

The impact of the internal capital market of business-group affiliation on the dynamic capital-structure adjustment speed: Evidence from Taiwan

Chao-Jung Chen¹ Ya-Ching Chu² Wei-Shao Wu³ Chuan-Pin Chu¹

¹ Department of Accounting, National Pingtung University

² Department of Accounting and Graduate Institute of Finance, National Cheng Kung University

³ Department of Finance, National Taipei University of Business

Corresponding author: Chao-Jung Chen

Address: No. 51, Minsheng E. Rd., Pingtung City, Pingtung County 900392, Taiwan (R.O.C.)

E-mail: chjung25@mail.nptu.edu.tw

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Abstract

This study examines the business group internal capital markets using a unique dataset on intra-group loans to investigate the relationship between intra-group loans and the leverage speed adjustment toward target leverage. Using a sample of business group affiliations in Taiwan from 1996 to 2020, this study finds that affiliated firms with intra-group loans have a faster adjustment speed, and the receivers of intra-group loans adjust their leverage faster than the providers, which is consistent with the financing advantage hypothesis. Moreover, when the provider is a core firm within the group or when the receiver in the business groups suffers from a more severe wedge between seat control and cash flow rights, the positive effect between intra-group loans and adjustment speed is more pronounced. Overall, this study highlights the vital role of intra-group loans in shaping the dynamic capital structure and reveals the business groups' financing advantages.

Keywords: capital structure adjustment speed, internal capital market, business group

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1. Introduction

According to the static trade-off theory, firms' holding retainment of additional debt can result in costs (such as bankruptcy risks or agency costs) and benefits (such as tax-shield benefits) (Kraus and Litzenberger 1973; Jensen and Meckling 1976). This happens as firms pursue optimal (target) debt ratios in the long run to increase their value. Meanwhile, the dynamic trade-off theory assumes that the speed of capital structure adjustment toward target debt ratios (referred to as the dynamic capital structure adjustment speed) is influenced by capital structure adjustment costs and benefits. This means that if adjustment costs are high, capital structures will slowly be adjusted, deviating from their target debt ratios. As a result, actual debt ratios may deviate from their target levels due to the overall external economic environment or varied adjustment costs generated by firm-specific internal factors,¹ altering the dynamic capital structure adjustment speed (Leary and Roberts 2005; Flannery and Rangan 2006). This study aims to investigate whether and how the internal capital market for group-affiliated firms affects the capital structure adjustment speed in Taiwan.

Internal capital markets and pyramidal ownership structures characterize group-affiliated firms. According to the financial advantage hypothesis, group-affiliated firms can establish financial advantages and share risks through internal capital markets to reduce financing constraints, especially when external capital markets are constrained (Desai, Foley, and Hines 2004; Claessens, Fan, and Lang 2006). Group-affiliated firms can also reallocate resources through internal capital markets. It is easy for the firms to obtain the required funds externally as group members provide loans or guarantees to one another. Therefore, debt costs are low (Byun, Choi, Hwang, and Kim 2013), helping group-affiliated firms better survive financial crises (Almeida, Kim, and Kim 2015; Santioni, Schiantarelli, and Strahan 2020). Consequently, adjustment costs can be reduced, while the capital structure adjustment speed can be raised (Kim, Heshmati, and Aoun 2006; Dewaelheyns and Van Hulle 2012). However, based on the tunneling hypothesis, internal capital markets may allow controlling shareholders to harm minority shareholders to fulfill their own interests, resulting in resource misallocation (La Porta, Lopez-de-Silanes, and Shleifer 1999; Johnson, La Porta, Lopez-de-Silanes, and Shleifer 2000; Almeida and Wolfenzon 2006) and increased debt cost. A pyramidal business group may control firms through shareholding, which usually leads to discrepancies between control and cash-flow rights. Therefore, controlling shareholders may use internal capital markets to reallocate resources to subsidiaries with strong investment potential. Similarly, when subsidiaries encounter negative cash flow shocks, intra-group capital reallocation may reflect the behavior of controlling shareholders who harm minority shareholders for their benefit (Lemmon and Lins 2003). In

¹ Adjustment costs may include bankruptcy costs, tax shield differences, transaction costs (such as securities or bond issue costs), and financial crisis costs or costs arising from legal norms and other factors (Wang and Lin 2015).

particular, firms with pyramidal ownership can easily conduct tunneling through transactions within internal capital markets, increasing adjustment costs and reducing the capital structure adjustment speed (Ghose 2017; Ghose and Kabra 2018).

According to the financial advantage and tunneling hypotheses, business groups' internal capital markets may influence the leverage adjustment speed toward the target level. Previous studies compared the effects of group and non-group firms on the adjustment speed but did not consider the impact of group-affiliated businesses' internal capital market. The study conducted by Lin and Yeh (2020), Buchuk, Larrain, Muñoz, and Urzúa (2014), and Santioni et al.'s (2020) directly evaluated internal capital markets based on related-party loans data among the affiliated firms disclosed in the annual reports in Taiwan (including loans to and from related parties within group-affiliated businesses).

Intra-group loans may bring financial advantages or tunneling (Buchuk et al. 2014). The financial advantage hypothesis predicts that adjustment costs can be reduced as the capital structure adjustment speed increases. Meanwhile, the tunneling hypothesis assumes that adjustment costs will be increased and the capital structure adjustment speed reduced. Thus, the influence of internal capital markets on capital structure adjustment speed is an empirical issue. Therefore, this study aims to answer the following research questions. Given the prevalence of internal capital markets in business groups, will their dynamic capital structure adjustment speed be reduced or raised? We distinguish between intra-loan providers and receivers: Intra-loan providers refer to those who lend money to other firms within their groups, while intra-loan receivers refer to those who borrow money from other firms within their groups. The second research question concerns whether the influences of intra-loan providers (i.e., supplying funds to the internal capital market) on the capital structure adjustment speed differs from that of intra-loan receivers (i.e., demanding funds from the internal capital market).

Using a sample of listed groups in the Taiwanese markets from 1996 to 2020, this study explores the influences of intra-group loans on capital structure adjustment speed. The empirical results reveal that when group-affiliated businesses have internal capital markets, capital structures are rapidly adjusted. This means that the speed at which actual debt ratios are adjusted to target levels increases, and the financial advantage effect outweighs the tunneling effect. Furthermore, we distinguish between the different influences of the types of intra-group loans on the capital structure adjustment speed. In particular, differences between intra-group loan providers and receivers were established. Loan providers mainly provide loans to firms within their groups, while the loan receivers mainly secure capital within their groups and are usually the beneficiaries of internal capital markets.² The empirical findings reveal that receivers of

² For receivers, tunneling means that transferring funds from other small firms to themselves through control rights to enjoy low-interest rates. For capital providers, tunneling means high-interest rates may be charged to borrowers. Therefore, both capital providers and receivers may engage in tunneling (Buchuk et al. 2014).

intra-group loans can adjust debt structures toward their targets faster than providers of intra-group loans, and the effect is more pronounced in under-levered firms. These results imply that receivers of intra-group loans can reduce debt adjustment costs and raise the debt adjustment speed through financial advantages, co-insurance, and reputations of group businesses' internal capital markets, consistent with the financial advantage hypothesis.

Different business-group affiliation characteristics can influence internal capital markets. Thus, this study further considers the influences of core firms within their groups and the deviation between seat control and cash-flow rights. Core firms are typically the ultimate controllers under normal circumstances, controlling and reallocating resources within groups and influencing group members' decisions. If the capital providers are core firms, they are more likely to exploit financial advantages through internal capital markets, positively influencing the debt structure adjustment speed. Meanwhile, if the capital receivers are core firms, they may be more likely to conduct tunneling through internal capital markets, negatively influencing the debt structure adjustment speed. Since core firms in business groups have more power and may conceal more private information, the financial advantage effect may be more pronounced if core firms provide intra-group loans. In contrast, the tunneling effect is more of a series of core firms obtaining intra-group loans.

We find that the faster speed of adjustment toward the target leverage is more pronounced among core firms within group businesses, which supports the financial advantage hypothesis. Meanwhile, the empirical results show that the capital structure adjustment occurs more rapidly when the providers of intra-group loans are core firms. In addition, the firms' wedge between seat control and cash-flow rights is wider, indicating high agency costs. Therefore, firms with considerable deviations between control and cash-flow rights incur high capital structure adjustment costs, while the financial advantage effect of intra-group loans may mitigate the agency-cost problem, increasing the capital structure adjustment speed. This study also found that receivers of intra-group loans among firms with high deviations adjust their capital structures more quickly than those who receive loans among firms with low deviations.

This study's academic contributions are as follows: First, Previous studies suggest that different leverage levels may exist depending on corporate demands but adjustment costs may still be incurred in capital structure adjustment regardless of whether debts are increased or decreased. The dynamic trade-off theory argues that firms consider their adjustment costs and benefits when adjusting the actual debts toward target levels, which has different meanings depending on their leverage levels. Therefore, the dynamic capital structure adjustment speed is a critical issue. In particular, a high capital structure adjustment speed indicates that managers believe that the costs in deviations from target debt ratios will be high, and expect to achieve target levels rapidly. In contrast, a low leverage adjustment speed indicates that an adjustment toward target debt ratios will incur high costs. Therefore, adjustment costs are an important factor

in the capital structure adjustment speed.

Different types of internal capital markets entail different adjustment costs, which influences their capital structure adjustment speeds. Thus, it is essential to further explore the influences of intra-group loans on the capital structure adjustment speed. Second, the financial advantages or tunneling that the internal capital markets of business-group affiliations may produce can deliver varied influences on the capital structure adjustment speed. Previous studies reflect inconsistent results on the relationship between business-group affiliates and the capital structure adjustment speed toward targets (Kim et al. 2006; Dewaelheyns and Van Hulle 2012; Ghose 2017; Ghose and Kabra 2018). However, previous research ignored the effect of internal capital markets on business groups. Thus, this study broadened the literature by utilizing the related-party loan data disclosed by firms to measure internal capital markets in business groups (Lin and Yeh 2020). Furthermore, this study divided internal capital markets into receivers and providers of intra-group loans. This study expects that providers and receivers of intra-group loans play different roles in internal capital markets, influencing the capital structure adjustment speed differently. The study's empirical results can fill the literature gap by relating to internal capital markets and the dynamic capital structure adjustment speed. Third, this study considers the importance of exploring how core firms within groups and information asymmetry influence the correlation between internal capital markets and the capital-structure adjustment speed. The tunneling or financial advantages of internal capital markets can be further explained through core firms and information asymmetry.

The following are the practice implication of this study. First, business-group affiliations are prevalent in Taiwan. They focus on resource allocation issues, utilization, and capital structures. The empirical results of this study explain whether business groups' internal capital markets (i.e., receivers and providers of intra-group loans) have different influences on capital management policies. Second, this study distinguishes the influences of different types of internal capital markets on corporate capital structures. Thus, external investors and analysts can understand the providers and receivers of intra-group loans within business groups under whom capital structures may be adjusted when making investment decisions. Third, boards can understand the influences of different types of CEOs on capital management decisions for supervision. According to the findings of this study, business-group affiliates may undertake tunneling through internal capital markets in the event of severe information asymmetry. Therefore, this study recommend that boards carefully observe whether firms have over-investments or over-retained funds.

The remainder of this paper is organized as follows. Section 2 explores the relevant literature and develops the main hypothesis. Section 3 describes the data and research design. Section 4 presents and discusses the empirical results, while Section 5 offers conclusions to this study.

2. Literature Review and Hypothesis Development

2.1 Literature on internal capital markets

In many countries, especially in Asia, business-group affiliations constitute organizational structures. Affiliated firms within a business group can exploit internal capital markets through capital reallocations and risk diversification (i.e., co-insurance among member firms) (Almeida et al. 2015; Claessens et al. 2006; Desai et al. 2004; Santioni et al. 2020). In addition, affiliated firms can trade within their groups, offer financial support to one another (e.g., financing between affiliated enterprises), and serve in co-insurance and reputation-building when borrowing money from banks. This practice offers financial advantages to business groups' internal capital markets (Khanna and Palepu 2000). However, the structure of diversified business groups may cause a deviation between control rights and cash-flow rights, enabling the ultimate controlling shareholders to engage in tunneling for their own wealth (Johnson et al. 2000). The ultimate controlling shareholders' cash-flow rights may influence business groups' decisions. For example, firms with low cash-flow rights may perform poorly due to certain behaviors (e.g., transfers of groups' internal funds from firms with low cash-flow rights to firms with high cash-flow rights or business groups' affiliated firms foregoing good investment projects and lending money to related firms) (Bertrand, Mehta, and Mullainathan 2002).

The financial advantage hypothesis states that internal capital markets play an important role in external financing restrictions or high external debt costs, while group members serve as co-insurance. Other members may provide an endorsement guarantee to reduce external financing costs and financing restrictions when some group members require capital (e.g., Hoshi, Kashyap, and Scharfstein 1990; Desai et al. 2004; Claessens et al. 2006; Chittoor, Kale, and Puranam 2015). An intra-group reallocation of cash flows can lead to the effective use of funds and their investment to reduce conglomerates' bankruptcy risks (Gopalan, Nanda, and Seru 2007). Business groups' internal capital markets can improve loan efficiency among group members, thus reducing the costs of debt (Byun et al. 2013). Therefore, groups benefit from resource reallocation and risk-sharing through enterprises' internal capital markets, making it easy for group members to survive in the face of negative cash-flow shocks (Almeida et al. 2015; Santioni et al. 2020). Buchuk et al. (2014) found that Chilean firms' investment and returns on equity increased when they borrowed internally. Using a sample of Taiwanese firms, Lin and Yeh (2020) suggested that the probability of underinvestment could be reduced if firms borrowed from related parties within groups, suggesting that group firms could improve their investment efficiency through internal capital markets.

Meanwhile, the tunneling hypothesis suggests that controlling shareholders may harm minority shareholders due to the deviations between control rights and cash-flow rights through groups' pyramidal ownership structures (Fang and Chang 2018). Such agency problem is called

tunneling, which shows the resource misallocation through which controlling shareholders harm minority shareholders for their interests and thus lead to agency conflicts (e.g., Almeida and Wolfenzon 2006; Khanna and Yafeh 2007; Jiang, Lee, and Yue 2010; Hu and Sun 2019), reduced earnings quality (Fan and Wong 2002; Kim and Yi 2006), or increased capital costs. In addition, tunneling may raise the agency cost of debt and eliminate the benefits as expropriation increases the monitoring costs and credit risks (Aslan and Kumar 2012; Lin, Ma, Malatesta, and Xuan 2011). The following literature supports the tunneling hypothesis. Bae, Kang, and Kim (2002) argued that Korean groups' controlling shareholders benefit and harm minority shareholders with merger and acquisition cases. Meanwhile, Lin et al. (2011) suggested that the deviations between control rights and cash-flow rights increased the costs of debt. According to Liu and Tian (2012), if the deviations between corporate control rights and cash-flow rights are severe, debts and intra-group loans will rise, and tunneling may occur as a result of loans from firms with low cash-flow rights to those with high cash-flow rights (Bertrand et al. 2002; Jiang et al. 2010), or interest will not be charged for intra-group loans (Gopalan et al. 2007). This phenomenon suggests that business groups may engage in illegal tunneling or inefficient resource allocation through internal capital markets and increase information asymmetry, heightening the probability of a financial crisis.

2.2 Literature on capital structure adjustment speed

The static trade-off theory³ assumes that firms can have target (optimal) debt ratios in the long run. Although high debt ratios can bring tax-shield benefits, they can also increase bankruptcy risks (Kraus and Litzenberger 1973) and agency costs (Jensen and Meckling 1976), forcing firms to trade off debt costs and benefits and pursue optimal debt ratios to maximize the firms' value. Previous studies suggest that firms set target debts and adjust their actual debt ratios to the targets once deviations occur (Graham and Harvey 2001; Leary and Roberts 2005; Flannery and Rangan 2006; Dang, Kim, and Shin 2014; Wang and Lin 2015; Li, Wu, Xu, and Tang 2017). Wang and Gu (2003) found that when a company has a target capital structure, managers adjust their financing decisions to achieve the target value. Other studies also indicated that firms do not fully adjust their actual debt ratios to the target levels, but they perform partial adjustments. The dynamic trade-off theory suggests that firms consider adjustment costs and benefits when adjusting actual debts to target levels. This means that if adjustment costs are higher than the adjustment benefits, the adjustment speed will be reduced, and actual debts may deviate from target debts. Therefore, adjustment costs can influence the capital structure adjustment speed (Leary and Roberts 2005; Flannery and Rangan 2006).

³ The theories cited in the studies on capital structures include the trade-off, pecking order, and market-timing theories. The literature on capital-structure adjustment speed is mainly based on the trade-off theory.

Previous studies found that individual firms' characteristics influence capital structure decisions. Large-sized firms, a large amount of operating cash flow, more growth opportunities, and large deviations from target debts lead to a faster capital structure adjustment speed toward targets (Wang and Lin 2015; Drobetz and Wanzenried 2006; Faulkender, Flannery, Hankins, and Smith 2012; Qian, Tian, and Wirjanto 2009). Byoun (2008) pointed out that firms with financing surpluses had above-target leverages, while those with below-target leverages and financial deficits adjusted their capital structures faster. Dang, Kim, and Shin (2012) suggested that firms with more investments, financial deficits and low earnings volatility rapidly adjusted their capital structures as adjustment costs were low. Mukherjee and Wang (2013), as well as Smith, Chen, and Anderson (2015), mentioned asymmetric influences on the capital structure adjustment speed when firms' actual debts were either higher or lower than their target levels. The findings of their study also revealed that firms with excessive debts adjust their capital structures faster.

Information asymmetry can also reduce capital structure adjustment speed (Jin, Zhao, and Kumbhakar 2020). An, Li, and Yu (2015) examined transnational data and found that high stock price crash risks led to high information asymmetry between firms and external investors. Thus, capital structure adjustment risks and costs increased, reducing the capital structure adjustment speed. However, in countries implementing high information transparency, the above effects are diminished. Abuhomous (2021) used a sample of five countries, including France, Germany, Japan, the United Kingdom (UK), and the United States of America (USA), and found that corporate trade credits could replace short-term external leverage. Furthermore, his study revealed that over-levered firms with low amounts of trade credit had faster capital structure adjustment toward targets than under-levered firms with low amounts of trade credits.

The agency cost hypothesis suggests that CEOs may deviate from their target debt ratios due to self-interest, resulting in high adjustment costs (Wang and Lin 2015; Chang, Chou, and Huang 2014) and changes in capital structure adjustment speed. However, considering good corporate governance mechanisms, agency costs can be reduced, and capital structure adjustment speed can be raised (Wang and Lin 2015; Liao, Mukherjee, and Wang 2015; Nguyen, Bai, Hou, and Vu 2020). Chang et al. (2014) found that under-levered firms unwillingly increase debts to avoid creditor supervision when corporate governance mechanisms are weak. Thus, their capital structures are slowly adjusted. Do, Lai, and Tran (2020) argued that the supervision effects are high when a firm's foreign investors hold a high ownership stake, which reduces the CEOs' agency problems and decreases the adjustment costs. In particular, foreign investors' supervision effects are more significant when firms have excessive debt levels. Li et al. (2017) claimed that the bank-firm relationship reduced debt adjustment costs for firms with insufficient debts, thereby raising the capital structure adjustment speed, especially among young firms with small collateral. Jiang, Jiang, Huang, Kim, and Nofsinger (2017) indicated that strong competitive banks willingly lend money to firms, offer low-interest rates, evaluate firms' loan cases quickly, and include loose terms in their loan contracts, thus reducing debt adjustment costs for firms and

raising their capital structure adjustment speed, especially for under-levered firms.

Brisker and Wang (2017) explored whether CEO incentives influence the capital structure adjustment speed. The results of their study revealed that over-levered (under-levered) firms rapidly (slowly) adjusted their capital structures when CEOs' internal debts were high. Other studies suggested that favorable macroeconomic conditions (Cook and Tang 2010), different countries' financial systems (Antoniou, Guney, and Paudyal 2008), corporate life cycle (Drobetz, Schilling, and Schröder 2015), emotional factors of the capital market (Chan, Lin, and Tu 2019), and corporate credit ratings (Wojewodzki, Poon, and Shen 2018) influence capital structure adjustment costs, benefits, and the speed of capital structure adjustment.

Based on the literature above, firms' overall economic environment or internal factors may incur capital structure adjustment costs, resulting in deviations of actual debt ratios from target levels. Therefore, this study investigated how business groups' internal capital markets influence their capital structure adjustment speed.

2.3 Hypothesis development: Influences of intra-group loans on capital-structure adjustment speed

Previous studies explored the influences of business groups on the capital structure adjustment speed and revealed that the empirical results vary by country. Kim et al. (2006) utilized a sample of Korean firms and found that business groups adjusted their capital structures faster than non-group firms. Dewaelheyns and Van Hulle (2012) obtained the same conclusions using a sample of Belgian firms. According to Ghose (2017) and Ghose and Kabra (2018), business groups slowly adjusted their capital structures in India. These findings indicate that business groups influence their capital structure adjustment speeds.

Previous studies explained the influences of business groups on capital structures from the perspective of internal capital markets and pyramidal ownership structures. However, they failed to evaluate the influences of internal capital markets on firms' capital structure adjustment speeds directly. This study examined how business groups' internal capital markets influence capital structure adjustment speed toward target leverage levels based on the intra-group loan data (borrowing from and lending to related parties within business groups) disclosed in Taiwan (Lin and Yeh 2020).

The financial advantage hypothesis states that co-insurance and business groups' reputations can reduce debt costs, financing restrictions, and adjustment costs. Therefore, it is expected that internal capital markets (intra-group loans) may raise groups' capital structure adjustment speeds—implying that internal capital markets can ensure that actual debt ratios are close to target levels. However, based on the tunneling hypothesis, controlling shareholders may transfer group resources through intra-group loans for their own benefits, causing severe agency problems,

increased adjustment costs, and reduced capital structure adjustment speed. Therefore, this study proposes the following hypothesis based on the financial advantage and tunneling hypotheses:

H1: *The speed of the capital structure adjustment toward targets is different between affiliated firms with and without intra-group loans.*

Providers (lending to other group members) and receivers (borrowing from other group members) of intra-group loans in internal capital markets may deliver varied influences. This study distinguished between providers of intra-group loans and receivers. Previous studies found varied effects of receivers and providers of intra-group loans. Buchuk et al. (2014) suggested that receivers and providers of intra-group loans impacted capital structures differently. They observed that providers of intra-group loans had no influence on total debts as their external debts increased. Meanwhile, receivers' total debts increased while their external debts decreased. Buchuk et al. (2014) emphasized that capital receivers benefited from the financial advantages of intra-group loans, reducing financing restrictions or capital costs through the financing provided by internal capital markets. However, Buchuk et al.'s (2014) study failed to explore the influences on the capital structure adjustment speed. Lin and Yeh (2020) examined the influences of internal capital markets on investment efficiency and found that receivers' underinvestment of intra-group loans decreased, which is consistent with the financial advantage hypothesis. Jara-Bertín, Pinto-Gutiérrez, and Pombo (2021) investigated the influences of internal capital markets on cash-flow sensitivity. They found that providers of intra-group loans held considerable cash and became highly sensitive, indicating that firms had to keep sufficient cash to provide financial support to other firms within their groups. Meanwhile, receivers of intra-group loans do not need to keep substantial amounts of cash because they generate benefits and assistance from internal capital markets. Based on previous studies, receivers and providers of intra-group loans have different influences on capital structures, investment efficiency, and cash policies. This study further explored whether providers and receivers of intra-group loans impact the capital-structure adjustment speed differently.

Receivers of intra-group loans typically experience more financing restrictions than providers (Buchuk, Larrain, Prem, and Urzúa 2020). The former mainly borrow money from other group members typically at low cost, on favorable covenant terms, and with few bankruptcy risks involved. Buchuk et al. (2014) suggested that capital receivers' total debts increased while those of capital providers remained the same. Therefore, this study claims that adjustment costs will be reduced, and receivers of intra-group loans will rapidly adjust capital structures if there are many intra-group loans or guarantees. Receivers of Intra-group loans face lower adjustment costs; thus, their actual debts are adjusted to target levels faster than those of providers. Therefore, this study proposes the following hypothesis:

H2: *Receivers of Intra-group loans adjust their capital structures faster than providers.*

3. Research Design

3.1 Research Samples and Data Sources

The sample for this study is affiliated firms listed on the Taiwan Stock Exchange (TWSE) and Taipei Exchange (TPEX) from 1996 to 2020⁴; The sample excludes observations from the financial crisis period (2008-2010)⁵ and removes the data with missing values in constructing the control variables. The data are sourced from the Taiwan Economic Journal (TEJ) Group affiliation database, internal capital market data (including data on loans from and to related parties), and data on other company characteristics and accounting variables to construct the control variables obtained from the TEJ Financial Database. The sample contains 9,486 firm-year observations. The sample selection process is described in Panel A of Table 1. Panel B represents a total of 1,715 (1,715/9,486 = 18%) and 7,771 (82%) firm-year observations for affiliated firms with and without intra-group loans, respectively. A total of 818 (818/1,715 = 48%) and 897 (52%) firm-year observations are labeled as providers and receivers of intra-group loans, respectively.

3.2 Research model

The dynamic trade-off theory asserts that firms set target (or optimal) capital structures influenced by the firms' characteristics. The empirical model in this study entails two steps. First, the firm's target leverage is estimated using Model 1. Second, a partial adjustment model using Model 2 is estimated. Following the literature (Wang and Lin 2015; Flannery and Rangan 2006; Huang and Ritter 2009; Faulkender et al. 2012; Chang et al. 2014; Li et al. 2017; Ghose and Kabra 2018), this paper uses a two-stage dynamic partial adjustment capital structure model. In the first stage, a firm's target capital structure (LEV_{it}^*) as the fitted value in Model (1) is estimated.

$$LEV_{i,t} = \beta \chi_{i,t-1} \quad (1)$$

$LEV_{i,t}$ denotes the observed leverage ratio for firm i at time t , which equals total liabilities divided by total assets. $\chi_{i,t-1}$ contains a vector of company-specific control variables, \mathbf{X} , at $t-1$, related to the costs and benefits of the speed of leverage adjustment toward the target debt level. Specifically, the company-specific control variables (\mathbf{X}) include those that control for profitability ($EBIT_{t-1}$), which is calculated as earnings before interest and tax divided by total assets; growth opportunities (Q_{t-1}), which is calculated as the sum of the market value of equity and book value of total liabilities divided by the book value of total assets; the non-debt tax shield (DEP_{t-1}),

⁴ Following Buchuk et al. (2014) and Lin and Yeh (2020), this study defined a business group as two or more listed firms.

⁵ For further details, please refer to 4.2 Discussion for the Financial Crisis.

Table 1 Sample Description

Panel A: sample selection					
					Numbers of observations
Non-financial firms listed in TWSE or TPEX (1996-2020)					27,535
Less: firm-year observations with missing values to construct control variables					(2,781)
Less: financial crisis period (2008-2010)					(3,505)
All firms sample (group and non-group)					21,249
Less: firms that are not affiliated with a business group					(11,763)
Business groups affiliation sample (Final sample)					9,486
Panel B: sample distribution					
Year	No. of all firms	Affiliated firm with intra-group loans	Affiliated firm without intra-group loans	Provider of intra-group loans	Receiver of intra-group loans
1996	127	21	106	10	11
1997	144	26	118	13	13
1998	168	33	135	14	19
1999	191	43	148	22	21
2000	226	51	175	27	24
2001	265	67	198	32	35
2002	297	89	208	55	34
2003	336	99	237	62	37
2004	393	105	288	69	36
2005	444	94	350	38	56
2006	467	88	379	33	55
2007	478	91	387	42	49
2011	532	84	448	35	49
2012	556	86	470	41	45
2013	568	87	481	47	40
2014	577	96	481	46	50
2015	587	98	489	40	58
2016	603	100	503	41	59
2017	619	90	529	37	53
2018	627	92	535	40	52
2019	637	93	544	36	57
2020	644	82	562	38	44
Total	9,486	1,715	7,771	818	897

Note: This table presents the sample selection process and sample distribution. Panel A reports the process of sample selection. Panel B reports sample distribution categorized by affiliated firms with intra-group loans and affiliated firms without intra-group loans. TWSE is Taiwan Stock Exchange; TPEX is Taipei Exchange.

which is calculated as depreciation divided by total assets; firm size ($SIZE_{t-1}$), which is calculated as the natural logarithm of total assets; asset tangibility (PPE_{t-1}), which is calculated as net plant, property, and equipment divided by total assets; research and development intensity (RD_{t-1}),

which is calculated as R&D expenses divided by total assets; and the industry-year median leverage (MED_L_{t-1}). To remove the effect of outliers, this paper winsorizes each variable at its respective 1% and 99% distributions. All the variables are defined and explained in Appendix 1.

In the second stage, Model 2 is used to estimate the adjustment speed from current to target leverage (Fama and French 2002; Kayhan and Titman 2007; Chang et al. 2014). δ represents the speed of leverage adjustment. A value of $\delta = 1$ indicates that a firm fully adjusts its capital structure to the target level each period, where $\delta < 1$ indicates the presence of adjustment costs.

$$LEV_{i,t} - LEV_{i,t-1} = \delta \times (LEV_{i,t}^* - LEV_{i,t-1}) + \varepsilon_{i,t} \quad (2)$$

This paper examines the effect of internal capital markets on the speed of leverage adjustment toward the target level and used the following model (Model 3) to examine the first hypothesis. The main variable of interest is $Intra_Loan_DM_{i,t-1} \times \Delta TARGET_{i,t}$; $\Delta TARGET_{i,t}$ is $LEV_{i,t}^* - LEV_{i,t-1}$. Following Buchuk et al. (2014) and Santioni et al. (2020), *Net Intra Loan* is defined as the net amount of loan to related-party within the group minus the amount of loan from related-party providers of intra-group loans, scaled by each firm's total assets. *Intra Loan DM* is equal to 1 if the *Net Intra Loan* is not equal to zero, and 0 otherwise (Santioni et al. 2020). δ_1 is the effect of the intra-loan on the speed of leverage adjustment. Based on the financial-advantage hypothesis, this paper predicts the coefficient of $Intra_Loan_DM_{i,t-1} \times \Delta TARGET_{i,t} > 0$ ($\delta_1 > 0$), indicating a faster adjustment toward the target level. According to the tunneling hypothesis, we predicted $\delta_1 < 0$.

$$\begin{aligned} LEV_{i,t} - LEV_{i,t-1} &= (\delta_0 + \delta_1 \times Intra_Loan_DM_{i,t-1})(LEV_{i,t}^* - LEV_{i,t-1}) + \varepsilon_{i,t} \\ \Delta LEV_{i,t} &= (\delta_0 + \delta_1 \times Intra_Loan_DM_{i,t-1}) \Delta TARGET_{i,t} + \varepsilon_{i,t} \\ &= \delta_0 \times \Delta TARGET_{i,t} + \delta_1 \times Intra_Loan_DM_{i,t-1} \times \Delta TARGET_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

Model (4) shows that this study included controls for various firm characteristics that prior research has shown to be important determinants of a firm's adjustment speed. These control variables (Z) include profitability ($EBIT$), growth opportunities (Q), non-debt tax shield (DEP), firm size ($SIZE$), asset tangibility (PPE), research and development intensity (RD), and industry-year median leverage (MED_L).⁶ δ_n is a set of coefficients based on the interaction of the items between control variables (Z) and $\Delta TARGET$. The year-fixed effects and group-fixed effects are also controlled.

⁶ Previous studies suggested that firm-specific characteristics may affect both target leverage and adjustment speed. Therefore, Model (4) included the control variables (Z vectors) used in the estimation of target leverage (Öztekin and Flannery 2012; Do, Huang, and Ouyang 2022).

$$\begin{aligned}
\Delta LEV_{i,t} &= (\delta_0 + \delta_1 \times Intra_Loan_DM_{i,t-1} + \delta_n \times Z_{i,t-1}) \Delta TARGET_{i,t} + \varepsilon_{i,t} \\
&= \delta_0 \times \Delta TARGET_{i,t} + \delta_1 \times Intra_Loan_DM_{i,t-1} \times \Delta TARGET_{i,t} + \\
&\quad \delta_n \times Z_{i,t-1} \times \Delta TARGET_{i,t} + Year\ fixed\ effects + Group\ fixed\ effects + \varepsilon_{i,t}
\end{aligned} \tag{4}$$

H2 examines the effect of providers (receivers) of intra-group loans on the adjustment speed. This study distinguished between firms that provide and those that receive intra-group loans. Following Santioni et al. (2020), *Provider* is one for firms whose *Net Intra_Loan* are positive, representing providers of intra-group loans (i.e., supplying funds to the internal capital market). Otherwise, its value is zero. Meanwhile, *Receiver* is one for firms whose *Net Intra_Loan* are negative, representing receivers of intra-group loans (i.e., demanding funds from the internal capital market). Otherwise, its value is zero (Santioni et al. 2020). H2 predicts that the coefficient of $Receiver_{i,t-1} \times \Delta TARGET_{i,t}$ (δ_3) is greater than $Provider_{i,t-1} \times \Delta TARGET_{i,t}$ (δ_2).

$$\begin{aligned}
\Delta LEV_{i,t} &= \delta_1 \times \Delta TARGET_{i,t} + \delta_2 \times Provider_{i,t-1} \times \Delta TARGET_{i,t} + \delta_3 \times Receiver_{i,t-1} \times \\
&\quad \Delta TARGET_{i,t} + \delta_4 \times Z_{i,t-1} \times \Delta TARGET_{i,t} + Year\ fixed\ effects + \\
&\quad Group\ fixed\ effects + \varepsilon_{i,t}
\end{aligned} \tag{5}$$

4. Empirical Analyses

4.1 The impact of the internal capital market on the speed of capital adjustment

Panel A of Table 2 presents the descriptive statistics for the full sample. The mean (median) of the book leverage ratio (*LEV*) is 0.427 (0.433).⁷ The mean of the *net* Intra-group loan (*Net Intra_Loan*) is -0.001, and the negative value implies that, on average, affiliated firms borrow from related parties within the group. The median of *Net Intra_Loan* is 0.000, indicating that the measure nets up to zero within each group.

Panel B of Table 2 shows that a mean and median difference test was performed for the main variables between firms with (Column (1) of Panel B) and without intra-group loans (Column (2) of Panel B). Compared with firms without intra-group loans, those with intra-group loans are larger, have more tangible assets and depreciation, and have higher industry-year median leverage. However, they have lower profitability and R&D expenses, as well as fewer growth opportunities. Table 3 presents the coefficients of the correlations between the leverage and its determinants in the target-leverage model (Model (1)). There is no evidence suggesting

⁷ The mean of *LEV* is similar to Wang and Lin's (2015) (mean = 0.46) and Wang and Chen's (2015) (mean = 0.445) results.

Table 2 Descriptive statistics

Panel A: full sample							
Variables	mean	Standard deviation	minimum	Q1	median	Q3	maximum
LEV	0.427	0.179	0.060	0.294	0.433	0.553	0.861
Δ LEV	0.004	0.067	-0.209	-0.028	0.002	0.035	0.224
LEV*	0.436	0.122	0.145	0.357	0.434	0.514	0.753
Δ TARGET	0.013	0.131	-0.323	-0.073	0.011	0.098	0.334
Net Intra_Loan	-0.001	0.012	-0.088	0.000	0.000	0.000	0.033
Intra_Loan_DM	0.181	0.385	0.000	0.000	0.000	0.000	1.000
Provider	0.086	0.281	0.000	0.000	0.000	0.000	1.000
Receiver	0.095	0.293	0.000	0.000	0.000	0.000	1.000
EBIT	0.048	0.084	-0.265	0.014	0.050	0.092	0.279
Q	1.386	0.800	0.591	0.920	1.130	1.559	5.581
DEP	0.030	0.025	0.000	0.012	0.024	0.040	0.130
SIZE	15.821	1.544	12.916	14.700	15.671	16.741	20.032
PPE	0.283	0.191	0.001	0.127	0.258	0.417	0.793
RD	0.024	0.039	0.000	0.000	0.008	0.029	0.207
MED_L	0.420	0.081	0.243	0.380	0.415	0.473	0.596
Panel B: firms grouped by intra-group loans							
Variables	Affiliated firm with intra-group loans ($N = 1,715$) (1)		Affiliated firm without intra-group loans ($N = 7,771$) (2)		Difference (1)-(2)		
	mean	median	mean	median	mean	median	
LEV	0.521	0.521	0.406	0.410	0.116***	0.111***	
Δ LEV	0.008	0.005	0.003	0.002	0.005***	0.004**	
LEV*	0.494	0.491	0.424	0.423	0.071***	0.068***	
Δ TARGET	-0.018	-0.015	0.020	0.017	-0.038***	-0.032***	
EBIT	0.025	0.032	0.053	0.054	-0.028***	-0.022***	
Q	1.195	1.032	1.429	1.160	-0.234***	-0.128***	
DEP	0.031	0.027	0.029	0.024	0.002***	0.003***	
SIZE	16.427	16.221	15.688	15.531	0.739***	0.689***	
PPE	0.311	0.301	0.277	0.248	0.034***	0.053***	
RD	0.011	0.002	0.026	0.010	-0.016***	-0.008***	
MED_L	0.438	0.427	0.416	0.413	0.021***	0.014***	

Note: This table presents the mean, standard deviation, first quartile, median, and third quartile of the variables used in this study, Panel A for the full sample, and Panel B compares firms with and without intra-group loans. The main sample comprises 9,486 firm-year observations listed in Taiwan market over the 1996-2020 period (exclude 2008-2010 financial crisis period). The variable definitions are in Appendix 1. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels between the firms with intra-group loan sample and the firms without intra-group loan sample.

Table 3 Pearson (Spearman) correlation matrix ($N = 9,486$)

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Δ LEV	1.000	0.268***	-0.025**	-0.001	0.034***	-0.193***	0.012	-0.009	0.005	0.012	0.006	0.022**
2. Δ TARGET	0.303***	1.000	0.033***	-0.051***	-0.091***	-0.032***	-0.048***	0.013	-0.044***	0.029***	0.042***	-0.003
3. Intra_Loan_DM	-0.042***	0.094**	1.000	0.725***	-0.755***	0.068***	0.002	-0.008	0.117***	-0.027***	0.007***	-0.002
4. Provider	-0.001	-0.050***	0.288***	1.000	-0.099***	-0.050***	-0.079***	0.028***	0.203***	0.032***	-0.112***	0.064***
5. Receiver	0.039***	-0.100***	-0.585***	-0.099***	1.000	-0.141***	-0.078***	0.037***	0.027***	0.069***	-0.117***	0.063***
6. EBIT	-0.214***	-0.047***	0.143***	-0.028***	-0.135***	1.000	0.502***	-0.034***	0.124***	-0.101***	0.121***	-0.055***
7. Q	-0.002	-0.025	0.011	-0.084***	-0.072***	0.345***	1.000	-0.002	-0.132***	-0.126***	0.269***	-0.225***
8. DEP	-0.018*	0.007	-0.051***	0.010	0.035***	-0.098***	-0.022**	1.000	0.090***	0.673***	0.074***	-0.124***
9. SIZE	0.001	-0.029***	0.096***	0.222***	0.022**	0.164***	-0.124***	0.125***	1.000	0.094***	-0.182***	0.151***
10. PPE	0.017*	0.024**	-0.065***	0.019*	0.068***	-0.089***	-0.128***	0.560***	0.089***	1.000	-0.170***	0.011
11. RD	0.015	0.015	0.027***	-0.104***	-0.104***	0.013	0.353***	-0.046***	-0.201***	-0.251***	1.000	-0.437***
12. MED_L	0.020*	0.014	-0.021**	0.067***	0.070***	-0.038***	-0.259***	-0.183***	0.129***	0.010	-0.446***	1.000

Note: The sample represents observations from 1996 to 2020 (exclude 2008-2010). Pearson (Spearman) correlations are above (below) the diagonal. The variable definitions are in Appendix 1. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

that the independent variables are highly correlated. Leverage (ΔLEV) negatively correlates with profitability ($EBIT$) and non-debt tax shield (DEP), but positively correlates with asset tangibility (PPE) and industry-year median leverage (MED_L).

Before considering the interaction term between $Intra_Loan_DM \times \Delta TARGET$, the effects of business groups and non-group firms on the capital structure adjustment speed was compared. Column (1) of Table 4 shows that the coefficient of $\Delta TARGET$ (0.182) is statistically significant at the 1% level. This result reveals that the average leverage adjustment speed is 18.2% for Taiwan's listed firms, implying that Taiwan firms have a target capital structure, which is consistent with the dynamic trade-off theory. Column (2) of Table 4 reports the effect of business groups and shows that the coefficient of $\Delta TARGET \times GROUP$ is -0.155 and is statistically negative at a significant level of 1%, indicating that business groups adjust their capital structures more *slowly* than non-group firms. Previous studies suggested that firm characteristics influence the leverage adjustment speed (Ho, Lu, and Bai 2021; Do et al. 2022). Column 3 of Table 4 contains the interaction term for the firms' characteristics control variables and target leverage deviation with similar results.

The asymmetric leverage adjustment speed between under-leveraged and over-leveraged firms was further investigated. Following Chang et al. (2014), this study classified firms as under-leveraged if the leverage (LEV) is *lower* than the predicted target leverage (LEV^*) from Model (1), and firms as over-leveraged if the leverage (LEV) is *higher* than the LEV^* . The coefficients of $\Delta TARGET \times GROUP$ in Columns (4) and (5) of Table 4 are -0.070 and -0.160 , respectively, and are significant at the 1% level. The tests for identifying the difference between the coefficients of $\Delta TARGET \times GROUP$ show that the adjustment speed for over-levered affiliated firms is significantly *less* than that of the under-levered affiliated firms (more negative) ($\chi^2 = 9.63$, p value < 0.01). These results suggest that the impact of business groups on the adjustment speed is more pronounced for under-levered firms.

The findings of the study are consistent with those of Ghose (2017) and Ghose and Kabra (2018), suggesting that group firms in Taiwan may face severe agency problems when transferring group resources for their own benefit, resulting in higher adjustment costs or lower potential capital adjustment benefits and slower adjustment speed. Alternatively, a group may have sufficient internal resources and may not need external resources to adjust its leverage capital structure, resulting in a lower adjustment speed.

Previous studies explained the influences of business groups on capital structures from the perspective of internal capital markets. This paper uses the intra-group loan data disclosed in Taiwan to examine Hypothesis 1, which aims to determine whether intra-group loans influence the capital structure adjustment speed. The results are shown in Table 5.

Net intra-group loans are also measured using borrowing from and lending to related parties. If the effects of the financial advantages outweigh those due to tunneling, intra-group

Table 4 Business groups affiliation and the speed of adjustment

	(1)	(2)	(3)	(4)	(5)
	Full sample	Full sample	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variables</i>	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)
$\Delta TARGET$	0.182*** (49.049)	0.402*** (59.312)	0.620*** (11.438)	0.327*** (4.401)	0.776*** (12.258)
$\Delta TARGET \times GROUP$		-0.155*** (-16.758)	-0.111*** (-11.425)	-0.070*** (-4.977)	-0.160*** (-13.005)
$\Delta TARGET \times EBIT$			0.123*** (10.024)	0.132*** (11.782)	-0.071** (-2.387)
$\Delta TARGET \times Q$			0.076*** (19.030)	0.076*** (15.374)	0.058*** (12.367)
$\Delta TARGET \times DEP$			0.854*** (5.105)	0.718*** (3.154)	0.629*** (3.477)
$\Delta TARGET \times SIZE$			-0.034*** (-10.744)	-0.007 (-1.589)	-0.020*** (-5.296)
$\Delta TARGET \times PPE$			-0.120*** (-4.631)	-0.105*** (-3.077)	-0.074** (-2.542)
$\Delta TARGET \times RD$			-0.341*** (-3.624)	-0.288*** (-2.461)	-0.235** (-2.010)
$\Delta TARGET \times MED_L$			0.409*** (7.287)	0.653*** (8.552)	0.181*** (2.793)
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes	Yes
<i>Group fixed effects</i>	No	Yes	Yes	Yes	Yes
Test the coefficient difference of $\Delta TARGET \times GROUP$ between over-leveraged (column (4)) and under-leveraged firms (column (5))					
				$\chi^2 = 9.63$ $p\text{-value} = 0.002$	
<i>N</i>	21,249	21,249	21,249	10,286	10,963
<i>Adjusted R²</i>	0.111	0.189	0.214	0.499	0.521

Note: This table examines whether the speed of adjustment varies between business group-affiliated firms and non-affiliated firms for a sample of 21,249 firm-year observations. Column (1) to column (3) report the results for the full sample, Column (4) for firms with leverage higher than the predicted target leverage (LEV*) from model (1) (over-levered firms) and Column (5) for those with leverage lower than LEV* (under-levered firms). ***, **, and * indicate that the difference is statistically significant at 1%, 5%, or 10% level based on two-tailed tests. Variable definitions are given in Appendix 1.

loans may reduce adjustment costs and raise the capital structure adjustment speed. However, if the tunneling effects outweigh those due to financial advantages, intra-group loans may reduce the capital structure adjustment speed.

This study's main sample comprises business groups' affiliated firms (the following tests mainly relate to affiliated firms). Intra-group loans (*Intra_Loan_DM*) are used to proxy for business groups' internal capital markets. Column (2) of Table 5 presents the results, showing that the coefficient of $\Delta TARGET \times Intra_Loan_DM$ is positive and significant at the 5% level (coefficient = 0.036), and indicating that the adjustment speed will increase in the case of intra-group loans. This finding supports the financial advantage hypothesis. Columns (4) and (5) of Table 5 present the results for over-levered firms and under-levered firms, respectively. The coefficients of $\Delta TARGET \times Intra_Loan_DM$ in Columns (4) and (5) of Table 5 are -0.040 and 0.103, which is significant at the 5% and 1% levels, respectively. The tests to identify the difference between the coefficients of $\Delta TARGET \times Intra_Loan_DM$ demonstrate that the adjustment speed for over-levered affiliated firms is significantly less than that for under-levered affiliated firms (more negative) ($\chi^2 = 14.78$, p value < 0.01). The result shows that the positive effect of intra-group loans on the adjustment speed is more pronounced for under-levered affiliated firms, implying that for under-levered firms, intra-group loans facilitate access to financing from groups. Therefore, allowing the firms to adjust their leverage faster. The findings of this study provide strong evidence in support of the financial advantage role of intra-group loans, enabling firms to better implement optimal financial policies.

The results in Tables 4 and 5 show that, on average, group firms have a *lower* adjustment speed than non-group firms. However, the group firms can raise capital through internal capital markets, creating a financing advantage that reduces the debt cost, financing constraints, or adjustment costs and increases adjustment speed, which is consistent with the financial advantage hypothesis.

Internal capital markets have providers (lenders to other group members) and receivers (borrowers from other group members) of intra-group loans. They play different roles in the internal capital markets, and they may have different influences on the capital structure adjustment speed. This paper distinguishes between receivers and providers of intra-group loans. Table 6 shows the empirical results. As seen in Table 6, the model in the full sample (Columns (1) and (2)) is estimated and separated into the subsamples of over-levered (Column (3)) and under-levered firms (Column (4)). Column (2) of Table 6 shows that the coefficient of $\Delta TARGET \times Provider$ is 0.049, but it is not statistically significant; while the coefficient of $\Delta TARGET \times Receiver$ is 0.059, which is positive and significant at the 5% level. This indicates that the capital structure adjustment speed of receivers is positive when groups have internal capital markets. Intra-group loans receivers adjust their capital structure faster than providers, which is consistent with H2. The tests to identify the difference between the coefficients of $\Delta TARGET \times$

Table 5 Intra-group loans and the speed of adjustment

	(1)	(2)	(3)	(4)	(5)
	Full sample	Full sample	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variables</i>	Coefficient (<i>t</i> -Statistic)	Coefficient (<i>t</i> -Statistic)	Coefficient (<i>t</i> -Statistic)	Coefficient (<i>t</i> -Statistic)	Coefficient (<i>t</i> -Statistic)
$\Delta TARGET$	0.246*** (40.089)	0.239*** (35.158)	0.424*** (6.041)	0.052 (0.509)	0.591*** (7.139)
$\Delta TARGET \times Intra_Loan_DM$		0.036** (2.428)	0.054*** (3.685)	-0.040** (-2.272)	0.103*** (5.708)
$\Delta TARGET \times EBIT$			0.067*** (5.117)	0.087*** (7.194)	-0.247*** (-5.107)
$\Delta TARGET \times Q$			0.062*** (10.487)	0.059*** (7.462)	0.068*** (10.359)
$\Delta TARGET \times DEP$			0.350 (1.418)	0.447 (1.451)	0.220 (0.734)
$\Delta TARGET \times SIZE$			-0.024*** (-6.336)	0.005 (0.900)	-0.017*** (-3.632)
$\Delta TARGET \times PPE$			-0.110*** (-3.024)	-0.067 (-1.359)	-0.093** (-2.241)
$\Delta TARGET \times RD$			-0.570*** (-3.808)	-0.198 (-1.198)	-0.497** (-2.338)
$\Delta TARGET \times MED_L$			0.299*** (3.864)	0.780*** (7.420)	0.107 (1.139)
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes	Yes
<i>Group fixed effects</i>	Yes	Yes	Yes	Yes	Yes
Test the coefficient difference of $\Delta TARGET \times Intra_Loan_DM$ between over-leveraged (column (4)) and under-leveraged firms (column (5))					
$\chi^2 = 14.78$ $p\text{-value} = 0.000$					
<i>N</i>	9,486	9,486	9,486	4,301	5,185
<i>Adjusted R²</i>	0.151	0.152	0.168	0.481	0.445

Note: This table examines the impact of intra-group loans on the speed of adjustment for a business group sample of 9,486 firm-year observations. Column (1) to column (3) report the results for the full sample, Column (4) for firms with leverage higher than the predicted target leverage (LEV*) from model (1) (over-levered firms) and Column (5) for those with leverage lower than LEV* (under-levered firms). ***, **, and * indicate that the difference is statistically significant at 1%, 5%, or 10% level based on two-tailed tests. Variable definitions are given in Appendix 1.

Receiver revealed that the adjustment speed for over-levered affiliated firms is significantly less than that for under-levered affiliated firms (more negative) ($\chi^2 = 5.14$, p value < 0.05), indicating that the positive effect is more pronounced for under-levered firms. This result suggests that capital receivers of intra-group loans receive benefits or assistance from internal capital markets to reduce financing constraints and debt adjustment costs, as well as increase the speed of debt adjustment, supporting the financial advantage hypothesis. This result supports this study's argument asserting that providers and receivers of intra-group loans adjust their capital structure at different speeds, which is consistent with Hypothesis 2.⁸

4.2 Discussion for the Financial Crisis

The financial decisions of the company may have been different during the financial crisis, which may have affected the speed of adjustment, and possibly, the impact of the internal capital market on the speed of adjustment. If the group is highly leveraged and has significant financial exposure to sectors that are heavily impacted by the crisis, the internal capital market may not be able to provide sufficient financing advantages to weather the storm. Therefore, the effect of the internal capital market during the financial crisis is limited.

In addition, our original evidence shows that the group's internal capital market helps to increase the speed of adjustment only for under-leveraged firms. During the financial crisis, these firms may have an incentive to slow down the speed of adjustment because low leverage increases their debt capacity and financial flexibility, which in turn helps them to cope with external negative shocks (Ang and Smedema 2011), thus, the effect of intra-loan on the speed of adjustment is not obvious in the period of financial crisis.

In order to test whether our results are the result of a possible structural shift, we also divide our sample period into three subsample periods (i.e., 1996-2007, 2008-2010, 2011-2020) to re-estimate the results of Table 4, Table 5, and Table 6, which are reported in Appendix 3. This study finds that the intra-loan effect is not significant in the 2008-2010 period (the interaction term *Intra_Loan_DM* \times $\Delta TARGET$ is insignificant in the column (4) of Panel B, and the interaction term *Receiver* \times $\Delta TARGET$ is insignificant in the column (4) of Panel C), indicating that the effect of internal capital market is different between the financial crisis period and the non-financial crisis period. As shown in Appendix 3, the effect of the internal capital market on the speed of adjustment during the financial crisis was not significant in our sample, suggesting that the effect may have been different during the financial crisis. Therefore, this study excludes the sample in the financial crisis period.

⁸ This study also followed Buchuk et al. (2014) to redefine providers and receivers of intra-group loans as those firm-year observations with net intra-group loans (*Net Intra_Loan*) greater (less) than 5% of total assets. The untabulated results revealed similar findings to that of Table 6.

Table 6 Internal capital markets and the speed of adjustment: provider and receiver

	(1)	(2)	(3)	(4)
	Full sample	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variable</i>	Coefficient (<i>t</i> -Statistic)	Coefficient (<i>t</i> -Statistic)	Coefficient (<i>t</i> -Statistic)	Coefficient (<i>t</i> -Statistic)
$\Delta TARGET$	0.239*** (35.140)	0.120* (1.694)	-0.096 (-1.381)	0.208* (1.809)
$\Delta TARGET \times Provider$	0.027 (1.230)	0.049 (1.572)	0.004 (0.099)	0.043 (1.596)
$\Delta TARGET \times Receiver$	0.040** (2.320)	0.059** (2.178)	0.014 (0.329)	0.128*** (4.129)
$\Delta TARGET \times EBIT$		0.060*** (4.032)	1.291*** (5.344)	-0.497** (-2.392)
$\Delta TARGET \times Q$		0.065*** (7.561)	0.032 (1.639)	0.082*** (5.581)
$\Delta TARGET \times DEP$		0.321 (0.405)	1.216* (1.896)	0.193 (0.198)
$\Delta TARGET \times SIZE$		-0.006 (-1.436)	0.020*** (4.272)	0.012** (2.161)
$\Delta TARGET \times PPE$		-0.117* (-1.788)	-0.125 (-1.584)	-0.173** (-2.155)
$\Delta TARGET \times RD$		-0.730** (-2.209)	-0.206 (-0.515)	-0.995*** (-3.118)
$\Delta TARGET \times MED_L$		0.334*** (2.873)	0.661*** (4.239)	0.080 (0.644)
<i>Year fixed effect</i>	Yes	Yes	Yes	Yes
<i>Group fixed effect</i>	Yes	Yes	Yes	Yes
Test the coefficient difference of $\Delta TARGET \times Provider$ between over-leveraged (column (3)) and under-leveraged firms (column (4))				
$\chi^2 = 0.76$ $p\text{-value} = 0.385$				
Test the coefficient difference of $\Delta TARGET \times Receiver$ between over-leveraged (column (3)) and under-leveraged firms (column (4))				
$\chi^2 = 5.14$ $p\text{-value} = 0.023$				
<i>N</i>	9,486	9,486	4,301	5,185
<i>Adjusted R²</i>	0.152	0.167	0.508	0.440

Note: This table examines whether the speed of adjustment varies between provider and receiver of intra-group loans for a sample of 9,486 firm-year observations. Column (1) to column (2) report the results for the full sample, Column (3) for firms with leverage higher than the predicted target leverage (LEV*) from model (1) (over-levered firms) and Column (4) for those with leverage lower than LEV* (under-levered firms). ***, **, and * indicate that the difference is statistically significant at 1%, 5%, or 10% level based on two-tailed tests. Variable definitions are given in Appendix 1.

4.3 Additional test

This paper further examines whether the effect of intra-group loans on the speed of leverage adjustment differs between core and non-core firms in the business groups. A firm is considered to be the “core firm” of a business group if it is at the top of the shareholding pyramid. Meanwhile, other firms within business groups are known as member firms. The definition is based on the concept of “ultimate controlling shareholders” (Yang, Kang, Lin, and Ronen 2016). From the perspective of financial advantage, core firms have control rights within their groups, with ultimate controllers typically dominating intra-group resource allocation. Core firms can typically integrate all intra-group information and reallocate resources. They can reallocate group resources to make their position in intra-group loans significant (Buchuk et al. 2020). Tunneling typically occurs when firms at the lower tiers of the pyramid lend money to those at the higher tiers. For example, if firms at the lower tiers lend money to core firms, the latter are considered borrowers (receivers of intra-group loans). Meanwhile, if core firms are receivers of intra-group loans, they are likely to use the loans for tunneling. Therefore, if core firms are internal capital receivers, their tunneling is more obvious, their adjustment costs will increase, and their capital structure adjustment speed will be reduced.

Under normal circumstances, core firms should be fund providers in business groups (Buchuk et al. 2020). Therefore, if the receivers of intra-group loans are core firms, they typically do not need to borrow money from other non-core firms due to their large size and few financing restrictions. If core firms are the providers of intra-group loans, their financial advantage will be more obvious, and their leverage adjustment speed will increase.

This paper examines whether core and non-core firms within their groups influence the correlation between intra-group loans and leverage adjustment speed. Based on the empirical results shown in Panel A of Table 7, the coefficient of $\Delta TARGET \times Intra_Loan_DM \times Core$ is not significant for the full sample (Column (1) and Column (2)), the over-leveraged subsample (Column (3)), and the under-leveraged subsample (Column (4)). When the amount of net intra-group loans is used to replace the intra-group loans dummy, the untabulated results would show that the coefficient of $\Delta TARGET \times Net\ Intra_Loan \times Core$ is positive and significant at the 10% level, indicating that core firms with intra-loan adjust their capital structures faster compared with non-core firms. This happens because they have larger amounts of intra-group loans. This finding supports the financial advantage hypothesis.

This paper also examines whether core firms within their groups are receivers or providers in the internal capital markets. The empirical results are shown in Panel B of Table 7. Column (2) shows that the coefficient of $\Delta TARGET \times Provider \times Core$ is positive and statistically significant at the 10% level, indicating that when core firms are the providers of intra-group loans, they can obtain financial benefits through the internal capital markets and adjust their capital structures quickly. On the other hand, the coefficient of $\Delta TARGET \times Receiver \times Core$ in Column (2) is

insignificant, indicating that whether the capital receivers are core firms has no significant impact on their capital structure adjustment speed. This paper finds that the coefficient of $\Delta TARGET \times Provider \times Core$ in the under-leveraged subsample (Column (4)) is positive and statistically significant at the 1% level, implying that when core firms are the loan providers, they adjust their leverage toward target levels faster in under-levered firms. This result suggests that the financial advantage of a core firm as the intra-group loan provider would be significant and would increase the leverage adjustment speed.

Combining the results of Panel A and Panel B in Table 7, this paper finds that the effect of the financial advantage of intra-group loans is more pronounced in the core firms of the business group, especially when the core firms are the providers of intra-group loans.

Controlling shareholders have more opportunities and incentives to harm minority shareholders in affiliated firms with high deviations between control rights and cash-flow rights (Johnson et al. 2000; Bertrand et al. 2002). Severe ownership deviations suggest high information asymmetry and increase adjustment costs. This paper further examines whether the relationship between intra-group loans and the adjustment speed varies between affiliated firms with high and low levels of deviations. Table 8 presents the results based on a firm's wedge, which is calculated as the divergence between seat control and cashflow rights (Kuan, Li, and Chu 2011; Yang, Chen, Kweh, and Chen 2013; Chang and Xie 2021; Lin, Cho, Wang, and Wu 2020). This paper concludes that the effect of financial advantage may be more pronounced for firms with a wider wedge.

Panel A of Table 8 presents the empirical results. Columns (1) and (2) demonstrate that the coefficient of $\Delta TARGET \times Wedge$ is negative and significant at the 1% level, implying that affiliated firms with wider wedges between seat control and ownership rights adjust their leverage to the target levels more slowly than those with thinner wedges. This result suggests that a wider wedge between seat control rights and cash flow rights in affiliated firms increases information asymmetry between the firm and the outsider. Meanwhile, weak corporate governance leads to higher adjustment costs and slower leverage adjustment speed. The coefficient on $\Delta TARGET \times Intra_Loan_DM \times Wedge$ in Columns (1) and (2) is positive and significant at the 10% level or better, suggesting that positive relationship between intra-group loans and the adjustment speed is more pronounced for firms with control rights exceeding their cash flow rights. Within their groups, receivers and providers of intra-group loans adjust their capital structures at different speeds. Columns (1) and (2) of Panel B illustrate that the coefficient of $\Delta TARGET \times Provider \times Wedge$ is insignificant. Meanwhile, the coefficient of $\Delta TARGET \times Receiver \times Wedge$ is positive and significant at the 5% level, indicating that intra-group loan receivers in firms with wider wedges adjust their capital structure faster than providers.

These results suggest that effective internal capital markets (financial advantage effect) mitigate the information asymmetry due to the wedge between control and cash flow rights,

Table 7 Internal capital market and the speed of adjustment: Core and non-core firms

Panel A: the impact of intra-group loans on the speed of adjustment				
	(1)	(2)	(3)	(4)
	Full sample	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variable</i>	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)
$\Delta TARGET$	0.233*** (28.437)	0.454*** (6.441)	0.097 (0.931)	0.639*** (7.630)
$\Delta TARGET \times Intra_Loan_DM$	0.023 (1.216)	0.038** (1.983)	-0.048** (-2.187)	0.089*** (3.665)
$\Delta TARGET \times Core$	0.018 (1.356)	0.043*** (3.154)	0.046** (2.304)	0.048*** (3.327)
$\Delta TARGET \times Intra_Loan_DM \times Core$	0.029 (0.988)	0.038 (1.300)	0.019 (0.543)	0.025 (0.716)
<i>Control variables</i>	No	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes
<i>Group fixed effects</i>	Yes	Yes	Yes	Yes
<i>N</i>	9,486	9,486	4,301	5,185
<i>Adjusted R²</i>	0.152	0.170	0.481	0.447
Panel B: the impact of provider and receiver of intra-group loans on the speed of adjustment				
	(1)	(2)	(3)	(4)
	Full sample	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variable</i>	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)
$\Delta TARGET$	0.233 (28.431)	0.462*** (6.476)	0.132 (1.243)	0.634*** (7.570)
$\Delta TARGET \times Provider$	-0.011 (-0.354)	0.029 (0.949)	0.023 (0.634)	0.016 (0.452)
$\Delta TARGET \times Receiver$	0.039 (1.785)	0.042* (1.902)	-0.071*** (-2.962)	0.148*** (4.729)
$\Delta TARGET \times Core$	0.018 (1.356)	0.043*** (3.166)	0.048** (2.377)	0.048*** (3.268)
$\Delta TARGET \times Provider \times Core$	0.079* (1.772)	0.076* (1.730)	-0.034 (-0.636)	0.137*** (2.703)
$\Delta TARGET \times Receiver \times Core$	0.001 (0.040)	0.014 (0.397)	0.033 (0.839)	-0.066 (-1.431)
<i>Control variables</i>	No	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes
<i>Group fixed effects</i>	Yes	Yes	Yes	Yes
<i>N</i>	9,486	9,486	4,301	5,185
<i>Adjusted R²</i>	0.152	0.170	0.482	0.448

Note: This table examines whether the association between intra-group loans (Panel A) (Panel B: providers and receivers) and the speed of adjustment varies between core and non-core firms for a sample of 9,486 firm-year observations. Column (1) to column (2) report the results for the full sample, Column (3) for firms with leverage higher than the predicted target leverage (LEV*) from model (1) (over-levered firms) and Column (4) for those with leverage lower than LEV* (under-levered firms). ***, **, and * indicate that the difference is statistically significant at 1%, 5%, or 10% level based on two-tailed tests. Variable definitions are given in Appendix 1.

Table 8 internal capital market and SOA: High wedge and Low wedge

Panel A: the impact of intra-group loans on the speed of adjustment				
	(1)	(2)	(3)	(4)
	Full sample	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variable</i>	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)
$\Delta TARGET$	0.255*** (24.724)	0.216** (2.533)	-0.329*** (-2.603)	0.385*** (3.787)
$\Delta TARGET \times Intra_Loan_DM$	0.025 (1.230)	0.038* (1.813)	-0.034 (-1.483)	0.138*** (4.367)
$\Delta TARGET \times Wedge$	-0.075*** (-5.276)	-0.063*** (-4.385)	0.005 (0.213)	-0.067*** (-4.339)
$\Delta TARGET \times Intra_Loan_DM \times Wedge$	0.058** (1.989)	0.057* (1.946)	0.002 (0.044)	-0.010 (-0.257)
<i>Control variables</i>	No	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes
<i>Group fixed effects</i>	Yes	Yes	Yes	Yes
<i>N</i>	6,901	6,901	3,043	3,858
<i>Adjusted R²</i>	0.154	0.165	0.466	0.399
Panel B: the impact of provider and receiver of intra-group loans on the speed of adjustment				
	(1)	(2)	(3)	(4)
	Full sample	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variable</i>	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)	<i>Coefficient</i> (<i>t</i> -Statistic)
$\Delta TARGET$	0.255*** (24.714)	0.221** (2.563)	-0.318** (-2.450)	0.352*** (3.465)
$\Delta TARGET \times Provider$	0.039 (1.074)	0.061* (1.688)	-0.007 (-0.196)	0.234*** (4.212)
$\Delta TARGET \times Receiver$	0.021 (0.904)	0.029 (1.268)	-0.041* (-1.670)	0.096*** (2.596)
$\Delta TARGET \times Wedge$	-0.075*** (-5.275)	-0.063*** (-4.367)	0.006 (0.293)	-0.068*** (-4.428)
$\Delta TARGET \times Provider \times Wedge$	0.036 (0.791)	0.025 (0.568)	0.001 (0.015)	-0.147** (-2.355)
$\Delta TARGET \times Receiver \times Wedge$	0.071** (1.997)	0.072** (2.048)	-0.005 (-0.126)	0.083 (1.587)
<i>Control variables</i>	No	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes
<i>Group fixed effects</i>	Yes	Yes	Yes	Yes
<i>N</i>	6,901	6,901	3,043	3,858
<i>Adjusted R²</i>	0.153	0.165	0.467	0.406

Note: This table examines whether the association between intra-group loans (Panel A) (Panel B: providers and receivers) and the speed of adjustment varies between higher and lower wedge firms for a sample of 6,901 firm-year observations (exclude 2,585 firm-year observations with missing values of seat control rights and cash flow rights). Column (1) to column (2) report the results for the full sample, Column (3) for firms with leverage higher than the predicted target leverage (LEV*) from model (1) (over-levered firms) and Column (4) for those with leverage lower than LEV* (under-levered firms). ***, **, and * indicate that the difference is statistically significant at 1%, 5%, or 10% level based on two-tailed tests. Variable definitions are given in Appendix 1.

reduce the adjustment costs, and increase the leverage adjustment speed, constraining the controlling shareholders' opportunistic behavior. This means that the controlling shareholders can use their ownership status to make the internal capital markets more efficient, allowing the firm to avoid external financing constraints and cause overinvestment problems (Lin and Yeh 2020) or other agency problems due to wider wedges. This supports the results of this study, suggesting that the wider wedge firm increase the leverage adjustment speed through the internal capital market. The financial advantage effect may be more pronounced among firms with wider wedges.

5. Conclusions

This study examined the effects of internal capital markets on the dynamic capital structure adjustment speed using a sample of business groups' affiliated firms in Taiwan from 1996 to 2020. To explore whether the samples differentially impact the dynamic capital structure adjustment speed, this research splits internal capital markets into receivers (borrowers from other firms within their groups) and providers (lenders to other firms within their groups) of intra-group loans. Specifically, this study attempted to answer the following research questions. First, if business groups have internal capital markets, will their capital structure adjustment speed be reduced or raised? Second, do capital receivers and providers in internal capital markets influence their capital structure adjustment speed differently?

The empirical results revealed that affiliated firms with intra-group loans adjust their capital structures faster than those without intra-group loans in business groups. This effect is particularly more pronounced in under-levered firms. This finding indicates that business groups' intra-group loans reduce adjustment costs and increase capital structure adjustment speed, showing that internal capital markets may produce greater financial advantage than tunneling effects.

Internal capital markets have receivers and providers of intra-group loans with different capital structure adjustment speeds. This study divided intra-group loans as received and provided. The results revealed that, compared with providers, intra-group loan receivers increase debts and reduce adjustment costs through internal capital market funds; thus, their capital structures are more rapidly adjusted. For receivers of intra-group loans, internal capital markets can reduce debt adjustment costs through business groups' financial advantages to raise the debt adjustment speed, indicating that internal capital markets influence providers' and receivers' capital structure adjustment speeds differently. Furthermore, this study considered core and non-core firms within the groups to explain whether business groups have financial advantages or tunneling in their capital-structure adjustment. The results revealed that, compared with non-core firms, core firms among business groups adjust their capital structures faster. In particular, the effect is more pronounced among affiliated firms offering intra-group loans. This finding suggested that core firms could control and reallocate internal resources, allowing them to gain

financial advantage through internal capital markets. Therefore, providers of intra-group loans—core firms—adjust their capital structures quickly.

This study addressed the severe deviations between seat control and cash-flow rights and finds that capital receivers adjust their capital structures quickly. Overall, this study emphasizes the importance of intra-group loans in shaping dynamic capital structures and reveals business groups' financing advantages.

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Appendix 1 Variable definitions

Variable	Definition
<i>LEV</i>	Total liabilities divided by total assets.
<i>LEV*</i>	Estimated book target leverage, calculated using the model (1).
ΔLEV	the difference between current leverage and prior year leverage.
$\Delta TARGET$	the difference between actual leverage and target leverage.
<i>Net Intra_Loan</i>	<i>Net Intra_Loan</i> is the net amount of loan to related-party within the group minus the amount of loan from related-party providers of intra-group loans, scaled by each firm's total assets.
<i>Intra_Loan_DM</i>	<i>Intra_Loan_DM</i> is one if <i>Net Intra_Loans</i> is not equal to zero, and zero otherwise.
<i>Provider</i>	Provider is one for <i>Net Intra_Loan</i> is positive, and zero otherwise.
<i>Receiver</i>	Receiver is one for <i>Net Intra_Loan</i> is negative, and zero otherwise.
<i>EBIT</i>	Profitability, Earnings before interest and tax divided by total assets.
<i>Q</i>	Growth opportunities, the sum of market value of equity and book value of total liability divided by the book value of total assets.
<i>DEP</i>	Depreciation divided by total assets.
<i>SIZE</i>	The natural logarithm of total assets.
<i>PPE</i>	Net plant, property and equipment divided by total assets.
<i>RD</i>	Research and development expenses dividend by the total assets.
<i>MED_L</i>	The industry-year median leverage.
<i>Core</i>	A firm is considered a business group's core firm "if it is at the top of a pyramidal shareholding, while other firms within business groups are known as member firms. In other words, the definition is based on the concept of ultimate controlling shareholders"
<i>Wedge</i>	The difference between seat control rights and cash-flow rights.

Appendix 2 The determinants of target capital structure

<i>Variable</i>	<i>Predict Sign</i>	<i>Coefficient (t-value)</i>
<i>Intercept</i>		−0.439 ^{***} (−17.22)
<i>EBIT</i>	−	−0.279 ^{***} (−31.28)
<i>Q</i>	−	−0.012 ^{***} (−11.22)
<i>DEP</i>	+/−	0.027 (0.52)
<i>SIZE</i>	+	0.036 ^{***} (44.30)
<i>PPE</i>	+	0.033 ^{***} (4.17)
<i>RD</i>	−	−0.325 ^{***} (−11.14)
<i>MED_L</i>	+	0.464 ^{***} (12.63)
<i>Year fixed effects</i>		Yes
<i>Industry fixed effects</i>		Yes
<i>N</i>		21,249
<i>Adjusted R²</i>		0.249

Note: This table examines the determinants of target capital structure. ***, **, and * indicate that the difference is statistically significant at 1%, 5%, or 10% level based on two-tailed tests. Variable definitions are given in Appendix 1.

Appendix 3

Panel A: Table 4 Business groups affiliation and the speed of adjustment

Variables	Period: 1996-2007			Period: 2008-2010			Period: 2011-2020		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variables</i>	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)
$\Delta TARGET$	0.369*** (2.873)	0.085 (0.504)	0.610*** (4.294)	0.310** (2.414)	0.575*** (3.211)	0.191 (1.285)	0.768*** (11.861)	0.631*** (6.833)	0.906*** (12.105)
$\Delta TARGET \times GROUP$	-0.169*** (-8.535)	-0.098*** (-3.769)	-0.124*** (-5.269)	-0.449*** (-14.835)	-0.235*** (-5.093)	-0.281*** (-7.356)	-0.194*** (-15.392)	-0.099*** (-5.343)	-0.212*** (-13.440)
<i>Control variables</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Group fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	7,117	3,412	3,705	3,505	1,734	1,771	14,132	6,874	7,258
<i>Adjusted R²</i>	0.288	0.573	0.600	0.245	0.513	0.560	0.229	0.502	0.534

Panel B: Table 5 Intra-group loans and the speed of adjustment

Variables	Period: 1996-2007			Period: 2008-2010			Period: 2011-2020		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*	Full sample	Over-leveraged LEV > LEV*	Under-leveraged LEV ≤ LEV*
<i>Variables</i>	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)	Coefficients (<i>t</i> -Statistic)
$\Delta TARGET$	0.179* (1.755)	0.573*** (4.190)	0.320*** (3.091)	0.068 (0.452)	0.499** (2.409)	0.243 (0.934)	0.628*** (7.728)	0.463*** (3.648)	0.702*** (7.299)
$\Delta TARGET \times Intra_Loan_DM$	0.043*	0.037	0.049*	-0.029	0.045	-0.036	0.035*	-0.073***	0.081***

Panel C: Table 6 Internal capital markets and the speed of adjustment: provider and receiver									
Period: 1996-2007									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
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集團企業內部資本市場對資本結構調整速度的影響：以臺灣為例

陳昭蓉¹ 朱雅菁² 吳偉劭³ 朱全斌¹

¹ 國立屏東大學會計學系

² 國立成功大學會計學系暨財務金融研究所

³ 國立臺北商業大學財務金融系

通訊作者：陳昭蓉

通訊地址：900392 屏東市民生東路 51 號（屏商校區）

E-mail：chjung25@mail.nptu.edu.tw

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摘 要

本文以 1996-2020 年的臺灣集團企業為樣本，探討集團內部貸款對於動態資本結構調整速度的影響。實證結果發現，有集團內部貸款的企業會提高資本結構調整速度，尤其在實際負債低於目標負債的樣本中更為明顯，支持融資優勢假說。本文進一步將集團內貸款區分為資金供給者（貸款給集團內的其他公司）及資金需求者（向集團內其他公司借款），則發現資金需求者因為可向集團內借款，降低資金成本，提高負債調整速度。本文進一步發現核心公司且為資金提供者或是席次控制權與現金流量權偏離嚴重且為資金需求者的公司，集團內部借款與資本結構調整速度的正向關係更為明顯。本文實證發現主要支持集團內部融資存在融資優勢的論點，因此可提高集團企業資本結構調整速度。

關鍵詞：資本結構調整速度、內部資本市場、集團企業

本文榮獲「2022 年會計理論與實務研討會」最佳論文獎。作者感謝「2022 年中華會計教育學會年會」參與學者的寶貴意見。作者感謝科技部所給予的專題計畫經費補助（計畫編號：MOST 110-2410-H-153 -006）。

數據可用性：本文使用的數據可從公開資料來源取得。



1. 研究議題

相較於非集團企業，集團企業本身存在內部資本市場，但集團內部資本市場可能產生融資優勢效果或利益輸送效果 (Buchuk et al. 2014)，本文採用 1996-2020 年的臺灣集團企業為樣本探討集團內借貸對於資本結構調整速度的影響。若融資優勢假說成立，調整成本下降，資本結構調整速度提高；若利益輸送假說成立，則會讓調整成本提高，導致資本結構調整速度下降，顯示內部資本市場對於資本結構調整速度的影響是一個實證問題。具體來說，本文主要探討下列研究問題：第一、若集團企業存在內部資本市場，是否會提高或降低資本結構調整速度？第二、集團內部資本市場的資金需求者（向集團內其他公司借款）及資金供給者（貸款給集團內其他公司）對於資本結構調整速度的影響是否不同？

2. 研究假說

相較於非集團企業，集團企業本身存在內部資本市場，根據融資優勢假說，集團組織型態可透過內部資本市場重新分配集團資源，且透過集團成員之間互相提供借貸或擔保而存在共保效應，降低資金成本或降低公司的融資限制，因而降低負債調整成本，因此預期若集團內部存在內部資本市場（即集團內部借貸）可提高資本結構調整速度，也就是可讓實際負債比率接近目標負債比率；然而，根據利益輸送假說，控制股東可能透過集團內部借貸移轉集團資源圖利自己，讓集團控制股東為了自己的利益而傷害小股東，反而容易讓集團企業透過內部資本市場的交易進行利益輸送，進而利用內部資本市場產生資源錯置的現象，造成嚴重的代理問題，則反而會提高調整成本，資本結構調整速度會變慢，亦即實際負債會越偏離目標負債。因此，根據融資優勢假說及利益輸送假說，假說 1 預期集團內借貸會影響資本結構調整速度，但不預期方向，假說 1 設立如下：

假說 1：集團內貸款會影響資本結構調整速度。

集團內部借貸可區分為資金需求者及資金供給者，其對於資本結構調整速度的影響可能不同。相較於資金供給者，若是資金需求者，通常會有較多的融資限制 (Buchuk, Larrain, Prem, and Urzúa Infante 2020)，資金需求者的借款來源主要來自於集團其他成員，通常資金成本較低及借款條件較好，較不會有破產的風險，Buchuk et al. (2014) 也發現資金需求者的總負債會提高，而資金供給者的總負債則較無變動，本文認為如果有較多來自於集團內的借款或保證，可以降低調整成本，使得集團內資金需求者的資本調整結構速度會更快。因此相較於資金供給者，資金需求者有來自於集團內的借款而提高負債，實際負債調整到目標負債比率的速度較快。假說 2 預期，相較於資金供給者，資金需求者負債的調整成本較

低，資本結構調整速度較快。

假說 2：相較於資金供給者，資金需求者的資本結構調整速度較快。

3. 研究方法

本文主要探討集團內部貸款對於資本結構調整速度的影響。首先，第一階段採用模式

(1) 估計目標負債比率 ($LEV_{i,t}^*$)

$$LEV_{i,t} = \beta \chi_{i,t-1} \quad (1)$$

其中， LEV 為總負債除以總資產， $\chi_{i,t-1}$ 為 i 公司第 $t-1$ 期會影響不同的負債比率的成本及利益的公司特性變數。

第二階段，採用模式 (2) 估計公司每一期會將負債比率部份調整到目標負債的速度， δ 代表實際負債比率調整到目標負債的調整速度， Δ 通常介於 0~1 之間，若 Δ 等於 1，代表公司可以立刻將實際負債比率調整到目標負債比率，若 Δ 小於 1，則代表公司實際負債比率偏離目標負債比率。將第 (1) 式代入第 (2) 式，並加入本文主要檢測變數 $Intra_Loan_DM_{i,t-1}$ 改寫為第 (3) 式。

$$LEV_{i,t} - LEV_{i,t-1} = \delta \times (LEV_{i,t}^* - LEV_{i,t-1}) + \varepsilon_{i,t} \quad (2)$$

$$LEV_{i,t} - LEV_{i,t-1} = (\delta_0 + \delta_1 \times Intra_Loan_DM_{i,t-1})(LEV_{i,t}^* - LEV_{i,t-1}) + \varepsilon_{i,t}$$

$$\begin{aligned} \Delta LEV_{i,t} &= (\delta_0 + \delta_1 \times Intra_Loan_DM_{i,t-1}) \Delta TARGET_{i,t} + \varepsilon_{i,t} \\ &= \delta_0 \times \Delta TARGET_{i,t} + \delta_1 \times Intra_Loan_DM_{i,t-1} \times \Delta TARGET_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

為了檢測本文假說 1 集團內部借貸情況對於負債調整速度的影響，在模式 (3) 加入交乘項 $Intra_Loan_DM_{i,t-1} \times \Delta TARGET_{i,t}$ ，若集團內存在內部資本市場， $Intra_Loan_DM$ 設為 1，其他為 0； $\Delta TARGET_{i,t}$ 為。並加入其他控制變數，將模式 (3) 改為模式 (4)，若支持融資優勢假說，則預期交乘項 $\delta_1 > 0$ ；若支持利益輸送假說，則預期 $\delta_1 < 0$ 。

$$\begin{aligned} \Delta LEV_{i,t} &= (\delta_0 + \delta_1 \times Intra_Loan_DM_{i,t-1} + \delta_n \times Z_{i,t-1}) \Delta TARGET_{i,t} + \varepsilon_{i,t} \\ &= \delta_0 \times \Delta TARGET_{i,t} + \delta_1 \times Intra_Loan_DM_{i,t-1} \times \Delta TARGET_{i,t} \\ &\quad + \delta_n \times Z_{i,t-1} \times \Delta TARGET_{i,t} + Year\ fixed\ effects + Group\ fixed\ effects + \varepsilon_{i,t} \end{aligned} \quad (4)$$

進一步將 $Intra_Loan_DM_{i,t-1}$ 區分為資金提供者 (*Provider*) 與資金需求者 (*Receiver*)，修改為模式 (5)，進一步檢測假說 2，當集團內部借貸淨額 > 0 ，代表為資金提供者，*Provider* 設為 1，其他設為 0；如果集團內部借貸淨額 < 0 ，代表為資金需求者，*Receiver* 設為 1，其他設為 0。H2 預期 δ_3 大於 δ_2 。

$$\begin{aligned} \Delta LEV_{i,t} = & \delta_1 \times \Delta TARGET_{i,t} + \delta_2 \times Provider_{i,t-1} \times \Delta TARGET_{i,t} + \delta_3 \times Receiver_{i,t-1} \times \\ & \Delta TARGET_{i,t} + \delta_4 \times Z_{i,t-1} \times \Delta TARGET_{i,t} + Year\ fixed\ effects + \\ & Group\ fixed\ effects + \varepsilon_{i,t} \end{aligned} \quad (5)$$

4. 研究結果

實證結果發現，若有集團內部貸款的企業其資本結構調整速度較快。本文進一步將集團內貸款區分為資金供給者及資金需求者，則發現透過集團內部貸款的資金需求者的負債調整速度較快，上述實證發現在實際負債低於目標負債的樣本中更為明顯，支持融資優勢假說。本文進一步考量是否為集團核心公司或是席次控制權與現金流量權偏離程度對於上述議題的影響，結果發現，核心公司且為資金提供者或是席次控制權與現金流量權偏離嚴重且為資金需求者的公司，集團內部借貸與資本結構調整速度的正向關係更為明顯。整體而言，實證發現主要支持集團內部融資存在融資優勢的論點，因此可提高集團企業資本結構調整速度。並透過將內部資本市場區分為資金需求者及資金供給者，進一步了解在內部資本市場中扮演的角色不同，對於資本結構調整速度的影響也不同。