate and lowest term spread. In Table 8 Panel A, for the book leverage ratio, the coefficient estimate of the lagged book leverage ratio is 0.5190 in the good state, so the adjustment speed of capital structure as measured by book leverage ratio is 0.4810 (1-0.5190) in years with good macroeconomic conditions. The adjustment speed in the bad state is only 0.3849 (1-0.6151). The numbers in Panel B suggest that the adjustment speed of the market leverage ratio in the good state is 0.4471 (1-0.5529), which is also faster than in the bad state, 0.4162 (1-0.5838). The coefficient estimates of lagged leverage ratio are all significant at 1% level. Comparing those coefficient estimates of lagged leverage ratio from separate regressions for years with good and bad macroeconomic conditions, the preliminary conclusion can be drawn that firms adjust their capital structure to target leverage ratio faster in good macroeconomic conditions.

To test the difference in adjustment speeds more formally, I pool the subsamples of good and bad economic conditions and use Eq.(4), which includes a dummy variable for good years and its interaction with the lagged leverage ratio. The results are reported in the last column of each panel. In Panels A and B, the coefficient estimates of the interaction term of GoodDum and lagged leverage ratio are negative (-0.1102 for Panel A and -0.0791 for Panel B) and statistically significant (at 1% level for Panel A and 10% level for Panel B), which provide more evidence to support that firms adjust their capital structure more rapidly in good macroeconomic states. The empirical results are consistent with my expectations as discussed in the literature review. Another thing that should be noticed is that for regressions based on both book and market leverage ratio, the relationship of leverage ratios to market-to-book ratio and profitability changed under different macroeconomic conditions, and only the result of profitability for market leverage ratio in bad states is significant at 5% level. Most firm-level factors are not significant at 10% level. The coefficients of size, using bad macroeconomic condition subsamples and both good and bad macroeconomic condition subsamples, are significant at 1% level. The same significance level can be observed for tangibility when good macroeconomic condition subsamples and both good and bad macroeconomic condition subsamples are used. Overall, the explanatory power of firm- and industry-level factors falls, and this situation may be driven by fewer observations in the analysis. As mentioned before, only observations in ten years with good and bad macroeconomic conditions will be used, so, simply, 2,809 and 3,968 firms' data are available for book leverage ratio and 2,799 and 3,950 firms' data are available for market leverage ratio.

Table 9 shows the regression results of Eq. (3) and Eq. (4), while the macroeconomic conditions are estimated by term spread. Based on the discussion in Section 4.2.4, the highest term spread is the sign of good macroeconomic states, and the lowest term spread is recognized as bad macroeconomic conditions. Hence, the observations of ten years with the highest term spread and ten years with the lowest term spread are used for good macroeconomic conditions and bad macroeconomic states' regression. The first two columns of both panels present the results of Eq. (3). In Panel A, the adjustment speed of book leverage ratio in good macroeconomic years can be calculated as 0.4425 (1-0.5575), and the adjustment speed of book leverage ratio in bad macroeconomic states is 0.3718 (1-0.6282). Firms adjust their capital structure more rapidly in good macroeconomic conditions. Panel B states that the adjustment speed of good macroeconomic states is 0.4510 (1-0.5490) and the adjustment speed of bad conditions can be estimated as 0.3507 (1-0.6493). The results are all significant at 1% level, which suggests the difference in adjustment speed is substantial. Therefore, it is reasonable to draw the same conclusion with Table 8, which is that the adjustment speed is faster in good states than in bad states.

Again, the last column of each panel shows the results of Eq. (4) by using the samples of both ten years with the highest term spread and ten years with the lowest term spread. The results of the interaction term of the dummy variable for good years and lag leverage ratio confirm the conclusion drawn from Eq. (3). In Panel A, the estimated coefficient is -0.0664 and significant at 10% level. In Panel B, the coefficient is -0.0966 and significant at 1% level. The significant negative results indicate that firms adjust their capital structure to target ratio more rapidly in years with good macroeconomic conditions than in years with bad macroeconomic conditions, no matter which macroeconomic factor is used to assess macroeconomic conditions.

Comparing panels in Table 8, it is also interesting to note that when estimating macroeconomic conditions by the annual GDP growth rate, the difference of book leverage ratio adjustment speed between good and bad macroeconomic state years (0.0961) is more obvious than the market leverage ratio (0.0309). The significant level of interaction term of the dummy variable for good state and lag leverage ratio is also higher (comparing 1% level to 10% level). Contrary to that, when estimating macroeconomic conditions by term spread (Table 9), the difference of adjustment speed of market leverage ratio between good and bad macroeconomic state years (0.1003) is larger compared to the difference of book leverage ratio (0.0707). In the last column of Panel B (market leverage ratio), 1% significance level of the interaction term is more statistically significant than 10%

significance level in Panel A (book leverage ratio).

No matter which estimation method is used or which macroeconomic factor is considered, the empirical findings in Tables 8 and 9 support my hypothesis that firms tend to adjust their leverage ratio back to the target more quickly in good macroeconomic conditions than in bad macroeconomic conditions. Previous work reaches the same conclusion (Cook and Tang, 2010).

[Table 8 and Table 9 about here]

Although the results in Tables 8 and 9 show that the coefficient estimates of lagged leverage ratios are statistically significant, the results of many firm factors reduced or lost statistical significance. For example, In Table 8 Panel A, market-to-book ratio and profitability lose their explanatory power completely. Except for the coefficient estimations of size showing a strong significance level (1%) when using subsamples from bad macroeconomic years and both good and bad macroeconomic years, the other variables are only significant at 5% or 10% level. The same pattern can be observed in Panel B. Though the results of tangibility in bad macroeconomic conditions and both good and bad states are significant at 1%, the industry median leverage ratio is not significant at all. Table 9 Panel B shows that, except for size, all other variables are not significant. Compared to that, Panel A may show better results as market-to-book ratio and industry median leverage ratio become significant in bad macroeconomic conditions and both good and bad states, but the sharp drop in variables' explanatory power should be further considered. As shown in Section 5.2.1, including the lag leverage ratio can reduce the explanatory power of firm variables. For example, in Table 7, size always stays significant, but the significance of market-to-book ratio and profitability decreased to varying degrees after adding lag leverage ratio. This situation is similar in Tables 8 and 9. The significance of the industry median market leverage ratio decreased markedly in Table 7 Panel B. This situation can also be observed in panel B of Tables 8 and 9. To examine the impact of the lag leverage ratio and reveal the real explanatory power of firm factors, I exclude *LAGBLR* and *LAGMLR* from the regression and report the regression results in Tables 10 and 11.

Table 10 shows the results of the book leverage ratio and market leverage ratio when the annual GDP growth rate is the estimation factor of macroeconomic conditions. Clearly, except for the market-to-book ratio, all other firms- and industry-level variables are restored to statistically significant in Table 10 Panel A. The sign of the coefficient of market-to-book ratio shows a contrary relationship with expectation in bad macroeconomic conditions. The significant levels of other variables are high enough to be accepted (5% and 1% levels). When using the market leverage ratio to assess the leverage level (Panel B), almost all the variables become significant again. Though market-to-book ratio stays negatively correlated with leverage ratio under bad macroeconomic conditions, the result is insignificance. The significant levels of size and profitability when using subsamples from good macroeconomic conditions are relatively low (10% level). The coefficient estimation of industry median leverage ratio in bad macroeconomic conditions is significant at 5% level. But, overall, the results indicate that the relationship between firm-level factors and leverage ratio stays the same, and they hold a strong explanatory power after ignoring the lag leverage ratio.

Table 11 presents the result of the dynamic model when macroeconomic conditions are defined by term spread. For Panel A, market-to-book ratio even loses its significance when the macroeconomic condition is bad. In Table 9 Panel A, the results are significant at 5% level in bad macroeconomic conditions. Compared to that, they are no longer significant in Table 11 Panel A. However, the significance level of other firm factors substantially increased. The significance level of size and tangibility when using subsamples from good macroeconomic conditions are not high (5% level). The coefficient estimation of profitability in bad macroeconomic conditions is only significant at 10% level. In Panel B, the results become more perfect as only the coefficients of tangibility in good macroeconomic states are relatively low (10% significance level). The same sign of coefficient estimations of factors confirms the conclusion mentioned above, which is that leverage ratio is positively correlated with size, tangibility, and industry median leverage ratio, and negatively correlated with tangibility and profitability.

Compared to Tables 8 and 9, the decrease in the value of R squared suggests that the lag leverage value is an important explanatory factor for capital structure decisions, and the dynamic partial adjustment model provides a better explanation for capital structure than the traditional model that simply considers various firm factors. Therefore, it can be preliminarily concluded that the lag leverage ratio value reduces the explanation power of firm factors in Tables 8 and 9, just like the conclusion drawn in Section 5.2.1. Meanwhile, comparing the results for using subsamples from only good or bad macroeconomic conditions and both states, the increased significance level of firm factors in the last column also implies that small sample size may impact the results for dynamic models.

[Table 10 and Table 11 about here]

5.3 Robustness Checks

5.3.1 Industry Median Leverage Ratio

Using different industry estimations would affect the sample size in different categories, hence obtain different industry median leverage ratios. I use 12 Fama and French categories to separate observations and run the same regressions as mentioned in Section 5. The results are shown in Tables 12, 13, 14, 15, and 16.

First, I run the baseline regression for whole observations to find out the basic relationship between leverage ratio and firm-level variables but using industry median leverage ratio estimated by 12-industry categories. Similarly, the coefficient estimations of the firm- and industry-level variables are consistent with the expectation. The leverage ratio has a positive relationship with size, tangibility, and industry median leverage ratio, and has a negative relationship with the market-to-book ratio and profitability. Moreover, the reduction of significance level of firm factors after including lag leverage ratio once more confirms the work shown in Table 7, namely that adding lag leverage ratio reduces the explanatory power of firm variables, but the increase of R squared value suggests that goodness of fitness rises significantly. Finally, the coefficient of the lag book leverage ratio is 0.5959, which suggests the adjustment speed is 0.4041, and the adjustment speed of the market leverage ratio is 0.3948. These results are very close to the figures in Table 7. It seems that using the industry median leverage ratio based on alternative industry categories does not affect the result.

[Table 12 about here]

Then I examine the adjustment speed in good and bad macroeconomic conditions by using subsamples from assessed years with the highest GDP growth rate and lowest GDP growth rate, respectively. Table 13 Panel A shows that the adjustment speed of book leverage ratio in good conditions is 0.4814 (1-0.5186), which is faster than in bad states, 0.3889 (1-0.6111). For the market leverage ratio (Panel B), the adjustment speed of good conditions can be estimated as 0.4499 (1-0.5501), and for bad states is 0.4125 (1-0.5875). When macroeconomic conditions are assessed by term spread, the same pattern can be observed. In Table 14 Panel A, the coefficient of lag market leverage ratio suggests the adjustment speed is 0.4428 (1-0.5572) in good conditions and 0.3761 (1-0.6239) in bad conditions. Panel B shows that adjustment speed is faster in good states (0.4532) than in bad states (0.3474) when the leverage ratio is assessed by market equity value. All of them are significant at 1% level, so the differences between adjustment speed in good and bad macroeconomic states are significant. The results of adding the interaction term of the lag leverage ratio and good dummy variables when using subsamples from good and bad macroeconomic condition years confirm the conclusion. Since they are negative and significant (1% level in Table 13 Panel A, 10% level in Table 13 Panel B, 10% level in

Table 14 Panel A, and 1% level in Table 14 Panel B).

Observing firm-level variables in Table 13, it is clear that market-to-book ratio and profitability are not significant anymore. It is the same as Table 8. Even the most stable firm factor, size, loses its significance in good macroeconomic conditions. The significant level of tangibility changed when using different subsamples, but the industry median market leverage ratio becomes insignificant, as shown in Panel B.

Therefore, it is reasonable to reach the same conclusion with Section 5.2.2, which states that the adjustment speed of capital structure is faster in good macroeconomic states.

[Table 13 and Table 14 about here]

Finally, I exclude lag leverage ratio as previous work to ensure the real explanatory power of firm variables. Tables 15 and 16 present the results. It is surprising to note that the market-to-book ratio almost stays insignificant with the book leverage ratio no matter which kind of estimation method is used to assess the macroeconomic conditions. Except for that, other variables become significant to varying degrees. Compared to Tables 10 and 11, the significance levels of profitability and tangibility increase slightly. But, in general, the consistency of coefficient estimations of variables with Table 9 suggests the results are stable.

[Table 15 and Table 16 about here]

Overall, using industry median leverage ratio based on different industry categories does not affect the results, and the same conclusion holds, namely that firms adjust their leverage ratio more quickly in good macroeconomic conditions.

5.3.2 Division of Sampling Years

In the previous work, I divide the 40 years (1981–2020) into four groups, and each group contains ten years of data. But with the development of the capital market, the amount of listed company has become more and more since 1990. When I use annual GDP growth rate and term spread respectively to classify years with good and bad macroeconomic conditions, some years are around 1981 when there were about 100 firms listed in the market. Therefore, whether the division of sampling years affects observations in estimated good and bad macroeconomic states and affects the results should be considered.

Here, I divide the entire sample period (40 years) into five groups and each group contains eight years. According to Section 4.2.4, when using the annual GDP growth rate to assess the macroeconomic conditions, the eight years with the highest annual GDP growth rate are recognized as good macroeconomic condition years. Contrarily, the eight years with the lowest annual GDP growth rate are recognized as bad macroeconomic condition years. As for term spread, years with good macroeconomic conditions are the eight years with the highest term spread, and years with bad macroeconomic conditions are the eight years with the lowest term spread. The middle three groups are not used in my analysis. Table 17 shows which years are in good or bad macroeconomic conditions based on the estimation of annual GDP growth rate and term spread, respectively.

[Table 17 about here]

Tables 18 and 19 report the regression results of Eq. (3) and Eq. (4) for macroeconomic states estimated by annual GDP growth rate and term spread, respectively. Compared to Tables 8 and 9, the difference in adjustment speed between good and bad macroeconomic states may be bigger in some situations. For example, in Table 18 Panel A, the difference in adjustment speed between good and bad conditions (0.1871), is bigger than the difference in Table 8 Panel A (0.0961), and the difference of market leverage ratio increased from 0.0309 (Table 8 Panel B) to 0.0501 (Table 18 Panel B). These results confirm the conclusion given in the previous section, that the adjustment speed is faster in good macroeconomic conditions. But the interaction item of good dummy variable and lag leverage ratio is not statistically significant in Panel B of Tables 18 and 19.

The coefficient estimations of firm-level factors are sometimes not consistent with expectations in Table 18. Panel A shows that profitability has a positive relationship in bad macroeconomic conditions and when both good and bad macroeconomic condition years are included. Tangibility is negatively correlated with leverage ratio in bad macroeconomic conditions. In Panel B, profitability holds a positive relationship in good macroeconomic conditions, and the market-to-book ratio is positively correlated with leverage ratio when using subsamples from bad macroeconomic conditions and good and bad macroeconomic conditions. It is worth noting that the coefficient estimations of industry market leverage ratio stay negative no matter which subsample is used. In Table 19 Panel A, only profitability holds a positive relationship in bad macroeconomic conditions. For Panel B, the coefficient estimations of profitability and market-to-book ratio in good macroeconomic conditions have contrary signs with expectations. Profitability is slightly positively correlated with leverage ratio in bad macroeconomic conditions. This situation may be caused by the decrease in number of samples, and excluding the lag leverage ratio is necessary to observe whether the relationship between variables and leverage ratio is consistent.

In Table 20 Panel B, the results are acceptable as the sign that coefficients are consistent with expectations. Market-to-book ratio stays insignificant but with a negative sign in bad macroeconomic conditions. The coefficient of profitability is only significant at 10% level in good macroeconomic conditions. Compared to that, the market-to-book ratio did not perform well in Panel A as it shows a positive relationship with leverage ratio in bad macroeconomic conditions, and the results are insignificant. Table 21 presents the results when using term spread as the estimation of macroeconomic conditions. As in Table 20, when the market leverage ratio is employed, all factors become significant again, while in Panel A, the performance of the market-to-book ratio is not good as the coefficient is not significant or only significant at 10% level. Overall, comparing the results before and after excluding lag leverage ratio, the signs of each variable are consistent with the expectation, so the results are robust to different divisions of the sampling period.

[Table 18, Table 19, Table 20 and Table 21 about here]

CHAPTER 6. CONCLUSION

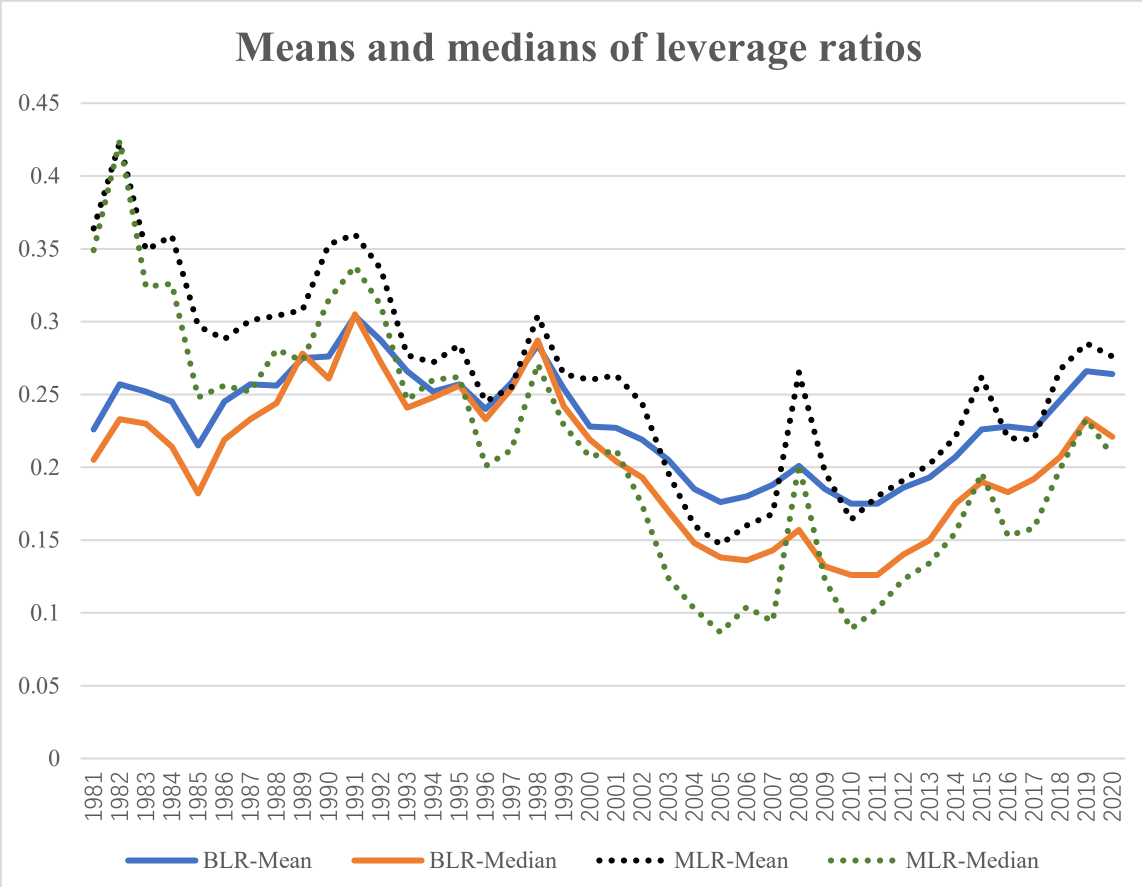
In this paper, I investigate the impact of macroeconomic conditions on firms' adjustment speed of capital structure. My sample consists of 17,898 observations based on book leverage ratio and 17,841 observations based on market leverage ratio from 1,795 firms listed on the Toronto Stock Exchange between 1981 and 2020. The 40 years are divided into four groups of ten years each, according to macroeconomic conditions measured by annual GDP growth rate and term spread, respectively. When assessing macroeconomic conditions by term spread, good macroeconomic condition years are ten years with the highest GDP growth rate. Contrarily, bad macroeconomic condition years are ten years with the lowest GDP growth rate. Similarly, when assessing macroeconomic conditions by term spread, good macroeconomic condition years are ten years with the highest term spread, and bad macroeconomic condition years are ten years with the lowest term spread. A dynamic partial adjustment model is formulated, and the adjustment speed is assessed separately by using subsamples from good and bad macroeconomic condition years. Then, using the pooled samples from good and bad macroeconomic condition years, the dummy variable of good macroeconomic conditions and the interaction term between it and lag leverage ratio is added to confirm the consequences. My empirical analysis shows that the adjustment speed of capital structure is faster in years with good macroeconomic conditions than in years with bad macroeconomic conditions. Moreover, the results are robust to the alternative measure of industry median leverage ratios as well as the alternative method to classify years into good and bad macroeconomic states.

Overall, my empirical result is consistent with the theoretical prediction of Hackbarth et al. (2006), and previous empirical research based on U.S. firms (Cook and Tang, 2010) and G7 countries (Drobetz et al., 2015).

Although this paper is the first to examine the relationship between macroeconomic conditions and capital structure adjustment speed in Canada over a long sample period, there are clear limitations. For example, further research needs to examine potential difference across firms with different levels of financial constraints, and across firms with different levels of deviation from the target.

With the findings, this paper is expected to enrich relevant studies and provide some references on the relationship between macroeconomic conditions and capital structure adjustment speed. It is also expected to offer some suggestions to managers on capital structure adjustment, such as focusing on operation when it is hard to make capital structure adjustment in bad macroeconomic conditions.

Figure 1. Means and medians of leverage ratios



Note: Figure 1 presents the changing trend of mean and median of both market leverage ratio and book leverage ratio between 1981 and 2020. Book leverage ratio (*BLR*) is calculated by total interest-bearing debt (WC03255)/total assets (WC02999). Market leverage ratio (*MLR*) is calculated by total interest-bearing debt (WC03255)/ (total interest-bearing debt (WC03255) + market value of equity (WC08001)). The blue solid line represents the mean value of the book leverage ratio and the orange solid line represents the median value of the book leverage ratio. The black broken line represents the mean of the market leverage ratio and the green broken line shows the median of the market leverage ratio.

Table 1. The distribution of good and bad economic states across years

Year	GDP	Term Spread
1981		
1982		
1983		
1984		
1985		
1986		
1987		
1988		
1989		
1990		
1991		
1992		
1993		
1994		
1995		
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2005		
2006		
2007		
2008		
2009		
2010		
2011		
2012		
2013		
2014		
2015		
2016		
2017		
2018		
2019		

Table 1 Continued

Year	GDP	Term Spread
2020		

Note: This table represents the good and bad macroeconomic condition years for the period 1981 to 2020. Macroeconomic conditions are assessed by annual GDP growth rate and term spread, respectively. Column GDP is assessed by annual GDP growth rate and Column Term spread is estimated by term spread. I divided sampling periods (40 years) into 4 groups. When using the annual GDP growth rate as the estimation method, good macroeconomic states are 10 years with the highest annual GDP growth rate, and bad macroeconomic states are 10 years with the lowest annual GDP growth rate. When using term spread to assess macroeconomic states, years with good macroeconomic conditions are 10 years with the highest term spread, and years with bad macroeconomic conditions are 10 years with the lowest term spread. Years with good macroeconomic conditions are in orange, while the years with the worst macroeconomic conditions are in blue.

Table 2. Variable definitions

Variable name	Variable description	Variable structure
Dependent variables		
BLR	Book leverage ratio	Total interest-bearing debt (WC03255)/Total assets (WC02999)
MLR	Market leverage ratio	Total interest-bearing debt (WC03255)/(Total interest-bearing debt (WC03255) + Market value of equity (WC08001))
Independent variables		
LAGBLR	Lag book leverage ratio	Lag book leverage ratio for one year
LAGMLR	Lag market leverage ratio	Lag market leverage ratio for one year
SIZE	Total asset	Ln (Total assets) (WC02999)
MB	Market value of equity to book value of equity	Market value of equity (WC08001)/Book value of equity (WC03501)
PRO	Profitability	Earnings before interest and taxes (WC18191)/Total assets (WC02999)
TANG	Tangibility	Net property, plant, and equipment (WC02501)/Total book assets (WC02999)
IMBLR	Industry median book leverage ratio	Use Fama and French 30 industries category to identify each industry's median book leverage ratio for each year.
IMMLR	Industry median market leverage ratio	Use Fama and French 30 industries category to identify each industry's median market leverage ratio for each year
Macroeconomic conditions		
GPD growth rate	The growth rate of GDP	Download from C.D. Howe Institute. https://www.cdhowe.org/council/business-cycle-council
Term spread	The difference between the over 10 years government marketable bond average yield and the three-month Treasury-bill rate.	Download from Statistics Canada. Table 10-10-0122-01. Financial market statistics, last Wednesday unless otherwise stated, Bank of Canada. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1010012201

Table 3. Annual means and medians of leverage ratios

	Book Leverage Ratio			Market leverage Ratio		
	Mean	Median	Obs	Mean	Median	Obs
1981	0.226	0.205	116	0.364	0.349	116
1982	0.257	0.233	121	0.423	0.424	120
1983	0.252	0.230	128	0.349	0.324	127
1984	0.245	0.214	138	0.359	0.326	138
1985	0.215	0.182	173	0.297	0.248	173
1986	0.245	0.219	184	0.288	0.256	183
1987	0.257	0.233	206	0.301	0.252	206
1988	0.256	0.244	235	0.304	0.281	235
1989	0.275	0.278	244	0.308	0.273	243
1990	0.276	0.261	270	0.353	0.315	270
1991	0.304	0.305	292	0.360	0.338	292
1992	0.287	0.272	304	0.336	0.311	304
1993	0.266	0.241	300	0.277	0.246	300
1994	0.252	0.248	308	0.272	0.260	308
1995	0.257	0.256	302	0.284	0.262	302
1996	0.240	0.233	338	0.245	0.201	338
1997	0.258	0.254	341	0.255	0.212	341
1998	0.284	0.287	349	0.304	0.271	348
1999	0.254	0.242	470	0.264	0.229	469
2000	0.228	0.219	535	0.260	0.207	530
2001	0.227	0.204	571	0.263	0.212	571
2002	0.219	0.193	613	0.244	0.174	612
2003	0.205	0.170	659	0.196	0.124	655
2004	0.185	0.148	684	0.160	0.103	684

Table 3 Continued

	Book Leverage Ratio			Market leverage Ratio		
	Mean	**Median**	**Obs**	**Mean**	**Median**	**Obs**
2005	0.176	0.138	744	0.147	0.0866	741
2006	0.180	0.136	788	0.160	0.104	788
2007	0.188	0.143	760	0.168	0.0941	756
2008	0.201	0.157	749	0.265	0.202	745
2009	0.185	0.132	690	0.197	0.123	687
2010	0.175	0.126	666	0.164	0.0891	663
2011	0.175	0.126	686	0.180	0.103	683
2012	0.186	0.140	667	0.191	0.123	662
2013	0.193	0.150	624	0.202	0.134	622
2014	0.207	0.175	569	0.221	0.155	569
2015	0.226	0.190	554	0.262	0.196	550
2016	0.228	0.183	518	0.220	0.153	516
2017	0.226	0.192	501	0.219	0.158	499
2018	0.246	0.207	490	0.267	0.199	488
2019	0.266	0.233	486	0.285	0.233	483
2020	0.264	0.221	482	0.276	0.208	481
Total	0.220	0.191	17,898	0.236	0.174	17,841

Note: This table shows the mean, median, and observations of the book leverage ratio and market leverage ratio. Book leverage ratio (BLR) is calculated by total interest-bearing debt (WC03255)/total assets (WC02999). Market leverage ratio (MLR) is calculated by total interest-bearing debt (WC03255)/ (total interest-bearing debt (WC03255) + market value of equity (WC08001)).

Table 4. Summary statistics for firm-level variables

	Obs	Mean	Median	Std. Dev.	P25%	P75%
BLR	17,898	0.220	0.191	0.212	0.0276	0.337
MLR	17,841	0.236	0.174	0.238	0.0184	0.377
SIZE	17,951	12.49	12.46	1.975	11.15	13.81
MB	17,840	1.622	1.053	1.960	0.725	1.684
PRO	17,677	-0.0371	0.0454	0.337	-0.0511	0.102
TANG	17,913	0.459	0.443	0.298	0.190	0.719
IMBLR	17,951	0.185	0.193	0.120	0.0878	0.260
IMMLR	17,951	0.189	0.179	0.149	0.0629	0.293

Note: This table shows the summary statistics for firm-level variables. Book leverage ratio (BLR) is calculated by total interest-bearing debt (WC03255)/total assets (WC02999). Market leverage ratio (MLR) is calculated by total interest-bearing debt (WC03255)/(total interest-bearing debt (WC03255) + market value of equity (WC08001)). Size (SIZE) is calculated by ln (total assets) (WC02999). Market value of equity to book value of equity (MB) is employed by the market value of equity (WC08001)/book value of equity (WC03501). Profitability (PRO) is estimated by (WC18191)/total assets (WC02999). Tangibility (TANG) is calculated by the net property, plant, and equipment (WC02501)/total book assets (WC02999). Industry median book leverage ratio (IMBLR) is estimated by Fama and French 30 industries category to identify each industry's median book leverage ratio for each year. Industry median market leverage ratio (IMMLR) is assessed by Fama and French 30 industries category to identify each industry's median market leverage ratio for each year.

Table 5. Correlation matrix and variance inflation factors between factors

Panel A Correlation matrix

Variables	BLR	MLR	LAGBLR	LAGMLR	SIZE	MB	PRO	TANG	IMBLR	IMMLR
BLR	1.000									
MLR	0.778***	1.000								
LAGBLR	0.817***	0.662***	1.000							
LAGMLR	0.670***	0.840***	0.778***	1.000						
SIZE	0.219***	0.303***	0.216***	0.283***	1.000					
MB	-0.089***	-0.334***	-0.080***	-0.292***	-0.349***	1.000				
PRO	-0.042***	0.058***	0.055***	0.117***	0.420***	-0.411***	1.000			
TANG	0.080***	0.125***	0.063***	0.099***	0.210***	-0.172***	0.099***	1.000		
IMBLR	0.406***	0.430***	0.385***	0.411***	0.313***	-0.213***	0.193***	-0.006	1.000	
IMMLR	0.353***	0.494***	0.334***	0.453***	0.312***	-0.278***	0.195***	0.044***	0.866***	1.000

Panel B Variance inflation factors between factors for book leverage ratio

	VIF	1/VIF
SIZE	1.397	.716
PRO	1.343	.744
IMBLR	1.288	.776
MB	1.286	.778
LAGBLR	1.192	.839
TANG	1.069	.936
Mean VIF	1.262	.

Panel C Variance inflation factors between factors for market leverage ratio

	VIF	1/VIF
SIZE	1.386	.722
MB	1.353	.739
PRO	1.347	.743
IMMLR	1.34	.746
LAGMLR	1.33	.752
TANG	1.061	.942
Mean VIF	1.303	.

Note: This table presents the correlation matrix and VIF analysis. Book leverage ratio (BLR) is calculated by total interest-bearing debt (WC03255)/total assets (WC02999). Market leverage ratio (MLR) is calculated by total interest-bearing debt (WC03255)/ (total interest-bearing debt (WC03255) + market value of equity

(WC08001)). Size (SIZE) is calculated by ln (Total assets) (WC02999). Market value of equity to book value of equity (MB) is employed by the market value of equity (WC08001)/Book value of equity (WC03501). Profitability (PRO) is estimated by (WC18191)/Total assets (WC02999). Tangibility (TANG) is calculated by net property, plant, and equipment (WC02501)/Total book assets (WC02999). Industry median book leverage ratio (IMBLR) is estimated by Fama and French 30 industries category to identify each industry's median book leverage ratio for each year. Industry median market leverage ratio (IMMLR) is assessed by Fama and French 30 industries category to identify each industry's median market leverage ratio for each year. The coefficients with $*$, $**$, and $***$ indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6. Summary statistics of leverage in different macroeconomic states

	BLR		MLR	
	Mean	**Median**	**Mean**	**Median**
Panel A Macroeconomic states assessed by GDP growth rate				
Good state	0.235	0.218	0.259	0.214
Bad state	0.228	0.198	0.266	0.208
Good vs Bad	0.007	0.02	-0.007	0.006
p-value	0.123	0.002	0.195	0.525
Panel B Macroeconomic states assessed by term spread				
Good state	0.206	0.177	0.204	0.139
Bad state	0.232	0.204	0.273	0.222
Good vs Bad	-0.026	-0.027	-0.069	-0.083
p-value	0.000	0.000	0.000	0.000

Note: This table presents the summary statistics of leverage in different macroeconomic states. Macroeconomic conditions are assessed by annual GDP growth rate and term spread respectively. I divided sampling periods (40 years) into 4 groups. When using the annual GDP growth rate as the estimation method, good macroeconomic states are 10 years with the highest annual GDP growth rate, and bad macroeconomic states are 10 years with the lowest annual GDP growth rate. When using term spread to assess macroeconomic states, years with good macroeconomic conditions are 10 years with the highest term spread, and years with bad macroeconomic conditions are 10 years with the lowest term spread. The mean, median value for good state subsamples, bad state subsamples, and the difference between them are stated. I also report the p-value for each difference.

Table 7. Regression results for firm variables and leverage ratio

Panel A. Book leverage ratio			**Panel B. Market leverage ratio**		
	BLR			MLR	
	(1)	(2)		(1)	(2)
LAGBLR		0.5955***	LAGMLR		0.6049***
		[0.000]			[0.000]
SIZE	0.0186***	0.0102***	SIZE	0.0341***	0.0206***
	[0.000]	[0.000]		[0.000]	[0.000]
MB	-0.0038***	-0.0024**	MB	-0.0123***	-0.0007
	[0.001]	[0.012]		[0.000]	[0.396]
PRO	-0.0796***	-0.0102	PRO	-0.0932***	-0.0143**
	[0.000]	[0.100]		[0.000]	[0.032]
TANG	0.0927***	0.0159*	TANG	0.1149***	0.0280***
	[0.000]	[0.088]		[0.000]	[0.005]
IMBLR	0.3976***	0.0829***	IMMLR	0.4135***	0.0590
	[0.000]	[0.000]		[0.000]	[0.147]
Constant	-0.1191***	-0.0517***	Constant	-0.2987***	-0.1807***
	[0.000]	[0.007]		[0.000]	[0.000]
Observations	15,805	15,805	Observations	15,752	15,752
R-squared	0.065	0.369	R-squared	0.128	0.402

Note: In this table, Panel A shows the results of the book leverage ratio and Panel B shows the results of the market leverage ratio. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Column (1) presents the primary relationship between firm factors and leverage ratio for whole observations, and column (2) presents the regression result of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ for whole observations. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 8. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by GDP growth rate

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
LAGBLR	0.5190***	0.6151***	0.6142***	LAGMLR	0.5529***	0.5838***	0.6203***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]
SIZE	0.0096	0.0090***	0.0096***	SIZE	0.0132	0.0201***	0.0174***
	[0.260]	[0.002]	[0.000]		[0.304]	[0.002]	[0.000]
MB	0.0008	-0.0010	-0.0010	MB	-0.0028	0.0028	0.0006
	[0.790]	[0.592]	[0.398]		[0.295]	[0.320]	[0.720]
PRO	0.0047	-0.0109	-0.0065	PRO	0.0360	-0.0290**	-0.0100
	[0.880]	[0.621]	[0.703]		[0.128]	[0.023]	[0.369]
TANG	0.0355*	0.0067	0.0328**	TANG	0.0666***	0.0393**	0.0576***
	[0.090]	[0.753]	[0.014]		[0.000]	[0.038]	[0.000]
IMBLR	0.0289*	0.0618*	0.0550*	IMMLR	-0.0019	-0.0522	-0.0209
	[0.083]	[0.063]	[0.062]		[0.965]	[0.631]	[0.703]
GoodDum			0.0126	GoodDum			-0.0110
			[0.251]				[0.556]
GoodDum*LAGBLR			-0.1102***	GoodDum*LAGMLR			-0.0791*
			[0.002]				[0.055]
Constant	-0.0292	-0.0311	-0.0447**	Constant	-0.0757	-0.1392	-0.1184*
	[0.759]	[0.250]	[0.045]		[0.600]	[0.130]	[0.079]
Observations	2,809	3,968	6,777	Observations	2,799	3,950	6,749
R-squared	0.314	0.382	0.360	R-squared	0.334	0.329	0.366

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by annual GDP growth rate are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used

(Peterson, 2009). Good macroeconomic states are 10 years with the highest annual GDP growth rate and bad macroeconomic states are 10 years with the lowest GDP growth rate. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and is 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. Panel A shows the results of the book leverage ratio and Panel B shows the results of the market leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared value for each regression.

Table 9. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by term spread

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
LAGBLR	0.5575***	0.6282***	0.6530***	LAGMLR	0.5490***	0.6493***	0.6628***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]
SIZE	0.0053**	0.0085***	0.0085***	SIZE	0.0101**	0.0197**	0.0175***
	[0.016]	[0.008]	[0.001]		[0.021]	[0.011]	[0.000]
MB	-0.0007	-0.0050**	-0.0024**	MB	0.0009	-0.0032	-0.0013
	[0.564]	[0.047]	[0.014]		[0.618]	[0.156]	[0.243]
PRO	0.0019	0.0098	-0.0105	PRO	-0.0040	-0.0053	-0.0136*
	[0.871]	[0.653]	[0.358]		[0.652]	[0.705]	[0.072]
TANG	0.0018	0.0080	0.0130	TANG	-0.0134	0.0491	0.0135
	[0.900]	[0.683]	[0.146]		[0.434]	[0.142]	[0.372]
IMBLR	0.0551	0.0738	0.0694**	IMMLR	0.0875	-0.0114	0.0435
	[0.182]	[0.284]	[0.017]		[0.108]	[0.924]	[0.502]
GoodDum			-0.0016	GoodDum			-0.0225
			[0.803]				[0.207]
GoodDum*LAGBLR			-0.0664*	GoodDum*LAGMLR			-0.0966***
			[0.063]				[0.009]
Constant	0.0197	-0.0186	-0.0300	Constant	-0.0409	-0.1408*	-0.1149**
	[0.504]	[0.495]	[0.258]		[0.404]	[0.098]	[0.013]
Observations	4,340	3,167	7,507	Observations	4,326	3,156	7,482
R-squared	0.318	0.373	0.382	R-squared	0.334	0.391	0.408

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by term spread are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 10 years with the highest term spread and bad macroeconomic states are 10 years with the lowest term spread. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. Panel A shows the results of the book leverage ratio and Panel B shows the results of the market leverage ratio. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared value for each regression.

Table 10. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by GDP growth rate without lag leverage ratio

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
		BLR				MLR	
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
SIZE	0.0239**	0.0144***	0.0193***	SIZE	0.0317*	0.0310***	0.0350***
	[0.029]	[0.001]	[0.000]		[0.056]	[0.000]	[0.000]
MB	-0.0021	0.0023	-0.0001	MB	-0.0189***	-0.0065	-0.0104***
	[0.561]	[0.314]	[0.928]		[0.001]	[0.144]	[0.002]
PRO	-0.0733**	-0.0759***	-0.0812***	PRO	-0.0651*	-0.1001***	-0.0994***
	[0.047]	[0.001]	[0.000]		[0.096]	[0.000]	[0.000]
TANG	0.0739***	0.1036***	0.1004***	TANG	0.1483***	0.1375***	0.1436***
	[0.002]	[0.001]	[0.000]		[0.000]	[0.000]	[0.000]
IMBLR	0.3252***	0.4335***	0.3778***	IMMLR	0.3108***	0.3334**	0.3609***
	[0.000]	[0.000]	[0.000]		[0.001]	[0.047]	[0.000]
Constant	-0.1637	-0.0830**	-0.1304***	Constant	-0.2499	-0.2439**	-0.3037***
	[0.158]	[0.029]	[0.000]		[0.179]	[0.020]	[0.000]
Observations	2,809	3,968	6,777	Observations	2,799	3,950	6,749
R-squared	0.066	0.070	0.068	R-squared	0.103	0.089	0.107

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by annual GDP growth rate are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 10 years with the highest annual GDP growth rate and bad macroeconomic states are 10 years with the lowest GDP growth rate. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. Panel A shows the results of the book leverage ratio and Panel B shows the results of the market leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared value for each regression.

Table 11. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by term spread without lag leverage ratio

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
SIZE	0.0115**	0.0175***	0.0168***	SIZE	0.0193***	0.0335***	0.0309***
	[0.014]	[0.002]	[0.000]		[0.005]	[0.001]	[0.000]
MB	-0.0024	-0.0038	-0.0034**	MB	-0.0092***	-0.0154***	-0.0116***
	[0.202]	[0.158]	[0.034]		[0.005]	[0.000]	[0.000]
PRO	-0.0577***	-0.0691*	-0.0845***	PRO	-0.0715***	-0.1046***	-0.0910***
	[0.004]	[0.057]	[0.000]		[0.001]	[0.002]	[0.000]
TANG	0.0577**	0.1164***	0.0872***	TANG	0.0479*	0.1702***	0.0904***
	[0.047]	[0.000]	[0.000]		[0.085]	[0.002]	[0.001]
IMBLR	0.2788***	0.4026***	0.3849***	IMMLR	0.3675***	0.3892***	0.4636***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.008]	[0.000]
Constant	-0.0023	-0.1058*	-0.0908**	Constant	-0.0972	-0.2738**	-0.2533***
	[0.970]	[0.068]	[0.015]		[0.214]	[0.016]	[0.000]
Observations	4,340	3,167	7,507	Observations	4,326	3,156	7,482
R-squared	0.030	0.078	0.061	R-squared	0.068	0.139	0.122

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by term spread are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 10 years with the highest term spread and bad macroeconomic states are 10 years with the lowest term spread. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. Panel A shows the results of the book leverage ratio and Panel B shows the results of the market leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared value for each regression.

Table 12. Regression results for firm variables and leverage ratio using 12-industry median leverage ratio

Panel A. Book leverage ratio

	BLR	
	(1)	(2)
LAGBLR		0.5959***
		[0.000]
SIZE	0.0209***	0.0108***
	[0.000]	[0.000]
MB	-0.0032***	-0.0022**
	[0.004]	[0.021]
PRO	-0.0819***	-0.0102*
	[0.000]	[0.096]
TANG	0.0904***	0.0146
	[0.000]	[0.117]
IMBLR_12	0.4060***	0.1183***
	[0.000]	[0.000]
Constant	-0.1471***	-0.0644***
	[0.000]	[0.001]
Observations	15,805	15,805
R-squared	0.059	0.369

Panel B. Market leverage ratio

	MLR	
	(1)	(2)
LAGMLR		0.6052***
		[0.000]
SIZE	0.0371***	0.0211***
	[0.000]	[0.000]
MB	-0.0117***	-0.0005
	[0.000]	[0.548]
PRO	-0.0969***	-0.0145**
	[0.000]	[0.031]
TANG	0.1105***	0.0267***
	[0.000]	[0.008]
IMMLR_12	0.4530***	0.0793
	[0.000]	[0.219]
Constant	-0.3376***	-0.1903***
	[0.000]	[0.000]
Observations	15,752	15,752
R-squared	0.121	0.402

Note: In this table, Panel A contains the results of the book leverage ratio and Panel B the results of the market leverage ratio. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Column (1) presents the primary relationship between firm factors and leverage ratio for whole observations, and column (2) presents the regression result of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ for whole observations. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 13. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by GDP growth rate using 12-industry median leverage ratio

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
LAGBLR	0.5186***	0.6111***	0.6113***	LAGMLR	0.5501***	0.5875***	0.6187***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]
SIZE	0.0100	0.0088***	0.0099***	SIZE	0.0138	0.0198***	0.0173***
	[0.216]	[0.003]	[0.000]		[0.216]	[0.002]	[0.000]
MB	0.0009	-0.0009	-0.0008	MB	-0.0027	0.0026	0.0006
	[0.765]	[0.632]	[0.470]		[0.386]	[0.335]	[0.718]
PRO	0.0045	-0.0102	-0.0064	PRO	0.0356	-0.0294**	-0.0100
	[0.886]	[0.643]	[0.704]		[0.137]	[0.022]	[0.372]
TANG	0.0359*	0.0039	0.0314**	TANG	0.0663***	0.0417**	0.0578***
	[0.085]	[0.851]	[0.018]		[0.000]	[0.019]	[0.000]
IMBLR_12	0.0546	0.1236**	0.1053**	IMMLR_12	0.0153	-0.0897	-0.0179
	[0.183]	[0.019]	[0.021]		[0.862]	[0.549]	[0.842]
GoodDum			0.0122	GoodDum			-0.0108
			[0.251]				[0.561]
GoodDum*LAGBLR			-0.1086***	GoodDum*LAGMLR			-0.0793*
			[0.002]				[0.051]
Constant	-0.0400	-0.0368	-0.0576**	Constant	-0.0863	-0.1299	-0.1182
	[0.653]	[0.201]	[0.021]		[0.466]	[0.180]	[0.114]
Observations	2,809	3,968	6,777	Observations	2,799	3,950	6,749
R-squared	0.315	0.383	0.361	R-squared	0.335	0.329	0.366

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon}_{i,t}$ under good and bad macroeconomic conditions estimated by annual GDP growth rate are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 10 years with the highest annual GDP growth rate and bad macroeconomic states are 10 years with the lowest GDP growth rate. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 14. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by term spread using 12-industry median leverage ratio

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
LAGBLR	0.5572***	0.6239***	0.6511***	LAGMLR	0.5468***	0.6526***	0.6651***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]
SIZE	0.0073***	0.0091***	0.0094***	SIZE	0.0131**	0.0194***	0.0179***
	[0.004]	[0.006]	[0.000]		[0.012]	[0.007]	[0.000]
MB	-0.0003	-0.0045*	-0.0021**	MB	0.0017	-0.0034	-0.0012
	[0.809]	[0.079]	[0.024]		[0.337]	[0.201]	[0.304]
PRO	0.0017	0.0108	-0.0105	PRO	-0.0052	-0.0056	-0.0137*
	[0.886]	[0.620]	[0.361]		[0.565]	[0.700]	[0.070]
TANG	0.0024	0.0041	0.0121	TANG	-0.0136	0.0502	0.0130
	[0.871]	[0.820]	[0.166]		[0.435]	[0.111]	[0.386]
IMBLR_12	0.1365	0.1318*	0.1176***	IMMLR_12	0.1941*	-0.0316	0.0441
	[0.157]	[0.071]	[0.006]		[0.089]	[0.838]	[0.679]
GoodDum			-0.0010	GoodDum			-0.0222
			[0.893]				[0.237]
GoodDum*LAGBLR			-0.0635*	GoodDum*LAGMLR			-0.0963***
			[0.078]				[0.010]
Constant	-0.0186	-0.0350	-0.0492*	Constant	-0.0938	-0.1333	-0.1190**
	[0.595]	[0.282]	[0.073]		[0.156]	[0.134]	[0.014]
Observations	4,340	3,167	7,507	Observations	4,326	3,156	7,482
R-squared	0.319	0.375	0.382	R-squared	0.337	0.391	0.408

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by term spread are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 10 years with the highest term spread and bad macroeconomic states are 10 years with the lowest term spread. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 15. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by GDP growth rate without lag leverage value using 12-industry median leverage ratio

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
SIZE	0.0268***	0.0155***	0.0214***	SIZE	0.0370**	0.0321***	0.0380***
	[0.010]	[0.000]	[0.000]		[0.013]	[0.000]	[0.000]
MB	-0.0016	0.0029	0.0005	MB	-0.0176***	-0.0065	-0.0100***
	[0.678]	[0.213]	[0.672]		[0.002]	[0.154]	[0.003]
PRO	-0.0800**	-0.0767***	-0.0831***	PRO	-0.0762*	-0.1011***	-0.1029***
	[0.032]	[0.000]	[0.000]		[0.063]	[0.000]	[0.000]
TANG	0.0853***	0.0966***	0.0998***	TANG	0.1548***	0.1318***	0.1406***
	[0.000]	[0.001]	[0.000]		[0.000]	[0.000]	[0.000]
IMBLR_12	0.3336***	0.4698***	0.4147***	IMMLR_12	0.3458**	0.3334*	0.3852***
	[0.001]	[0.000]	[0.000]		[0.010]	[0.099]	[0.004]
Constant	-0.2077*	-0.0975**	-0.1616***	Constant	-0.3282**	-0.2500**	-0.3416***
	[0.055]	[0.015]	[0.000]		[0.043]	[0.024]	[0.000]
Observations	2,809	3,968	6,777	Observations	2,799	3,950	6,749
R-squared	0.056	0.069	0.065	R-squared	0.094	0.081	0.099

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by annual GDP growth rate are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 10 years with the highest annual GDP growth rate and bad macroeconomic states are 10 years with the lowest GDP growth rate. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 16. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by term spread without lag leverage ratio using 12-industry median leverage ratio

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
SIZE	0.0150***	0.0211***	0.0201***	SIZE	0.0254***	0.0373***	0.0355***
	[0.007]	[0.001]	[0.000]		[0.004]	[0.000]	[0.000]
MB	-0.0017	-0.0028	-0.0027*	MB	-0.0080***	-0.0150***	-0.0109***
	[0.380]	[0.305]	[0.085]		[0.008]	[0.001]	[0.000]
PRO	-0.0596***	-0.0705**	-0.0872***	PRO	-0.0763***	-0.1064***	-0.0953***
	[0.004]	[0.049]	[0.000]		[0.001]	[0.002]	[0.000]
TANG	0.0618**	0.1049***	0.0870***	TANG	0.0501*	0.1589***	0.0870***
	[0.034]	[0.000]	[0.000]		[0.086]	[0.001]	[0.000]
IMBLR_12	0.3057**	0.4213***	0.4133***	IMMLR_12	0.4679***	0.3943**	0.5327***
	[0.011]	[0.000]	[0.000]		[0.001]	[0.025]	[0.000]
Constant	-0.0498	-0.1495**	-0.1357***	Constant	-0.1840*	-0.3133**	-0.3147***
	[0.480]	[0.020]	[0.001]		[0.084]	[0.014]	[0.000]
Observations	4,340	3,167	7,507	Observations	4,326	3,156	7,482
R-squared	0.026	0.078	0.057	R-squared	0.065	0.128	0.115

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by term spread are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 10 years with the highest term spread and bad macroeconomic states are 10 years with the lowest term spread. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 17. The distribution of good and bad economic states across years for 5 groups

Year	GDP	Term Spread
1981		
1982		
1983		
1984		
1985		
1986		
1987		
1988		
1989		
1990		
1991		
1992		
1993		
1994		
1995		
1996		
1997		
1998		
1999		
2000		
2001		
2002		
2003		
2004		
2005		
2006		
2007		
2008		
2009		
2010		
2011		
2012		
2013		
2014		
2015		
2016		
2017		
2018		
2019		

Table 17 Continued

Year	GDP	Term Spread
2020		

Note: This table represents the good and bad macroeconomic condition years for the period 1981 to 2020. Macroeconomic conditions are assessed by annual GDP growth rate and term spread. Column GDP is assessed by annual GDP growth rate and Column Term spread is estimated by term spread. I divided sampling periods (40 years) into 5 groups. When using the annual GDP growth rate as the estimation method, good macroeconomic states are 8 years with the highest annual GDP growth rate, and bad macroeconomic states are 8 years with the lowest annual GDP growth rate. When using term spread to assess macroeconomic states, years with good macroeconomic conditions are 8 years with the highest term spread, and years with bad macroeconomic conditions are 8 years with the lowest term spread. Years with good macroeconomic conditions are in orange, while years with the worst macroeconomic conditions are in blue.

Table 18. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by GDP growth rate for 5 groups

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
LAGBLR	0.4586***	0.6457***	0.6521***	LAGMLR	0.5141***	0.5642***	0.6092***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.002]	[0.000]
SIZE	0.0206***	0.0070**	0.0097***	SIZE	0.0318***	0.0198***	0.0182***
	[0.002]	[0.013]	[0.000]		[0.000]	[0.010]	[0.000]
MB	-0.0011	-0.0012	-0.0016	MB	-0.0033	0.0033	0.0013
	[0.722]	[0.613]	[0.342]		[0.287]	[0.396]	[0.615]
PRO	-0.0156	0.0115	0.0071	PRO	0.0236	-0.0242	-0.0127
	[0.641]	[0.621]	[0.742]		[0.429]	[0.151]	[0.435]
TANG	0.0269	-0.0242	0.0147	TANG	0.0645***	0.0133	0.0492***
	[0.150]	[0.212]	[0.325]		[0.002]	[0.317]	[0.001]
IMBLR	0.0333	0.0714*	0.0319	IMMLR	-0.0201	-0.1074	-0.0736
	[0.349]	[0.094]	[0.180]		[0.628]	[0.367]	[0.193]
GoodDum			0.0152	GoodDum			-0.0153
			[0.166]				[0.554]
GoodDum*LAGBLR			-0.1168**	GoodDum*LAGMLR			-0.0364
			[0.010]				[0.630]
Constant	-0.1468**	0.0038	-0.0400	Constant	-0.2887***	-0.1015	-0.1075
	[0.018]	[0.767]	[0.171]		[0.002]	[0.322]	[0.151]
Observations	1,876	3,067	4,943	Observations	1,870	3,054	4,924
R-squared	0.296	0.404	0.391	R-squared	0.333	0.296	0.354

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by annual GDP growth rate are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used

(Peterson, 2009). Good macroeconomic states are 8 years with the highest annual GDP growth rate and bad macroeconomic states are 8 years with the lowest GDP growth rate. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 19. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by term spread for 5 groups

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
LAGBLR	0.5789***	0.6196***	0.6592***	LAGMLR	0.5536***	0.6741***	0.6848***
	[0.000]	[0.001]	[0.000]		[0.000]	[0.000]	[0.000]
SIZE	0.0054***	0.0069***	0.0081***	SIZE	0.0114**	0.0153**	0.0159***
	[0.006]	[0.009]	[0.004]		[0.024]	[0.026]	[0.001]
MB	-0.0001	-0.0047*	-0.0023**	MB	0.0006	-0.0025	-0.0016
	[0.944]	[0.072]	[0.026]		[0.778]	[0.280]	[0.167]
PRO	-0.0094	0.0244	-0.0111	PRO	-0.0128**	0.0140	-0.0091
	[0.210]	[0.181]	[0.346]		[0.013]	[0.287]	[0.211]
TANG	0.0084	0.0046	0.0184*	TANG	-0.0117	0.0382	0.0143
	[0.553]	[0.831]	[0.073]		[0.556]	[0.263]	[0.393]
IMBLR	0.0162	0.0837	0.0561*	IMMLR	0.0602	0.0242	0.0536
	[0.663]	[0.263]	[0.072]		[0.361]	[0.873]	[0.461]
GoodDum			0.0002	GoodDum			-0.0195
			[0.980]				[0.304]
GoodDum*LAGBLR			-0.0712*	GoodDum*LAGMLR			-0.1212***
			[0.071]				[0.003]
Constant	0.0195	0.0040	-0.0254	Constant	-0.0507	-0.0910	-0.0968**
	[0.366]	[0.820]	[0.364]		[0.357]	[0.254]	[0.034]
Observations	3,613	2,871	6,484	Observations	3,599	2,861	6,460
R-squared	0.341	0.355	0.386	R-squared	0.338	0.401	0.420

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon}_{i,t}$ under good and bad macroeconomic conditions estimated by term spread are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 8 years with the highest term spread and bad macroeconomic states are 8 years with the lowest term spread. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and is 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 20. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by GDP growth rate without lag leverage value for 5 groups

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
	BLR				MLR		
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
SIZE	0.0364***	0.0136**	0.0207***	SIZE	0.0535***	0.0310***	0.0371***
	[0.002]	[0.012]	[0.000]		[0.000]	[0.001]	[0.000]
MB	-0.0067	0.0002	-0.0017	MB	-0.0198***	-0.0064	-0.0118***
	[0.128]	[0.938]	[0.404]		[0.004]	[0.196]	[0.006]
PRO	-0.0971**	-0.0640**	-0.0770***	PRO	-0.1120*	-0.0983***	-0.1120***
	[0.042]	[0.033]	[0.002]		[0.059]	[0.006]	[0.000]
TANG	0.0602**	0.0980***	0.0998***	TANG	0.1309***	0.1334***	0.1502***
	[0.023]	[0.003]	[0.000]		[0.000]	[0.002]	[0.000]
IMBLR	0.2694***	0.4527***	0.3531***	IMMLR	0.2389***	0.2571	0.2705***
	[0.002]	[0.000]	[0.000]		[0.001]	[0.146]	[0.002]
Constant	-0.2935**	-0.0677	-0.1379***	Constant	-0.4893***	-0.2197*	-0.3018***
	[0.011]	[0.170]	[0.003]		[0.001]	[0.067]	[0.000]
Observations	1,876	3,067	4,943	Observations	1,870	3,054	4,924
R-squared	0.102	0.066	0.069	R-squared	0.131	0.074	0.100

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by annual GDP growth rate are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 8 years with the highest annual GDP growth rate and bad macroeconomic states are 8 years with the lowest GDP growth rate. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

Table 21. Regression results for the dynamic partial adjustment capital structure model in good vs. bad macroeconomic states defined by term spread without lag leverage ratio for 5 groups

Panel A Book leverage ratio				**Panel B Market leverage ratio**			
		BLR				MLR	
	Good state	Bad state	Good vs Bad		Good state	Bad state	Good vs Bad
SIZE	0.0103**	0.0159***	0.0163***	SIZE	0.0194**	0.0291***	0.0297***
	[0.014]	[0.002]	[0.000]		[0.012]	[0.002]	[0.000]
MB	-0.0017	-0.0036	-0.0030*	MB	-0.0101***	-0.0143***	-0.0116***
	[0.464]	[0.194]	[0.081]		[0.007]	[0.001]	[0.000]
PRO	-0.0716***	-0.0461*	-0.0843***	PRO	-0.0779***	-0.0797***	-0.0842***
	[0.000]	[0.069]	[0.000]		[0.000]	[0.001]	[0.000]
TANG	0.0691**	0.1060***	0.0946***	TANG	0.0528*	0.1577***	0.0934***
	[0.035]	[0.001]	[0.000]		[0.087]	[0.004]	[0.001]
IMBLR	0.2323***	0.3708***	0.3555***	IMMLR	0.3467***	0.4336**	0.4906***
	[0.000]	[0.000]	[0.000]		[0.002]	[0.020]	[0.000]
Constant	0.0171	-0.0745	0.0171	Constant	0.3467***	0.4336**	0.4906***
	[0.720]	[0.110]	[0.720]		[0.002]	[0.020]	[0.000]
Observations	3,613	2,871	6,484	Observations	-0.0931	-0.2204**	-0.2410***
R-squared	0.029	0.061	0.056	R-squared	[0.243]	[0.041]	[0.001]

Note: In this table, the results of Eq. (3) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \boldsymbol{\varepsilon_{i,t}}$ under good and bad macroeconomic conditions estimated by term spread are shown in the first two columns of each panel. In each regression, firm fixed effects are considered and the standard errors clustered by time are used (Peterson, 2009). Good macroeconomic states are 8 years with the highest term spread and bad macroeconomic states are 8 years with the lowest term spread. Column Good vs Bad states the results of Eq. (4) $LEVR_{i,t} = (1-\delta)LEVR_{i,t-1} + \delta\beta X_{i,t} + \beta_1 GoodDum_t + \beta_2 GoodDum_t * LEVR_{i,t-1} + \boldsymbol{\varepsilon_{i,t}}$ by using both subsamples in good and bad conditions. $GoodDum_t$ is equal to 1 if it is a good macroeconomic condition in year t and 0 otherwise. The interaction term is the product of dummy variable and lag leverage ratio. The coefficients of each firm variable are presented with the p-value. The coefficients with *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. I also state the observations and R-squared values for each regression.

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