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THE IMPACT OF INDUSTRY-ADJUSTED PROFITABILITY AND S-CURVE TARGETED INDUSTRY ON CAPITAL STRUCTURE: EVIDENCE FROM THAILAND

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ABSTRACT

This study examines the impact of industry-adjusted profitability and S-curve targeted industries under an innovation-driven economy on firms' capital structures in Thailand. The results demonstrate that a superior degree of industry-adjusted profitability reduces the need for debt financing. Within the industry, franchise and harvest firms with sufficient earnings have a lower debt overhang than under-performing firms. Furthermore, the S-curve targeted industries, which typically use debt to finance their expensive investments, appear to use fewer loans when they feel pressured by the investment support policy to intensify research and development (R&D) activities. Overall, in the emerging market geared toward a new economic roadmap, firms' capital structures are shaped by competitive performance as well as industry and policy forces.

Keywords: Industry-adjusted profitability, Competitive position, Targeted industry, S-curve, Capital structure, Innovation-driven economy

INTRODUCTION

Decision-making regarding financial sources is critical for a firm's long-term economic success. The business cycle and market forces that offer competitive

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advantages over competitors are linked to capital finance (Kumar et al., 2017). Within an industry, the capital structures of firms vary greatly (MacKay & Phillips, 2005), and likely hinge on the level of agency conflicts and the degree of industry competition (Degryse et al., 2012). Firms in advanced and competitive sectors are subject to several equilibrium factors that shape their financial status. Existing literature suggests that a firm's relative profitability within an industry is important and has an effect on the sensitivity of its stock returns to industry news (Hao et al., 2011), the variation in its cost of capital (Safdar, 2018), and the degree of earnings manipulation to achieve industry-average performance (Yamaguchi, 2022).

On the one hand, the association between industry-specific factors and financing is difficult to discern, as the industry sector is characterised by large units, changes over time, and variations between and within economies. Despite such difficulties, the majority of variation in leverage ratios appears to be driven by unobserved, time-invariant factors that generate a stable capital structure for each industry over long horizons (Lemmon et al., 2008). In practice, the industry-fixed effects on financial decision-making remain significant for users. For example, banks use firms' industry-level information to estimate expected losses and the probability of default when making loans to them (Amiram et al., 2017). Likewise, investors see the character, competitive environment, and systematic risk of an industry sector as signs that help them predict the future success of a member firm (Abad et al., 2020).

The objectives of this study are to examine the impact of the intra-industry factor (industry-adjusted profitability) and the inter-industry factor (S-curve targeted industry) on capital structure in Thailand. The study was conducted on Thai businesses as Thailand's economy has long been dominated by the banking system. Prior to the 1997 Asian financial crisis, the banking sector provided the majority of funds to fuel business activities, resulting in an accumulation of bad loans. A revolution against the flawed monetary system and poor governance practices was sparked as a result of the financial crisis (see details in Appendix A). In the Thai capital market, firms' current earnings appear to have the predictability of their future performance and cash flows (Boonlert-U-Thai & Sen, 2019). However, the new CEOs were motivated to create an earnings impression to signal competitiveness (Nuanpradit, 2019). When deciding on their financing policies, firms might compare their profitability to that of their peers. Additionally, the Thailand 4.0 agenda has resulted in policies promoting innovation and knowledge-based economies, particularly in the 10 S-curve targeted industries (Rattanakhamfu & Tangkitvanich, 2018). The business sector must adapt in order to take advantage of the government's assistance (Banmairuroy

et al., 2022). Innovative and technology costs are prohibitively expensive despite a variety of investment subsidies, making alternative financing sources inaccessible to targeted firms. According to Abadi et al. (2016), the debt structure of emerging economies differs from that of developed economies because capital markets are less developed, there are fewer external sources of capital, and creditors are not as effectively protected.

This study contributes to the literature on accounting performance, competitiveness, innovative industry, and capital structure in many ways. First, this research fills gaps in the literature that examined the effect of firms' and/or their industry's profitability on the firms' capital structure (e.g., Haron, 2018; M'ng et al., 2017) by offering a measure of industry-adjusted profitability. Second, to the best of my knowledge, this research is the first to establish the relationship between the intra-industry competitive positions, derived from the relative profitability and growth matrix in the study of Calandro Jr. and Lane (2007), and capital structure. Furthermore, this research contributes to Miao (2005) and Hall (2010)'s theoretical literature on the financing of innovative firms by providing empirical evidence of the link between the targeted industries and debt finance in emerging markets like Thailand, which has recently advanced to an innovation-driven economy with investment subsidies available. Additionally, this evidence will complement that from advanced markets like Italy, where Bragoli et al. (2016) found a nonlinear relationship between innovation intensity and leverage.

THE THAILAND 4.0 MODEL'S TARGETED INDUSTRY

The Thai R&D system's efficiency rates were considerably lower than those of other Asia-Pacific countries from 2002–2010 (Rattanakhamfu & Tangkitvanich, 2018). The Thai economy stagnated at middle-income levels and was unable to reach high-income levels. To escape the middle-income trap, Thailand must implement a proactive innovation policy, establish targeted industries with clear objectives, and take measures to attract international leaders to invest in the country (Office of Industrial Economics, 2017). This increases competitive advantages and changes the structure of the economy from manufacturing and asset-based to knowledge-based industries. In late 2015, the nation introduced the Thailand 4.0 new model, aiming at four goals of national development: economic prosperity, social well-being, raising human values, and environmental protection. To do so, the 10 sectors of the first (old) and new S-curve[1] targeted industries were used as an engine to develop an innovation-driven economy, and targeted firms have been stimulated to scale up their R&D activities.

The former is the existing S-curve industries, which are a traditional growth engine of the Thai economy and for which the government has made significant efforts to support over the last decade (Banmairuroy et al., 2022). The first S-curve targeted industries include the five existing sectors: cars, smart electronics, affluent medical and wellness tourism, agriculture and biotechnology and food. Thailand needs to introduce a new growth engine, namely innovation-and-technology-based industries, to challenge the fast pace of global economic transformation. This gives rise to the new S-curve targeted industries, which are made up of five new sectors: robotics, logistics and aviation, biofuels and biochemicals, digital technology, and medical services. These industries are characterised by a lot of innovation and technology.

The nation has been continuously encouraging Thai firms to use innovation and technology by revising and issuing legislation, such as the Investment Promotion Act No. 1 (1977), No. 2 (1991), No. 3 (2001), No. 4 (2017) and the National Competitiveness Enhancement for Targeted Industries Act No. 1 (2017). Following that, the eligible firms will receive a variety of basic tax and non-tax advantages, and if they are in the targeted industries, they will gain additional privileges (e.g., increased tax relief timing). A variety of investment incentives include, firstly, the provision of grants for R&D investment to firms through government agencies and universities. Second, state-owned companies are expected to make a minimum investment in private R&D. Third, self-funded R&D expenses are eligible for a maximum tax deduction of 300%. Fourth, a maximum 13-year income tax exemption is permitted for self-funded R&D expenditures. Fifth, over a 10-year period, self-financed R&D spending is eligible for a 50% income tax cut. Sixth, some tight restrictions on foreign workers are removed. Last but not least, import duties on R&D-related machinery and raw materials will be waived.

THEORY, LITERATURE REVIEW AND HYPOTHESIS

Profitability

Donaldson (1961) argued that managerial attitudes prefer internal sources of funds over external sources. Myers and Majluf (1984) propounded the concepts of information asymmetry and adverse selection and pioneered the pecking order theory. The asymmetric information between managers and external investors establishes a preference ranking for the three financing sources, with each source being subject to a different degree of adverse selection. An issuance of equity is subject to a serious adverse selection problem. A loan from a lender is subject to

only a minor adverse selection problem, and the use of retained earnings eliminates the problem (Frank & Goyal, 2009). Equity is inherently riskier than debt because, when a firm announces stock issuance, rational investors then revalue the firm's financial status. Meanwhile, retained earnings are a better source of funds than outside financing from either equity or debt. If retained earnings aren't enough, the firm will look for debt financing, then equity as a last resort.

Existing research indicates a negative association between debt finance and firm or industry profitability in numerous economies following the pecking order theory. In the developed market, Bragoli et al. (2016) found that the profitability reduced leverage levels of Italian firms both before and during the global economic crisis, owing to sufficient internal capital generated by their profits. On the one hand, undeveloped debt markets oftentimes result in high borrowing costs and are associated with considerable information asymmetry, which makes equity financing costly as well (Kumar et al., 2017). For instance, Haron (2018) concluded that the national financial reform policy encourages Indonesian firms to fund investment through retained earnings rather than bank loans. Mazur (2007) argued that the negative association between profitability and debt exists exclusively among Poland's less profitable firms. Nonetheless, Polish firms with high profits receive substantial loans due to their low bankruptcy risk at the time. Besides, Ahsan et al. (2016) found that Pakistani firms with high profit use less debt, but they would increase debt levels if the average profitability of their industry increased. Kuč and Kaličanin (2021) further summarized that financial performance has a negative impact on short-term debt for large firms in Serbia. In a nutshell, profitability has a pronounced negative effect on debt levels in developing countries due to inefficient long-term bond markets and the difficulties associated with borrowing against intangible growth opportunities (Booth et al., 2001), and in southern Asian countries due to information asymmetry and adverse selection costs (M'ng et al., 2017). Conversely, small and medium firms in Taiwan (Thi & Phung, 2021) and auto and cement firms in Pakistan (Nazir et al., 2021) have underperformed when they rely on debt finance.

Profitability fluctuations within industries are significantly greater than those between industries (Bourgeois III et al., 2014), implying different profit rates and competitive advantages across industry members (Caves & Porter, 1977; Hawawini et al., 2003). Profitability in comparison to peers serves as an indicator of both strengths and weaknesses, reflects a firm's competitive status, e.g., franchise, harvest (Calandro Jr & Lane, 2007), and communicates the corporate potential, e.g., operational systems, management quality, and product innovation (Dawkins et al., 2007). According to Hao et al. (2011), the stock returns of more profitable firms are less sensitive to industry news than those of less profitable

firms within the industry. In other words, the stronger the competitive position a firm is in, as demonstrated by its relative profitability, the less systematic risk it faces relative to its peers in the same industry. For the Thai firms, new CEOs also exploited increasing profits to impress the market (Nuanpradit, 2019). Based on the pecking order theory, the current study argues that businesses view high profitability relative to their industry peers as a competitive advantage. Funding capital investment by accumulated earnings produces fewer adverse selection problems, so they avoid reliance on loan financing. Increases in debt costs may lead to more information dispersion and the greater responsiveness of stock prices to external shocks, hence limiting competitiveness in developing markets. Thus, firms with a higher degree of industry-adjusted profitability discourage the use of debt. The hypothesis is as follows:

H1: Industry-adjusted profitability is negatively associated with debt financing.

Industry Effects

Modigliani and Miller (1958) established capital structure and firm valuation theories, arguing that a firm's market value is unrelated to its capital structure. Modigliani and Miller (1963) later proposed that the presence of interest tax subsidies increases the firm's value. Kraus and Litzenberger (1973) formalised the trade-off theory by demonstrating that a firm chooses its target capital structure by comparing the tax benefits of debt against the bankruptcy and agency costs associated with debt. Bradley et al. (1984) confirmed, based on the classical trade-off theory, that the optimal degree of leverage is negatively linked to the cost of financial distress and to the quantity of non-debt tax shields. Firms with increased advertising and R&D spending are accompanied by high agency costs of debt, so they avoid incurring debt. In contrast, regulated firms appear to utilise significant leverage. Accordingly, Jensen and Meckling (1976), who presented the agency theory, claimed that risk-averse industries, such as public utility companies, financial institutions, and mature-stage businesses, make substantial use of debt finance.

Firms within an industry exhibit a homogenous capital structure, and industries retain their relative leverage ranks over time (Harris & Raviv, 1991). Differences in the average debt ratios between industry categories depend on asset risks, external fund requirements and economic conditions (Myers, 1984). Titman (1984) pointed out that liquidation imposes high costs on manufacturing

industries whose products require the availability of specialised service and spare parts. Firms lower their leverage level if they can charge high costs to customers. Chang et al. (2009) found that U.S. firms with exclusive products, customers, or suppliers are reluctant to take on debt. Many stakeholders will be affected if highly specialised firms become bankrupt. Kayo and Kimura (2011) suggested that munificence firms across 40 countries have lower leverage levels, owing to abundant resources, less market competition, and high profitability. Consistent with the evidence of Smith et al. (2015), a climate favouring a munificent industry encourages New Zealand firms to generate excess resources as a buffer against periods of shortages, and maintain their debt capacity for future contingencies. In Indonesia, firms in dynamic industries, which operate in an unpredictable business environment, take on less debt to mitigate liquidity risks (Haron, 2018). In India, bank lending to innovative firms is constrained due to the firms' failure to generate satisfactory short-term returns on investments (Gupta, 2019).

On the other hand, Italian firms with increased R&D activity would incur significant debt, but banks offer loans up to a certain level of R&D expenditure (Bragoli et al., 2016). Li and Islam (2019) concluded that leverage ratios are higher for Australian firms operating in market-leading and economically significant industries. The economic characteristics, competitive dynamics, and specialisation of these industries allow firms to finance them with debt. Moreover, previous studies discuss the relationship between the industry categories and debt, with two competing views. For example, Frank and Goyal (2009) suggest that firms in regulated industries have stable cash flows and low financial distress costs, which improve their ability to raise more debt. However, these firms allow managers less discretion and feature a lower level of conflict between managers and shareholders, hence taking on debt is less desirable. Miao (2005) indicates that leverage will decrease when a firm operates in industries that have rapid technological growth, high bankruptcy costs, and high fixed operating costs. Nonetheless, if those industries have high entry costs, leverage levels may be increased.

Thai business sectors have been continuously encouraged to raise competitiveness through tax and non-tax incentives.[2] Recently, the second agenda of the Thailand 4.0 model aiming at an innovation-driven economy embraces the S-curve targeted industries in the advanced technological and innovation sectors. Intuitively, this new economic policy calls for increasing investment in R&D activities for the targeted firms. The government, through many agencies, has improved various tools of investment support, e.g., cash grants, the two-step system of tax incentives, and permission for foreigners, to motivate innovative spending. These targeted firms receive extra benefits from the non-debt tax shields

and the non-tax shields exclusively. Bragoli et al. (2016) reported that public limited companies normally characterised by diluted ownership appear to have more reliance on debt at first and then tend to minimise leverage as R&D intensity increases. In this current study, the targeted industries exhibit characteristics such as technology, entrance and exit obstacles, industry competition, risk levels, and government subsidies that are not present in non-targeted industries, implying a separate capital structure. This study contends that targeted firms that receive privileged tax and non-tax benefits over non-targeted firms face additional risks if they need to scale up R&D activities in response to recent economic policy. In line with the classical trade-off theory, thus, the targeted firms will likely lower debt finance in order to curtail the subsequent leverage-related costs (bankruptcy costs and agency costs of debt) when they are compelled to raise those activities. The hypothesis is as follows:

> H2: Under the new economic model, the targeted industries are negatively associated with debt financing.

METHODOLOGY

Sample Data and Description

The sample consists of all listed firms on the Stock Exchange of Thailand (SET) over the period 2001–2018. Longitudinal financial data for the sample was collected from the SET Market Analysis and Reporting Tool (SETSMART) database and the Securities and Exchange Commission of Thailand website. The initial sample comprises 8,401 firm-year observations (100%) for all industries (excluding rehabilitated firms). According to the SET's industry classification, Thai listed firms are categorised into 28 sectors in eight industry groups, including (1) agro and food, (2) consumer products, (3) financials, (4) industrials, (5) property and construction, (6) resources, (7) services and (8) technology. The removal of incomplete financial data and unusual data from the initial sample set resulted in 2,301 firm-year observations (27.4%) and 42 firm-year observations (0.5%), respectively. The final sample was 6,058 firm-year observations (72.1%) of 549 firms.

Models and Variables

This study analyses the 18-year unbalanced panel data. The common issue arising from model estimations of panel data is whether to choose a fixed or random effects model. The former treats individual firm effects as constant (time invariant). The latter takes these effects as random disturbances that vary across the firm-year

observations and are uncorrelated in the model. This study reports the main results of both models and employs the specification test to evaluate which model is the more appropriate model when interpreting the results. In ordinary least squares (OLS) regression models, the control variables are size, firm performance, growth opportunities tangibility, and the year-fixed effects as follows:

$$LDR_{i,t} = \beta_0 + \beta_1 PROFIT_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 PERF_{i,t} + \beta_4 GROWTH_{i,t} + \beta_5 TANG_{i,t} + Year\ Fixed\ Effects + \varepsilon_{i,t} \quad (1.1)$$

$$LDR_{i,t} = \beta_0 + \beta_1 FRANCHI_{i,t} + \beta_2 HARVEST_{i,t} + \beta_3 UNPROGRO_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 PERF_{i,t} + \beta_6 GROWTH_{i,t} + \beta_7 TANG_{i,t} + Year\ Fixed\ Effects + \varepsilon_{i,t} \quad (1.2)$$

$$LDR_{i,t} = \alpha_0 + \alpha_1 TARGET_{i,t} + \alpha_2 TARGET{*}AFT2015_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 PERF_{i,t} + \alpha_5 GROWTH_{i,t} + \alpha_6 TANG_{i,t} + Year\ Fixed\ Effects + \varepsilon_{i,t}. \quad (2)$$

$$LDR_{i,t} = \gamma_0 + \gamma_1 PROFIT_{i,t} + \gamma_2 TARGET_{i,t} + \gamma_3 TARGET{*}AFT2015_{i,t} + \gamma_4 SIZE_{i,t} + \gamma_5 PERF_{i,t} + \gamma_6 GROWTH_{i,t} + \gamma_7 TANG_{i,t} + Year\ Fixed\ Effects + \varepsilon_{i,t} \quad (3.1)$$

$$LDR_{i,t} = \gamma_0 + \gamma_1\ FRANCHI_{i,t} + \gamma_2\ HARVEST_{i,t} + \gamma_3\ UNPROGRO_{i,t} + \gamma_4 TARGET_{i,t} + \gamma_5 TARGET{*}AFT2015_{i,t} + \gamma_6 SIZE_{i,t} + \gamma_7 PERF_{i,t} + \gamma_8 GROWTH_{i,t} + \gamma_9 TANG_{i,t} + Year\ Fixed\ Effects + \varepsilon_{i,t} \quad (3.2)$$

This study measures the capital structure ($LDR_{i,t}$) by using the book value ratio of long-term debt to total assets of firm *i* at the end of fiscal year *t*, following recent studies (e.g., Chen et al., 2016). Long-term debt, compared to short-term debt and convertible debt, is the most significant proxy for the capital structure. Adoption of leverage book values rather than leverage market values is a reasonable approach as financial managers basically use book leverage to make corporate decisions (Graham & Harvey, 2001).

Industry-adjusted profitability ($PROFIT_{i,t}$) is captured by a dummy variable, which is coded one for firm *i* in year *t* if its profitability is greater than the median of its own industry (superior relative profitability) and zero otherwise (inferior relative profitability). Profitability is calculated by the ratio of earnings before interest and tax to the average of last and current year's total assets at the end of the fiscal year. This study's industry-adjusted profitability is a relative measure similar to that of Hao et al. (2011). While those authors adopt the profitability ranking within the industry and assign a ranked value to each observation, this current study classifies each observation into one of two groups: industry median-

upper profitability or industry median-lower profitability. Because businesses frequently use the relative profitability and growth matrix to position their competitors in order to formulate investment and finance policies (Calandro Jr. & Lane, 2007). This study thus breaks down the measure of industry-adjusted profitability into the four competitive positions within an industry. Each observation is annually classified into a quadrant of the competitive matrix: franchise (if its profitability and growth are both above the industry median), harvest (if its profitability is above the industry median, but its growth is below the industry median), unprofitable growth (if its profitability is below the industry median, but its growth is above the industry median), or under-performing (if its profitability and growth are both below the industry median). The firm's competitive position is then represented by one of three dummy variables: coded one, if the firm-year observation is positioned at the franchise (*FRANCHI*), harvest (*HARVEST*), or unprofitable growth (*UNPROGRO*); and zero otherwise (the under-performing position).

Targeted industry ($TARGET_{i,t}$) is measured by a dummy variable, which is coded one for firm i in year t if the firm operates in a sector related to the 10 S-curve targeted industries of the national economic agenda, and zero otherwise. This study matches the definitions of the 10 S-curve targeted industries with the 28 sectors of the SET. Consequently, the targeted firms are those firms from nine sectors of five industries: (1) agro and food (the two sectors of agribusiness; food and beverage), (2) industrials (the automotive sector), (3) resources (the energy and utilities sector), (4) services (the three sectors of health care services; tourism and leisure; transportation and logistics), and (5) technology (the two sectors of electronic components; information and communication technology). Despite the fact that Thai firms in the specific sectors/areas have long been encouraged to innovate, the targeted industries were officially formed in 2015 following the introduction of the Thailand 4.0 model in order to enhance R&D levels. This study interacts *TARGET* with *AFT2015* as a dummy variable, which is coded one for the observations from year 2015 onwards, and zero otherwise. Therefore, the interaction term of *TARGET*AFT2015* is a proxy for the targeted industries under the new economic policy.

Size ($SIZE_{i,t}$), measured by the natural logarithm of total assets for firm i at the end of fiscal year t, is employed to control the firm's different potential for debt financing based on its size. The trade-off theory predicts the positive effect of firm size on debt. Firms with a large size are more diversified, and their bankruptcy costs fall. Large firms are anticipated to have easier access to debt financing (e.g., Degryse et al., 2012).

Performance ($PERF_{i,t}$), calculated as the ratio of earnings before interest and tax to the average of last and current year's total assets for firm *i* at the end of fiscal year *t*, denotes the returns on total assets that have a significant impact on the capital structure. Under the pecking order theory, firms in developing countries assign a priority to retained earnings as a source of funding due to high debt costs and limited financial sources (Kumar et al., 2017). Thus, a negative relationship between performance and leverage is anticipated.

Growth opportunities ($GROWTH_{i,t}$), computed by the market value of equity divided by the book value of equity for firm *i* at the end of fiscal year *t*, communicate the potential for future business expansion. A high growth opportunity provokes moral hazard problems and more risk-taking, which leads to financial distress and a firm's devaluation (Myers, 1977). Therefore, growing firms would likely reduce debt levels according to the trade-off theory and agency costs.

Tangibility ($TANG_{i,t}$), measured by the ratio of property, plants, and equipment to total assets for firm *i* at the end of fiscal year *t*, represents collateral, which determines the firm's access to long-term loans. Based on the trade-off theory, lenders will compensate for bearing a customer's credit risk, bankruptcy risk, and information asymmetry problems by requiring fixed-asset guarantees (Bragoli et al., 2016).

The *Year Fixed Effects* variable comprises 17 dummy variables to control for differences in capital structure over the 18 sampled years. The dummy variables are coded one if the firm is in years 2001–2017, and zero otherwise. $\varepsilon_{i,t}$ represents the error component for firm *i* in year *t*.

RESULTS

Descriptive Statistics

Figure 1 presents the distribution of the average long-term debt ratios across the eight industries. The bar chart shows that the resources industry accounts for the highest average long-term debt ratio of 0.255. Resource firms bear the high costs of pre-paid capital investment in machinery, equipment, and exploration. Therefore, they require long-term debt for their funding. With an average long-term debt ratio of 0.227, the service industry (comprising economically significant sectors, e.g., transportation, commerce and tourism) mainly hinges on long-term loans that can be secured by many fixed assets (e.g., rights of use, vehicles and

buildings). The consumer products industry had the lowest average long-term debt ratio of 0.103. This industry, which features personal, home, and fashion products, relies heavily on short-term lines of credit to do business.

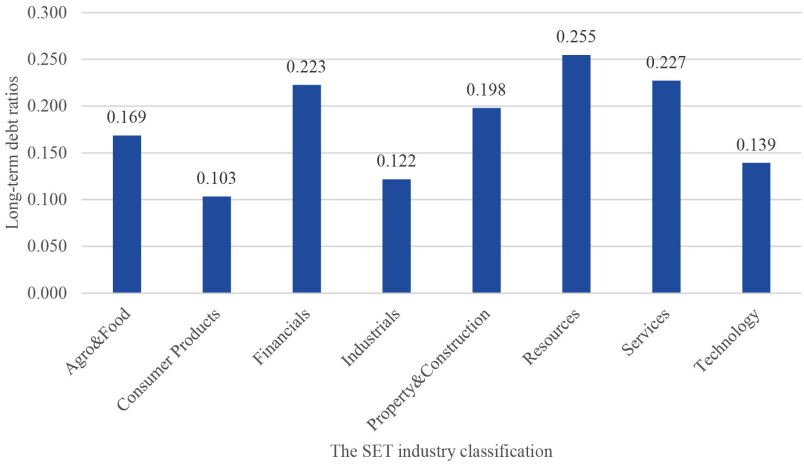

Figure 1. Distribution of average long-term debt ratios across the industries

Table 1 summarises the descriptive analysis. In Panel A, the average *LDR* ratio of 0.184 indicates that Thai firms used long-term debt to finance 18.4% of total assets on average from 2001 to 2018. This proportion is comparable to that of Pakistani firms (0.195), as found by Ahsan et al. (2016), but varies considerably from that of Polish firms (0.070), as found by Mazur (2007). The mean *PROFIT* value of 0.504 implies that half of the sampled firms are more profitable than the industry median. The average values of *FRANCHI*, *HARVEST* and *UNPROGRO* suggest that 33.6%, 16.7% and 15.7% of the sample account for the franchise, harvest, and unprofitable growth firms, respectively, leaving 34% of the underperforming firms. According to the average *TARGET* value of 0.438, the S-curve targeted firms account for approximately 43.8% of the total sample. For control variables, the average *SIZE* is 15.524, suggesting that the sampled firms' total assets are roughly 4.5 billion baht, which is significantly lower than those of Chinese firms (21.722) as reported by Hui and May (2022). The mean of *PERF* is 0.080, similar to Kuč and Kaličanin (2021) for the Serbian country (0.090), and the mean of *GROWTH* is 2.151, comparable to Thi and Phung (2021) for the Taiwan firms (1.970). The average *TANG* ratio of 0.350 suggests that Thai firms have lower fixed assets in order to secure loans than Pakistani firms do (0.519), as reported by Nazir et al. (2021).

Table 1
Descriptive analysis

Panel A: Descriptive statistics

Variables		Mean	SD	Q1	Median	Q3	VIF
1	LDR	0.184	0.432	0.000	0.076	0.305	
2	PROFIT	0.504	0.500	0.000	1.000	1.000	6.01
3	FRANCHI	0.336	0.472	0.000	0.000	1.000	5.70
4	HARVEST	0.167	0.373	0.000	0.000	0.000	4.07
5	UNPROGRO	0.157	0.363	0.000	0.000	0.000	1.24
6	TARGET	0.438	0.496	0.000	0.000	1.000	1.33
7	TARGET*AFT2015	0.140	0.346	0.000	0.000	0.000	1.28
8	SIZE	15.524	1.669	14.338	15.235	16.383	1.03
9	PERF	0.080	0.706	0.024	0.061	0.103	1.02
10	GROWTH	2.151	0.156	0.790	1.280	2.230	1.01
11	TANG	0.350	0.256	0.118	0.328	0.534	1.07

Panel B: Pearson correlation matrix

	1	2	3	4	5	6	7	8	9	10
2	–0.079***									
3	–0.030**	0.638***								
4	–0.058***	0.413***	–0.319***							
5	0.049***	–0.401***	–0.307***	–0.193***						
6	0.046***	–0.002	0.012	–0.033***	–0.013					
7	–0.028*	–0.009	0.000	–0.015	–0.000	0.456***				
8	0.184***	–0.034***	0.018	–0.069 ***	0.072***	0.039***	0.107***			
9	–0.014	0.102***	0.064***	0.018	–0.046 ***	0.003	–0.011	–0.037***		
10	–0.004	0.049***	0.075***	–0.033**	0.011	0.029**	0.022*	–0.012	0.002	
11	0.021*	0.021*	0.038***	–0.038**	–0.035 ***	0.235***	0.098***	–0.062***	0.021*	0.009

Note: *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.

In Panel B of Table 1, describing the Pearson correlation matrix, the correlation directions of the variables are basically consistent with expectations. For example, the correlation between *LDR* and *PROFIT* and the correlation between *LDR* and *TARGET*AFT2015* are negative. The correlation between *LDR* and *SIZE* is positive. The variance inflation factors, or VIFs, for the regressions range from 1.01 to 6.01, as shown in Panel A. This suggests no multicollinearity between the independent variables.

Regression Results

Table 2 tabulates the OLS regression results of the capital structure determinants. By comparing differences in the estimates between the fixed and random effects models, the chi-square values of the Hausman test reject the null hypothesis of the random effects model in favour of the fixed effects model, and hence the existence of unexplained year-to-year variations in the observations. Then, the estimates from the fixed effects regressions are used to interpret the results of this study.

In the Models 1.1 and 3.1 of Table 2, the regression coefficients for *PROFIT* (–0.071 and –0.070, respectively) are negative and significantly associated with *LDR* ($p < 0.01$ for both models), suggesting that the higher the firm's industry-adjusted profitability, the lower its use of long-term debt, thus supporting H1. The findings bridge the gaps in the literature of M'ng et al. (2017) and Deesomsak et al. (2004), both of which reported no association between leverage and the profitability levels of Thai firms by using industry-adjusted profitability to predict leverage. Also, the findings complement the prior work investigating firms' and industries' profitability levels (e.g., Booth et al., 2001) by offering the industry-adjusted measure of profitability. For the Models 1.2) and 3.2, the coefficients for *FRANCHI* (–0.059 for both models) and *HARVEST* (–0.079 for both models) are negative and significantly associated with *LDR* ($p < 0.01$ for both models and variables), suggesting that franchise and harvest firms use less debt than under-performing firms. However, the coefficients for *UNPROGRO* in the same models are insignificant, implying no association between unprofitable growth firms and debt finance.

Briefly, firms consider their earnings in relation to their industry peers before making decisions about their financial resources. In line with the pecking order theory, if the profitability levels are higher than those of the industry average (that implies either the franchise or harvest stage of business), firms avoid financing through debt to attenuate informational asymmetry and adverse selection problems associated with external financing and sustain competitiveness in the market. Franchise firms can generate additional revenue by recruiting new

franchisees. Therefore, debt and equity financing are replaced by funds from franchise income (Gim et al., 2019). In contrast, underperforming firms with more debt include new entrants, which usually start with substantial leverage due to the high equity costs of unrecognised enterprises, as well as existing firms that may go bankrupt or need rehabilitation due to serious financial problems (MacKay & Phillips, 2005).

In the Models 2, 3.1 and 3.2, the coefficients for *TARGET* (0.041, 0.040 and 0.040, respectively) are positive and statistically associated with *LDR* ($p < 0.01$ for all models), suggesting that the targeted sectors utilise debt to fuel business growth. The regression coefficients for *TARGET *AFT2015* (–0.034, –0.033, and –0.034 for Models 2, 3.1 and 3.2, respectively) are negative and significantly associated with *LDR* ($p < 0.1$ for all models), implying that the targeted industries under the new policy toward innovative enhancement finance with less debt, thus supporting H2. Taken together, the S-curve targeted firms use external debt finance to run their businesses, but they will be charged with bankruptcy costs and debt agency costs if they incur additional loans to scale up R&D expenses in response to policy forces. Consistent with the classical trade-off theory, if leverage-related costs and non-debt tax advantages (through government subsidies) increase, innovation-driven firms minimise debt financing. The findings conform with those of Clemente-Almendros and Sogorb-Mira (2018) that suggest that non-debt tax incentives can act as substitutes for the interest tax shield. The findings also complement the evidence of Bragoli et al. (2016) that banks offer loans for R&D investment only at a certain threshold, so firms must supply other financing sources to fund their extra costs.

Across the five models, size and tangibility are consistent with the predictions of the positive signs, in line with the trade-off theory. Large firms are diversified and subject to low financial distress costs and agency costs of debt, thereby encouraging them to increase their long-term debt. Firms with a high level of tangible assets could issue more debt when raising capital. Following the passage of the Thai Debt Collection Act in 2015, the increased protection and rights of creditors have probably resulted in the accessibility of loans for sufficiently collateralised firms. However, there is no evidence of the relationship between performance, growth opportunities, and leverage. The untabulated results of the *Year Fixed Effects* show that the coefficients of the dummy variables of the years 2001–2004 and 2010 are positive and statistically significant, implying that firms relied more on debt during those periods than in the based year of 2018.

Table 2
The capital structure determinant

Variables	Sign	Coefficient (*p*-value)									
		Fixed-effects regression					Random-effects regression				
		(1)		(2)	(3)		(1)		(2)	(3)	
		(1.1)	(1.2)		(3.1)	(3.2)	(1.1)	(1.2)		(3.1)	(3.2)
Constant		–0.583 (0.000***)	–0.580 (0.000***)	–0.626 (0.000***)	–0.583 (0.000***)	–0.581 (0.000***)	–0.550 (0.000***)	–0.542 (0.000***)	–0.601 (0.000***)	–0.561 (0.000***)	–0.556 (0.000***)
PROFIT	(–)	–0.071 (0.000***)			–0.070 (0.000***)		–0.065 (0.000***)			–0.065 (0.000***)	
FRANCHI	(?)		–0.059 (0.000***)			–0.059 (0.000***)		–0.054 (0.000***)			–0.054 (0.000***)
HARVEST	(?)		–0.079 (0.000***)			–0.079 (0.000***)		–0.067 (0.000***)			–0.067 (0.000***)
UNPROGRO	(?)		0.014 (0.387)			0.015 (0.360)		0.016 (0.332)			0.016 (0.318)
TARGET	(?)			0.041 (0.003***)	0.040 (0.003***)	0.040 (0.003***)			0.043 (0.001***)	0.043 (0.001***)	0.043 (0.001***)
TARGET* AFT2015	(–)			–0.034 (0.076*)	–0.033 (0.073*)	–0.034 (0.073*)			–0.046 (0.017**)	–0.046 (0.015**)	–0.047 (0.008***)
SIZE	(+)	0.050 (0.000***)	0.050 (0.000***)	0.051 (0.000***)	0.050 (0.000***)	0.049 (0.000***)	0.048 (0.000***)	0.047 (0.000***)	0.049 (0.000***)	0.048 (0.000***)	0.047 (0.000***)
PERF	(–)	–0.002 (0.764)	–0.002 (0.764)	–0.007 (0.352)	–0.002 (0.762)	–0.002 (0.763)	–0.001 (0.910)	–0.000 (0.951)	–0.005 (0.461)	–0.001 (0.892)	–0.000 (0.928)
GROWTH	(–)	–0.000 (0.953)	–0.000 (0.856)	–0.000 (0.666)	–0.000 (0.892)	–0.000 (0.795)	–0.000 (0.964)	–0.000 (0.983)	–0.000 (0.763)	–0.000 (0.992)	–0.000 (0.949)

(*Continued on next page*)

Table 2 (*Continued*)

Variables	Sign	Coefficient (*p*-value)									
		Fixed-effects regression					Random-effects regression				
		(1)		(2)	(3)		(1)		(2)	(3)	
		(1.1)	(1.2)		(3.1)	(3.2)	(1.1)	(1.2)		(3.1)	(3.2)
TANG	(+)	0.052 (0.014**)	0.051 (0.016**)	0.036 (0.095*)	0.038 (0.084*)	0.037 (0.091*)	0.057 (0.007***)	0.058 (0.006***)	0.041 (0.061*)	0.043 (0.047**)	0.045 (0.039**)
Year Fixed Effects		Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
R^2		0.404	0.406	0.371	0.424	0.426	0.404	0.407	0.372	0.426	0.428
F-value [Wald X^2]		56.62	40.76	41.61	41.76	32.74	[261.17]	[256.56]	[237.53]	[274.33]	[270.46]
Hausman's test: X^2		91.83	97.84	23.46	88.58	85.79					
N		6,058	6,058	6,058	6,058	6,058	6,058	6,058	6,058	6,058	6,058

Note: *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.

SENSITIVITY TESTS

Financial Turmoil Before and After the Crisis Periods

Financial crises can have an impact on corporate funding decisions. The 2008 global financial crisis (GFC) was prompted by subprime mortgage issues in financial sectors, resulting in market turbulence, economic contraction, and the loss of financing sources (Kothari & Lester, 2012). This study examines whether the predicted associations between debt financing and the interest variables remained unchanged before and after the financial crisis. Following previous studies (e.g., Safdar, 2018), this study drops firm-year observations from 2008–2010 ($N = 962$) and estimates the models separately for the pre- and post-crisis samples (2001–2007 and 2011–2018, respectively). As the *TARGET*AFT2015* took into account the omitted variable of the pre-crisis regressions, this variable was taken out of the model analysis.

In Table 3, the results show that the signs of the coefficients for *PROFIT*, *FRANCHI*, *HARVEST* and *TARGET* for both pre- and post-crisis samples are consistent with the full sample. Thus, the fact that the firms with high industry-adjusted profitability, including franchise and harvest firms, minimize debt finance holds after the exclusion of the sample around the crisis years. For the *SIZE* control variable, the signs of the coefficient for both sub-samples are consistent with the full sample. As for the remaining control variables, the sub-samples, however, show different results from the full sample. The coefficients for *PERF* appear to be negatively associated with *LDR*, and the coefficients for *GROWTH* are positively associated with *LDR* in the post-crisis periods. This suggests that low-performing and high-growth firms finance their operations through debt to revive economic activity, indicating a noticeable improvement in the business climate following the GFC. Despite the positive associations between *TANG* and *LDR* in the full sample, these associations exist only in the post-crisis periods. Thus, global financial turmoil may result in banks' more restricted collateral policies to secure firms' loans.

Table 3
Financial turmoil before and after the crisis period

Variables	Sign	Coefficient (*p*-value)									
		Pre-crisis periods (2001–2007)					Post-crisis periods (2011–2018)				
		(1)		(2)	(3)		(1)		(2)	(3)	
		(1.1)	(1.2)		(3.1)	(3.2)	(1.1)	(1.2)		(3.1)	(3.2)
Constant		–0.594 (0.000***)	–0.601 (0.000***)	–0.662 (0.000***)	–0.616 (0.000***)	–0.599 (0.000***)	–0.751 (0.000***)	–0.769 (0.000***)	–0.771 (0.000***)	–0.747 (0.000***)	–0.769 (0.000***)
PROFIT	(–)	–0.091 (0.000***)			–0.089 (0.000***)		–0.038 (0.000***)			–0.042 (0.000***)	
FRANCHI	(?)		–0.103 (0.001***)			–0.102 (0.001***)		–0.029* (0.090)			–0.027* (0.091)
HARVEST	(?)		–0.116 (0.001***)			–0.116 (0.001***)		–0.035 (0.001***)			–0.035 (0.001***)
UNPROGRO	(?)		–0.054 (0.180)			–0.054 (0.175)		0.066 (0.000***)			0.066 (0.000***)
TARGET	(?)			0.044 (0.072*)	0.027 (0.303)	0.039 (0.091*)			0.018 (0.088*)	–0.003 (0.581)	0.009 (0.091*)
SIZE	(+)	0.055 (0.000***)	0.057 (0.000***)	0.056 (0.000***)	0.054 (0.000***)	0.056 (0.000***)	0.058 (0.000***)	0.058 (0.000***)	0.058 (0.000***)	0.053 (0.000***)	0.058 (0.000***)

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Table 3 (*Continued*)

Variables	Sign	Coefficient (*p*-value)									
		Pre-crisis periods (2001–2007)					Post-crisis periods (2011–2018)				
		(1)		(2)	(3)		(1)		(2)	(3)	
		(1.1)	(1.2)		(3.1)	(3.2)	(1.1)	(1.2)		(3.1)	(3.2)
PERF	(–)	0.003 (0.745)	0.003 (0.729)	0.000 (0.962)	0.003 (0.726)	0.003 (0.725)	–0.121 (0.013**)	-0.100 (0.039**)	–0.265 (0.000***)	–0.098 (0.042**)	–0.103 (0.034**)
GROWTH	(–)	–0.000 (0.822)	–0.000 (0.850)	–0.000 (0.701)	–0.000 (0.840)	–0.000 (0.808)	0.001 (0.025**)	0.000 (0.289)	0.001 (0.029**)	0.001 (0.022**)	0.000 (0.320)
TANG	(+)	0.050 (0.300)	0.046 (0.343)	0.025 (0.624)	0.027 (0.595)	0.025 (0.618)	0.070 (0.000***)	0.072 (0.000***)	0.066 (0.000***)	0.077 (0.000***)	0.068 (0.000***)
Year Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2		0.137	0.180	0.132	0.142	0.193	0.233	0.245	0.230	0.250	0.256
F-value		14.43	10.59	12.11	10.90	9.57	20.62	18.39	18.50	16.81	20.39
N		1,704	1,704	1,704	1,704	1,704	3,392	3,392	3,392	3,392	3,392

Note: *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.

Targeted Firms' Collateral and Size

Based on the H2 results, which show that the targeted firms are propelled towards innovative enhancement finance with less debt, this study examines two additional questions: (1) whether insufficient collateral prevents targeted firms from obtaining loans, and (2) how business size relates to indebtedness. To begin, this research develops subsamples of low-and high-collateral firms, which correspond to the businesses' fixed asset levels. In Panel 4 of Table A the coefficients for *TARGET* are positive for both groups with low and high collateral (p-value < 0.01 and p-value < 0.1, respectively). The *TARGET*AFT2015* coefficient is negative for the group with low collateral (p-value < 0.05) but positive for the group with high collateral (p-value < 0.05). In general, innovative firms require greater debt to finance expensive capital expenditures. When these firms must persuade extra innovation spending, they minimise indebtedness, especially when collateral is insufficient. If they can secure a loan, these firms will continue to cover the additional projects through debt.

Table 4
Collateral and size of targeted firms

Variables	Sign	Coefficient (p-value)			
		Panel A: Collateral		Panel B: Size	
		Low	High	Small	Large
Constant		–0.572 (0.000***)	–0.685 (0.000***)	0.109 (0.579)	–0.707 (0.000***)
TARGET	(?)	0.075 (0.004***)	0.019 (0.056*)	0.053 (0.009***)	0.019 (0.250)
TARGET*AFT2015	(–)	–0.112 (0.012**)	0.043 (0.016**)	–0.045 (0.270)	–0.013 (0.619)
SIZE	(+)	0.050 (0.000***)	0.047 (0.000***)	–0.002 (0.874)	0.057 (0.000***)
PERF	(–)	–0.591 (0.000***)	–0.001 (0.739)	–0.006 (0.445)	–0.291 (0.000***)
GROWTH	(–)	–0.001 (0.615)	0.000 (0.846)	–0.000 (0.873)	–0.000 (0.504)
TANG	(+)	–0.094 (0.362)	0.207 (0.000***)	0.072 (0.047**)	0.019 (0.452)
Year Fixed Effects		Yes	Yes	Yes	Yes
R^2		0.112	0.380	0.162	0.443
F-value		21.40	35.32	12.37	29.43
N		3,029	3,029	3,029	3,029

Note: *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.

Following that, the study divides the sample into small- and large-sized groups based on the amount of total assets. The coefficient for *TARGET* in Panel B of Table 4 is positive and significant only for small-targeted firms (*p*-value < 0.01). The *TARGET*AFT2015* coefficients are insignificant for both groups, indicating that there is no association between corporate size, the industries targeted by the new model, and debt. Referring to the findings in Table 2, large firms would favour debt financing to exploit tax-saving opportunities based on the trade-off theory. The targeted industries, on the other hand, benefit from a variety of tax incentives that assist businesses of all sizes. Therefore, only small-targeted firms must take on debt following the pecking-order theory.

Endogeneity Issue

Industry-adjusted profitability

Profitability is most likely linked to earlier manipulation of real activity to meet earnings targets (Gunny, 2010). This study performed a two-stage least squares (2SLS) regression to address the industry-adjusted profitability dummy variable that is likely endogenous. The study uses (1) abnormal discretionary expenditures (*REM_DIS*) and (2) the earnings movements for benchmarks (*BENCH*, *BEAT*, and *JUSTMISS*) in the prior year as the instrumental variables of industry-adjusted profitability (Beyer et al., 2018). Reducing recent discretionary expenses could result in favourable future profitability as opposed to cutting sales prices or overproducing, both of which might harm future performance if the firms reestablish old prices or suffer large inventory holding costs. *REM_DIS* is the regression residual (multiplied by negative one) obtained from the following model: $DISX_{i,t}/A_{i,t\text{-}1} = \alpha_0 + \alpha_1(1/A_{i,t\text{-}1}) + \alpha_2(S_{i,t\text{-}1}/A_{i,t\text{-}1}) + \varepsilon_{i,t,}$ where $DISX_{i,t}$ is discretionary expenditures including the sum of R&D, advertising, and SG&A in year t, $A_{i,t-1}$ is total assets in year t–1, and $S_{i,t\text{-}1}$ is net sales in year t–1. *BENCH* represents earnings that bench (just beat) a benchmark and is defined as a dummy variable set equal to 1 if either of the following is non-negative and less than 0.01: (1) net income scaled by lagged assets; or (2) an increase in net income, scaled by lagged assets, from the preceding year. Otherwise, it is equal to 0. *BEAT* expresses earnings that beat a benchmark. It is denoted by a dummy variable that is set to equal 1 if *BENCH* equals 0 and either of the following is equal to or greater than 0.01: (1) net income scaled by lagged assets or (2) increase in net income, scaled by lagged assets, from the preceding year. Otherwise, it is set to equal 0. *JUSTMISS* denotes earnings that just missed a benchmark. It is measured by a dummy variable that is set to equal 1 if *BENCH* and *BEAT* equal 0 and either of the following benchmarks is missed by 0.01 or less: (1) net income scaled by

lagged assets or (2) increase in net income, scaled by lagged assets, from the preceding year. Otherwise, it is set to equal 0.

Table 5
The two-stage least squares regressions

Variables	Sign	Coefficient (*p*-value)	
		Panel A: Industry-adjusted profitability	Panel B: Targeted industry
Constant		–0.661 (0.000***)	–0.570 (0.000***)
$\widehat{\text{PROFIT}}$	(–)	–0.120 (0.000***)	–
$\widehat{\text{TARGET}}$	(?)	–	0.013 (0.097*)
$\widehat{\text{TARGET}}$ *AFT2015	(–)	–	–0.021 (0.094*)
SIZE	(+)	0.056 (0.000***)	0.046 (0.000***)
PERF	(–)	0.016 (0.017**)	–0.019 (0.078*)
GROWTH	(–)	0.000 (0.618)	–0.000 (0.479)
TANG	(+)	0.052 (0.001***)	0.052 (0.034**)
First stage instruments:			
REM_DIS	(?)	0.183 (0.079*)	–
BENCH	(?)	–0.063 (0.002***)	–
BEAT	(?)	0.575 (0.000***)	–
JUSTMISS	(?)	–0.065 (0.002***)	–
HHI	(?)	–	0.458 (0.000***)
MUNIFICENT	(?)		–0.304 (0.000***)
DYNAMIC	(?)		–0.609 (0.000***)
Year Fixed Effects		Yes	Yes
R^2		0.190	0.144
Wald X^2		667.65 (0.000***)	238.35 (0.000***)
N		4,069	5,228
Wu-Hausman's test for endogeneity: *p*-value		0.0001	0.4974
Minimum eigenvalue statistic		20.21	16.15
Sargan'test for instrument validity: *p*-value		0.4785	0.4178

Note: *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.

Table 5 presents the results of the 2SLS regressions. In Panel A of Table 5, the Wu-Hausman test (p-value = 0.0001) is significant, thus *PROFIT* is endogenous. The statistical significance of the minimum eigenvalue statistic (20.21) indicates that the instruments have explanatory power for *PROFIT*. According to the Sargan statistic, which is insignificant (p-value = 0.4785), the instruments are valid. In the first stage logistic regression, *PROFIT* is regressed on lagged *REM_DIS*, *BENCH*, *BEAT*, and *JUSTMISS*. The logistic regression results show that the coefficients for *REM_DIS* and *BEAT* are positive and significantly associated with *PROFIT* ($p < 0.1$ and $p < 0.01$, respectively), and the coefficients for *BENCH* and *JUSTMISS* are negative and significantly associated with *PROFIT* ($p < 0.01$ for both variables). Thus, firms manipulated earnings through discretionary spending and met their earnings target in the preceding year to signal the likelihood of high industry-adjusted profitability in the current year. The negative coefficients for *BENCH* and *JUSTMISS* indicate managerial rent extraction, which occurs when managers use earnings to just meet or miss a benchmark from the previous year. In the second stage, the coefficient for $\widehat{PROFIT}$ is negative and significantly associated with *LDR* ($p < 0.01$), which is consistent with the results of the main test. Then, the H1 conclusion is not sensitive to endogeneity issues.

Targeted industry

Targeted and non-targeted firms have different industry landscapes, degrees of competition, and risk levels, so the 2SLS regression was used to alleviate endogeneity concerns for the targeted industry variables. Following prior research, this study employs three instrumental variables that reflect industry characteristics (e.g., Smith et al., 2015; Kayo & Kimura, 2011). To begin, *HHI*, as a proxy of industry concentration (competition), is measured by the sum of the squares of annual market shares of firms. Second, *MUNIFICENT*, a representative of industry munificence[3], is calculated by the regression slope ratios as the following approaches: (1) regressing time against annual sales of an industry over the preceding five years; and (2) generating the ratio of the regression slope coefficient scaled by the mean value of annual sales over the same 5-year period. Thirdly, *DYNAMIC*, as a proxy of industry dynamism[4], is computed as the standard error of the munificence regression slope coefficient (from the aforementioned approaches) scaled by the mean value of annual sales over the same 5-year period.

In Panel B of Table 5, the Wu-Hausman test (p-value = 0.4974) is insignificant, thus *TARGET* is exogenous[5]. The statistical significance of the minimum eigenvalue statistic (16.15) indicates that the instruments have explanatory power for *TARGET*. In addition, the Sargan statistic, which is insignificant (p-value = 0.4178), suggests the validity of the instruments. In the first

stage of logistic regression, the study regresses *TARGET* on *HHI*, *MUNIFICENT*, and *DYNAMIC*. The first stage results reveal that the coefficient for *HHI* is positive and significantly associated with *TARGET* ($p < 0.01$) and that the coefficients for *MUNIFICENT* and *DYNAMIC* are negative and significantly associated with *TARGET* ($p < 0.01$ for both variables). This indicates the likelihood of a high competitiveness level in the targeted industries. Also, these industries may have minimal resources but are able to create long-term sales growth without encountering economic instability. In this circumstance, the targeted industries then require resources and assistance to promote their growth potential. In the second stage regression, the positive coefficient for $\widehat{TARGET}$ and the negative coefficient for $\widehat{TARGET}$ *AFT2015 are statistically significant ($p < 0.10$ for both variables), which is consistent with those in the baseline regression and thus confirms the H2 result after mitigating for endogeneity concerns.

CONCLUSIONS

This study examines the impact of industry-adjusted profitability and S-curve targeted industry on the capital structure and yields two main conclusions. To begin with, firms reduce debt financing if their profitability exceeds that of the industry median. By decomposing profitability into the intra-industry four competitive positions based on the relative profitability and growth matrix, franchise and harvest firms use less debt than under-performing firms do in order to keep agency costs low and maintain their competitive status. The under-performing firms' massive debt financing may indicate either entrant or exit status. A new entrant usually obtains debt financing during the startup phase, while the deadweight costs of financial distress and debt overhang force businesses to cease operations (Cole & Sokolyk, 2018; Weber & Yang, 2020). Second, competitiveness-advanced industries, i.e., targeted industries, which typically use loans to fund their costly investments, appear to use fewer loans when they feel compelled to increase R&D transactions as a result of the nation's new economic agenda. Avoidance of debt finance may be explained by subsequent financial distress costs. As the government purposefully affords a variety of tax shelters (e.g., large scale deduction for R&D costs) to the targeted firms, they likely perceive these benefits as a substitution for the interest tax shield. An alternative explanation is that to accelerate the pace of innovation through debt financing, a high amount of collateral is certainly required.

A large battery of sensitivity tests shows that, first and foremost, the main results of the association between industry-adjusted profitability, intensified innovative industries, and debt finance are robust enough to use the two samples

separated into pre- and post-crisis periods, excluding the three-year sample around the crisis. Secondly, when taking loan-secured assets into consideration, the targeted firms with low collateral could not utilise debt to fund extra R&D outlay. When they have sufficient collateral to secure a loan, debt finance is selected to raise this expenditure. Next, the study partitions the targeted firms according to their size. The fact that the targeted firms generally use debt to fund their normal R&D investment is valid for those small-targeted firms. However, firm size does not affect the relationship between the added R&D activities and indebtedness. Lastly, the study employs instrumental variables to address endogeneity concerns in the association between industry-adjusted profitability, targeted industry, and debt finance. The 2SLS's results are in agreement with those of the OLS's conclusions.

This study has several implications for market participants and policymakers. First, having a superior degree of industry-adjusted profitability curtails the need for debt financing. A timely increase in newcomers' profitability is suggested as it improves liquidity and competitiveness. Without upper-level profitability, high-leveraged firms presumably underperform and go bankrupt. Also, investors should exercise caution regarding investment decisions by analysing firms' profitability and competitive position within the industry in order to anticipate debt obligation tendencies. Second, the debt financing of intensified innovative firms likely faces high leverage-related costs and a lack of resources and collateral. Recently, usage of intellectual property assets as collateral has been initiated by the Thai Business Collateral Act of 2015. However, the application remains unconvincing due to an incomplete information system (Thailand Development Research Institute, 2017). Improvements in interconnectivity between regulatory agencies should be required before this law can be applied effectively. Additionally, interventions with clear policy objectives should be considered, such as loan guarantee programs for targeted firms below a certain size or tangibility, government-backed loans through financial institutions.

Last but not least, two decades ago, the investment support policies for the targeted firms were rather successful since those small firms could access more debt financing. However, the increase in the innovation pace makes firms hesitate to continue to use financial sources like debt. Thailand's investment assistance programs are identical to those of Hong Kong, resulting in self-financed spontaneous innovation and a lag in innovative competition (Wang, 2018). Following Singapore's strong state intervention in government-linked companies, it is suggested that policy attention and financial resources be directed to state-owned firms to stimulate innovation output. But concerns about how resources are used and the possibility of corruption must be weighed against the benefits of

fast growth. There are some limitations to this study. Results should be interpreted cautiously since non-listed firms were not included in the sample. Moreover, the S-curve targeted industries are probably just a noise measure as they might not be representative of all firms actually complying with the innovation increasing policy. Some businesses that fall outside the non-targeted industry scope may be able to fully adapt to the new economic policy.

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NOTES

1. S-curves describe how most businesses enter the market, grow, and then stagnate. The arc shows how a new firm starts at the bottom of its S-curve and grows from there. As the firm sells more products or services, the curve rises. When consumers know about a product or service, the market matures significantly. Its growth will then slow.
2. For example, those firms that operate in the prescribed areas, such as special zones (e.g., Eastern seaboard, Zone 2–3) during the implementation of the 5th National Economic and Social Development Plan (1982–1986) and economic corridor zones (e.g., East-West, North-South) during the implementation of the 9th and 10th National Economic and Social Development Plans (2002–2011).
3. The capacity of an industry's environment to foster the growth of its member firms is referred to as munificence. Due to abundant resources and limited market competition, sectors with high munificence are usually more lucrative.
4. Dynamism refers to the business volatility of a particular industry. When it comes to sales growth, firms that operate at a rapid pace confront a wide range of uncertainties.
5. The research tends to continue regarding TARGET as endogenous. The 2SLS estimates are consistent even if TARGET is exogenous.

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APPENDIX

Appendix A

Institutional Background in Thailand

Prior to the Asian financial crisis (AFC) of 1997, Thai businesses were totally reliant on domestic financial institutions, including commercial banks, finance corporations, and state-owned banks. Local commercial banks' loans amounted to about 104% of GDP by the end of 1997. Family groups controlled about half of the domestic financial institutions, which they used to channel funds to their networked businesses. When making loan decisions, those financial institutions appear to have relied on personal ties and poor collateral rather than enterprises' projected future cash flows (Charumilind et al., 2006). The instruments for monitoring debt funding were disturbed by cronyism between lenders and borrowers, allowing connected firms to acquire large long-term loans without quality collateral. A number of Thai firms without connections had taken out loans from short-term foreign sources to fuel their growth opportunities.

Weakness in the economic system, including the adoption of flawed monetary and institutional regulations, drew Thailand into financial failure—for example, through bad loans from domestic banks and the accumulation of short-term foreign debt by many local firms. Thailand was already vulnerable at the start of the AFC, wreaking havoc on national economic systems through high external deficits, inflated commodity prices, and massive non-performing loans (NPLs). On 2 July 1997, the government announced the switch from a fixed to a flexible exchange rate policy, resulting in a 15%–20% devaluation of the currency (at 28.80 baht per dollar). In May of that year, there was an unusually high level of foreign exchange market pressure (EMP). This was the start of Thailand's financial turmoil, which then spread to other emerging economies (Gong et al., 2004).

Asian monetary authorities improved the financial system considerably following the AFC. On 28 November 1997, the Bank of Thailand (BOT) initiated "the fit and proper criteria" to reform internal bank governance by emphasizing the qualifications for a bank's board composition (Pathan et al., 2008). The key requirements include at least five years of experience as a bank director in financial institutions, and board members are only allowed to serve on a maximum of three different boards concurrently. Banks are required to report all high-valued and executive-related transactions and NPLs on a regular basis as well. The revised regulations impose further restrictions on lending to or investing in related parties. As of 1998, the BOT revised Thailand's financial institution ownership legislation to allow foreign investment groups to own 100% of shares, replacing the prior prohibition on nonresident ownership.

Compared to other Asian countries, Thailand's corporate governance reform has been slow, owing to the removal of pre-crisis regulations and institutions in favour of something wholly new. Following the AFC, the financial and banking systems encountered a new business climate. To begin with, numerous insolvent financial firms

had been closed. Between 1996 and July 1999, restructuring reduced the number of domestic banks and financial companies by 50% and 75%, respectively (Limpaphayom & Connelly, 2004). Surviving firms were compelled to establish rigorous lending standards and renew their policies on operational and credit risks. Second, the BOT pushed for corporate consolidation in an effort to bolster the financial situations of the remaining banking institutions. Foreign investment groups and offshore funds acquired majority shareholders in Thai commercial banks through takeovers due to the loosened foreign ownership restrictions (Pinprayong & Wongsurawat, 2012). Then, institutional investors got more involved in the market and used their voting rights more often.

In August 2001, the SET published new corporate governance reporting guidelines that address corporate governance concepts, recommendations, and best practices. The government declared 2002 the year of good governance and established national corporate governance bodies. The BOT launched phase one of its financial master plan the same year, with the goal of boosting bank consolidation and modifying bank classifications. Phase two of this strategy began in 2007 with the goal of increasing competitiveness, reducing operational costs, and establishing the infrastructure necessary to liberalise the financial industry. The financial shock to East Asian economies, particularly Thailand, during the 2008 GFC was not as severe as the hit to Western economies. This demonstrates that Thailand's financial reforms during the AFC may have strengthened domestic financial sectors (Inoguchi, 2014). In comparison to the AFC (1997–1998), the GFC appears to have had little impact on Thai economic growth and market capitalization (with Thailand being among the top five performers among 16 emerging countries following the global crisis) (Galagedera, 2013).