The Impact of Public Officials' Corruption on Thai Privatised SMEs' Insolvency and Financial Policies

Chalerm Jaitang[1]
Zhaohua Li
Christopher Gan

Abstract

This study investigates how corruption affects Thai SMEs' insolvency risk and financial policies between 2017 and 2021. The results are robust across various methodologies, including ordinary least squares, instrumental variable approach, channel analysis, propensity score matching, and alternative measure of corruption. Our results support the "sanding the wheels" hypothesis, revealing that corruption significantly raises the insolvency risk for Thai SMEs. Firms respond by increasing their liquidity or cash holdings.

The negative impact of corruption is pronounced for mature firms and domestic Thai-owned firms compared to new firms and foreign-owned counterparts, respectively. Mature and domestic Thai-owned firms tend to raise cash reserves and increase leverage to manage corruption. While foreign-owned firms hold more cash in corrupt environments, they do not rely on additional leverage as a financial strategy. In addition, increased cash holdings mitigate the risk of insolvency for mature firms and domestic Thai-owned firms when operating in corrupt environments. However, higher leverage in highly corrupt environments amplifies the risk of insolvency for mature firms, domestic Thai-owned, and foreign-owned firms. Our findings highlight how firms' different characteristics shape different financial policies to navigate these challenging environments.

Keywords: SMEs; insolvency; financial policies; corruption; Thailand
JEL Classification: D73; G30; G32; G33

[1] Corresponding Author, Address: Department of Financial and Business Systems, Lincoln University, New Zealand, Email: chalerm.jaitang@lincolnuni.ac.nz

1. Introduction

Corruption is a global issue, more prominent in developing economies. In 2023, Thailand's Corruption Perceptions Index (CPI) ranked 108th out of 180 countries, indicating a high level of corruption (Transparency International, 2023). The effects of corruption on the country's economic development and firm performance are documented in the literature (e.g.,Méon & Sekkat, 2005; Wellalage & Thrikawala, 2021). Corruption and firm performance can be viewed as two sides of a coin. On one hand, corruption can have a positive effect on firm performance, often referred to as the "greasing the wheels" hypothesis. The firm-level studies indicate that corruption can enhance firms' return on assets (ROA) (Van Vu et al., 2018), firms' income growth (Wang & You, 2012), and reduce the adverse effects of regulations on entrepreneurship in highly regulated economies (Dreher & Gassebner, 2013).

On the other hand, corruption sands the wheels and deteriorates firm performance. Prior studies have shown that corruption and the intensity of bribery negatively impact firms' ROA, particularly in transition economies (Nam et al., 2020; Van Vu et al., 2018). Several studies indicate the negative impact of corruption on various aspects of firm growth such as firms' annual growth (Beck et al., 2005; Martins et al., 2020), employment growth (Martins et al., 2020; Ullah, 2021), and productivity growth (Martins et al., 2020). Additionally, García-Gómez et al. (2022) highlight the negative impact of corruption on corporate investment, supporting the "sanding the wheels" hypothesis that corruption impedes business development.

Previous studies show that corruption has positive and negative effects on firm performance, depending on social and economic factors. Most studies focus on the impact of corruption on short-term firms' performances, such as yearly ROA, employment growth, and income growth. By investigating the impact of corruption through the lens of the greasing or sanding the wheels hypothesis, our study highlights the long-term firm performance consequences for Thai Small and Medium-sized Enterprises (SMEs)[2]. We examine whether corruption significantly impacts the financial foundations and ultimately leads to the insolvency of Thai SMEs. Our study is the first to investigate the corruption impact on Thai SMEs' insolvency, offering new insights into how corruption shapes Thai SMEs' financial stability and long-term viability.

We further explore how SMEs adapt their financial policies in response to corruption, drawing on the Grabbing Hand Theory, which suggests that corrupt government officials engage in rent-seeking behaviors and pursue their selfish interests (Shleifer & Vishny, 1998), imposing additional costs on firms through bribery and extortion. This creates a challenging environment for businesses, leading them to adopt specific financial strategies to respond to and navigate these additional costs.

[2] Definitions of SMEs provided by the Office of SMEs Promotion of Thailand (see Appendix A.1)

The literature presents conflicting arguments regarding the relationship between corruption and firms' cash holdings. Some studies find that firms in highly corrupt environments increase cash holdings to pay bribes or respond to the “grabbing hand” of corrupt officials (Cai et al., 2022; Park, 2022; Tayem, 2023; Thakur & Kannadhasan, 2019; Tran, 2020). This suggests that the threat of political extortion prompts firms to accumulate cash reserves to prepare for potential political payoffs and to preserve financial flexibility. Additionally, Jayakody et al. (2023) present further findings that firms operating in more corrupt environments tend to increase their cash levels when faced with high uncertainty. Conversely, some studies argue that firms in highly corrupt environments shield themselves to protect their assets from political expropriation by decreasing cash holdings and increasing leverage (Smith, 2016), and obfuscation during conference calls (Chourou et al., 2024). Additionally, Liu et al. (2018) highlight that rent-seeking activities strongly benefit government officials, which promote earnings management, and conceal firm-specific information from the market.

Our study examines how Thai officials’ corruption influences the insolvency of Thai SMEs and how these firms adopt their financial policies in response to the rent-seeking behaviors of public officials, often referred to as the "grabbing hand," in varying corrupt environments. We use the number of corruption and allegation cases per capita across different provinces in Thailand to measure corruption. Our study also explores differences in firm characteristics, such as age and ownership type. A comparative analysis is important since firms may experience varying impacts of corruption and they may adopt different financial strategies in response to corrupt environments.

Our study contributes to existing literature in several ways. First, we examine the impact of corruption on firm insolvency and financial policies, a topic that remains underexplored in the context of Thai firms. Second, we provide evidence of the potential moderating effect of firms’ financial policies on the relationship between corruption and firm insolvency, offering a more nuanced understanding of how firms navigate corrupt environments. Finally, we examine the differences in firm characteristics, an area often overlooked in most prior studies. Our study highlights that the impact of corruption may vary depending on specific firm attributes, and these differences may lead to the adoption of different financial strategies to respond to corrupt practices. This approach allows for a more detailed discussion beyond the general findings typically presented, offering insights into how firms with different characteristics respond to corruption.

The paper is organized as follows. Section 2 presents the research hypotheses. Section 3 describes the data and variables. Section 4 presents the empirical results and discussions and Section 5 concludes the study with policy implications.

2. Research Hypotheses

In emerging economies, the effect of corruption on firm performance differs depending on the types of firm, age and ownership. Nam et al. (2020) indicate that corruption harms firms' performance, but corruption exhibits more detrimental effects on the performance of new firms compared to their more mature counterparts. New firms lack business skills and suffer from immense difficulties in handling the risks of bribe extraction by public officials (Nam et al., 2020).

In terms of ownership type, corruption can impose substantial barriers and costs to the firms, regardless of ownership. On one hand, foreign firms may have less bargaining power than domestic firms to cope in a corrupt environment. According to Ashyrov and Masso (2020), in highly corrupt countries, bribes reduce the productivity of foreign-owned firms more than that of domestic-owned firms. Foreign-owned firms may lack local knowledge, and connections with local officials, and they may face higher costs in operating or greater difficulties in obtaining permits, licenses, or other approvals needed to conduct their business (Brada et al., 2019; Cuervo-Cazurra, 2008). On the other hand, Nam et al. (2020) indicate that corruption negatively impacts the performance of private domestic firms, while its impact on foreign direct investment firms is not significant. Domestic-owned firms often face excessive bureaucratic burdens and direct government exploitation (Nam et al., 2020). The domestic-owned firms may be more vulnerable to extortion by government officials, leading to increased operational costs. Thus, we hypothesize the following relationships:

H1 (a): *Corruption increases the risk of insolvency for new Thai SMEs than mature Thai SMEs.*
H1 (b): *Corruption increases the risk of insolvency for domestic Thai-owned than foreign-owned firms.*

A recent study finds that younger firms are likely to have higher bribe perceptions than older firms (Ashyrov & Masso, 2020). However, new firms typically face limited financial resources and greater reliance on informal financing (Chavis et al., 2011). This financial strain makes it difficult for new firms to maintain sufficient cash reserves due to their lack of internal resources (La Rocca et al., 2011). As a result, new firms may struggle to effectively navigate corrupt environments because of both resource constraints and limited access to financing.

On the other hand, mature firms have more experience in operating businesses and in dealing with public services (Nam et al., 2020). Mature firms typically possess stronger financial resources (La Rocca et al., 2011), which may provide them with more flexibility in dealing with corrupt officials or grabbing hands. Mature firms are expected to increase their cash holdings in response to officials' rent-seeking behaviors by public officials, following liquidity motives in corrupt environments. According to Park (2022), firms operating in corrupt environments tend to hold more cash and increase borrowing, especially when the cost of capital rises. Debt also serves as a key financial resource for mature firms,

allowing them to sustain their operations even when internal resources are insufficient (La Rocca et al., 2011). Therefore, mature firms may increase debt while maintaining higher cash reserves to effectively respond to corruption. Therefore, we hypothesize the following relationships:

H2 (a): *Cash holdings and leverage will not increase for new firms operating in corrupt environments.*
H2 (b): *Cash holdings and leverage increases for mature firms operating in corrupt environments.*

Ashyrov & Masso (2020) suggest that foreign-owned firms tend to pay larger bribes compared to domestically-owned firms. Nam et al. (2020) further indicate that corruption is less deleterious to new FDI firms, as these foreign firms might be willing to pay bribes to overcome the bureaucratic burden during entry into the market. They may even exploit corruption to enhance their performance.

On the other hand, in terms of corruption culture, DeBacker et al. (2015) show that owners from countries with higher corruption norms evade more taxes. Similarly, Liu (2016) finds that firms operating in a highly corrupt culture are prone to misconduct by engaging in earnings management, accounting fraud, options backdating, and opportunistic insider trading. These empirical studies suggest that corruption attitudes and culture can be imported from a native country to the host country. Given Thailand's high ranking in global corruption indices, it is likely that the corrupt culture of foreign firms will be relatively weaker than that of local Thai firms.

Therefore, to respond to the rent-seeking behaviors (Grabbing Hand), both Thai-owned firms and foreign-owned firms would be more likely to hold high cash to pay bribes to local public officials to access public services and obtain permits or licenses in corrupt environments. Park (2022) suggests that firms, regardless of ownership, tend to increase cash holdings in corrupt environments and take on more debt due to the higher cost of capital. While maintaining higher cash reserves in highly corrupt environments, both Thai-owned and foreign-owned firms may increase leverage, particularly when internal resources are insufficient. Thus, we hypothesize the following relationships:

H3 (a): *Cash holdings and leverage increases for Thai domestic-owned firms operating in corrupt environments.*
H3 (b): *Cash holdings and leverage increases for foreign-owned firms operating in corrupt environments.*

3. Data Description and Variables

The primary source of the Thai SME dataset is obtained from the Department of Business Development (DBD) of Thailand. By law, all firms registered as juristic persons in Thailand must submit their annual financial statements to the DBD at the Ministry of Commerce. The dataset has a total of 22,711 firm-year observations from 5,150 distinct firms, across 77 provinces and 17 diverse industries in Thailand

for the period 2017 to 2021. To eliminate the impact of extreme value, continuous firm-year variables are winsorized at 1st and 99th percentiles. Data on the number of corruption and allegation cases is sourced from the National Anti-Corruption Commission and the Office of Public Sector Anti-Corruption Commission of Thailand. Table 1 defines the dependent, explanatory, and control variables used in our study.

Table 1 Variable descriptions

Variables	Descriptions
Cash Ratio	Cash and equivalents divided by total assets
Leverage	Total debt divided by total assets
Insolvent	A binary variable indicating whether the firm undertakes insolvency (undergoing liquidation, dissolution, or bankruptcy, excluding cases involving mergers or takeovers) takes the value of one if firm i is insolvent, and zero otherwise.
Corruption	The number of officials' corruption and allegation cases scaled by population in the province (from National Anti-Corruption Commission and Office of Public Sector Anti-Corruption Commission)
High Corrupt	A dummy variable is equal to one if the province has corruption and allegation cases per 100,000 people at or above the median for that year; zero otherwise
Net Working Capital	Net working capital net of cash divided by total assets
Negative NI	A dummy variable is equal to one if a firm had a negative net income during the year, and zero otherwise.
EBITDA	Earnings before interests, taxes, depreciation, and amortization divided by total assets
PPE	Property, plant, and equipment divided by total assets
ln (Sales)	Natural log of sales
ROA (%)	Net profit divided by total assets multiplied by 100
Excess Cash	Difference between firm's cash ratio and the industry average cash ratio in the year
Excess Leverage	Difference between firm's leverage ratio and the industry average leverage ratio in the year
Size (base: Small)	Firm size: Small, and Medium SMEs are categorized by the firm's number of employees and annual revenue. (see Appendix A.1 for details)
Corporate Type (base: Ordinary Partnership)	Corporate registered type: Ordinary Partnership, Juristic Ordinary Partnership, and Company Limited
GPP	The growth rate of Gross Provincial Products in year t (from the Office of the National Economic and Social Development Council)
ln (Per Capita Income)	Natural log of province per capita income (from the Office of the National Economic and Social Development Council)
ln (Population)	Natural log of provincial population (from Department of Provincial Administration, Ministry of Interior)
Education Attainment	Average years of educational participation for individual aged 15 and above in each province (from National Statistical Office of Thailand)

4. Empirical Results and Discussions

4.1. Descriptive statistics and univariate test

Table 2 presents the median values for corruption and allegation cases per 100,000 (Corruption), and exclusive allegation cases per 10,000 (Allegation), 8.741 and 7.986 respectively. These cases per capita are higher than those reported by Li and Pan (2023), which equals 0.05 based on official convictions adjusted for the provincial population in China. Furthermore, the median cases per capita in our study exceed those reported by Chourou et al. (2024) at 0.250, and Smith (2016) at 0.238, which are based on corruption cases per capita in the United States. This highlights a higher incidence of corruption in Thailand compared to China and the United States, which aligns with the CPI from Transparency International.

Table 2 shows the median cash ratio for Thai SMEs is 0.056. This indicates that Thai SMEs hold cash and cash equivalents to approximately 5.6 percent of their total assets which is lower than the cash ratios reported by Li and Pan (2023), Seo and Han (2022), and Smith (2016) for the listed firms, 0.152, 0.11, and 0.078, respectively. Similarly, the median leverage ratio for Thai SMEs is 0.048, which is lower than the median leverage ratios of listed firms reported by Cai (2021), Chourou et al. (2024), Seo and Han (2022), and Smith (2016), 0.440, 0.190, 0.510, and 0.215, respectively. This may reflect challenges in accessing financing as highlighted by the World Bank Group (2017).

Table 3 presents the results of univariate tests comparing the variables between firms located in high-corrupt and low-corrupt provinces. Firms are classified as in a high-corrupt (low-corrupt) province if the number of corruption and allegation cases per 100,000 in the province is at or above (below) the median for that year. The findings indicate that the number of corruption cases is twice as high in high-corrupt provinces compared to in low-corrupt provinces. The financial policies (cash ratio and leverage) are significantly higher in high-corrupt provinces. This result contradicts the findings of Smith (2016), who indicates that while leverage is higher, the cash ratio is significantly lower in high-corrupt areas. Firms in high-corrupt provinces exhibit significantly lower performances, presented by more frequent negative net income, lower EBITDA, and lower ROA, which are consistent with the findings of García-Gómez et al. (2022), Martins et al. (2020), and Van Vu et al. (2018). Additionally, firms in high-corrupt provinces typically have higher rates of insolvency than those in low-corrupt provinces. This is in line with our hypothesis, which posits that corruption increases the risk of insolvency for Thai SMEs.

Table 3 also indicates that many of the control variables exhibit significant differences between low-corrupt and high-corrupt provinces, except for property plant and equipment (PPE) and the natural log of sales (ln (Sales)). Notably, economic indices such as Gross Provincial Product growth (GPP) and the natural logarithm of per capita income, as well as the education index measured by educational attainment, are significantly higher in high-corrupt provinces than in low-corrupt provinces. These

differences in firm-level control variables may be driven directly or indirectly by corruption or by other unobserved factors. To address these potential biases, we employ an instrumental variable approach in Section 4.3 and use propensity score matching in Section 4.5 to control for observable differences. Additionally, our model incorporates additional covariates, such as economic indices, population metrics, and education inputs, which are detailed in Tables A.2.

Table 2 Summary descriptive statistics (22,711 firm-year observations)

variables	mean	median	SD	min	max
Corruption	9.693	8.741	5.087	1.912	30.251
Allegation	8.893	7.986	4.775	1.600	28.087
High Corrupt (dummy)	0.524	1.000	0.499	0.000	1.000
Cash Ratio	0.173	0.056	0.233	0.001	0.835
Leverage	0.438	0.048	1.359	0.001	11.348
Insolvent (dummy)	0.168	0.000	0.374	0.000	1.000
Net Working Capital	0.199	0.211	0.636	-3.926	0.956
Negative NI	0.290	0.000	0.454	0.000	1.000
EBITDA	0.016	0.038	0.258	-1.719	0.608
PPE	0.305	0.141	0.328	0.0003	0.985
ln (Sales)	13.101	14.710	5.574	0.000	19.802
ROA (%)	0.506	2.893	25.690	-174.825	53.690
Excess Cash	0.0002	-0.110	0.230	-0.254	0.654
Excess Leverage	-0.003	-0.267	1.320	-0.829	10.452
GPP	1.475	1.712	5.971	-40.418	22.790
ln (Per Capita Income)	11.854	11.652	0.687	10.931	13.874
ln (Population)	13.568	13.494	0.739	12.157	15.553
Education Attainment	8.375	8.170	1.025	5.560	11.260

Table 3 Mean and difference in mean testing between high-corrupt and low-corrupt provinces

	Low-corrupt provinces	High-corrupt provinces	*t*-statistics difference in means low vs. high
Corruption	6.2484	12.8221	-1.3e+02 ***
Cash Ratio	0.1656	0.1800	-4.6824 ***
Leverage	0.4020	0.4707	-3.8318 ***
Insolvent (dummy)	0.1501	0.1837	-6.8036 ***
Net Working Capital	0.2118	0.1878	2.8469 ***
Negative NI (dummy)	0.2793	0.2992	-3.3037 ***
PPE	0.3078	0.3027	1.1603
EBITDA	0.0228	0.0104	3.6517 ***
ln (Sales)	13.1570	13.0502	1.4432
ROA (%)	1.2284	-0.1503	4.0571 ***
Excess Cash	-0.0075	0.0071	-4.8162 ***
Excess Leverage	-0.0346	0.0252	-3.4308 ***
GPP	1.3460	1.5929	-3.0974 ***
ln (Per Capita Income)	11.7257	11.9701	-27.2072 ***
Education Attainment	8.1323	8.5963	-35.5394 ***

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Empirical finding: Baseline regression

To test hypotheses *H1(a)* and *H1(b)*, we use regression analysis to examine how Thai local officials' corruption affects the insolvency of Thai SMEs. The analysis is applied to the full sample and to subsamples categorized by firm age and ownership type, using the following model:

$$Y_{i,t}(Insolvent) = \alpha_0 + \alpha_1\, corruption_{j,t} + \sum \alpha_k\, X_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (1)$$

where *i* = firm *i*, *j* = firm located in province *j*, and *t* = year *t*.

The variable $corruption_{j,t}$ denotes the number of corruption convictions and allegation cases per 100,000 in province j and year t. $X_{i,t}$ is a vector of firm-specific control variables including size, corporate registered type, leverage, cash ratio, ROA, and net negative income. The firm-specific control variables in equation (1) are based on the literature (Nam et al., 2020; Van Vu et al., 2018). We incorporate year and industry dummies into the regression, which reduces the effects of the omitted firm and industry-level explanatory variables (Cai et al., 2022; La Rocca et al., 2011).

The dependent variable is a binary classification which is insolvent or solvent. Thus, the chosen analytical approach is logistic regression, a widely utilized method in this context.

Table 4 presents the results of the logistic regression using insolvency as the dependent variable. Column (1) of Table 4 shows the coefficient of corruption is positive and significant at the 1% level for overall Thai SMEs, indicating that corruption increases the likelihood of Thai SMEs' insolvency. Our findings support the "*sanding the wheels*" hypothesis, suggesting that corruption impedes business development. This is consistent with the studies of Beck et al. (2005), García-Gómez et al. (2022), Martins et al. (2020), and Ullah (2021) that corruption harms firms' performance. The rent-seeking behaviors of local officials, or the "grabbing hand," increase business costs (Chavis et al., 2011), increase investment costs, and deter foreign investment (Cuervo-Cazurra, 2008).

To investigate whether corruption impacts firms differently based on age and ownership type, the results are presented in Columns (2) to (5) of Table 4. Regarding firm age, a firm is classified as new if it has been in operation for no more than three years, and as mature otherwise. Corruption positively affects but is not significant on the probability of insolvency in new Thai SMEs as shown in Column (2) of Table 4. Conversely, corruption significantly increases the probability of insolvency in mature firms as shown in Column (3) of Table 4. The Wald test is used to assess the differential impact of corruption on insolvency between new and mature firms. The Wald Chi-square (χ^2) statistic for the difference test in corruption coefficients between these groups is 6.630 (see the final row of Table 4). This leads us to reject the equal corruption effects across new and mature firms. When comparing the magnitude of corruption coefficients, the results suggest that mature firms are more vulnerable to insolvency as the level of corruption increases, compared to new firms. These findings contradict Nam et al. (2020)

who indicate that corruption exhibits more detrimental effects on the performance of new firms compared to mature counterparts. A potential explanation for this discrepancy is that new Thai firms may be less exploited by local officials compared to mature firms, primarily due to their shorter periods of operation and limited interactions with officials. New firms typically have fewer resources and equity (Coad et al., 2013; La Rocca et al., 2011). Thus, new firms may be less attractive targets for exploitation than mature firms, which are likely to possess greater assets and resources.

Regarding the ownership type, a firm is categorized as domestic Thai-owned if it is 100% Thai-invested and as foreign-owned otherwise. Corruption significantly increases the probability of insolvency for both domestic Thai-owned firms and foreign-owned firms, Columns (4), and (5) of Table 4, respectively. The Wald Chi-square (χ^2) statistics is 15.460, indicating that the corruption coefficients are not significantly equal between Thai and foreign-owned firms. When we compare the magnitude of corruption coefficients, the result suggests that domestic Thai-owned firms operating in highly corrupt environments are more negatively impacted in terms of insolvency risk than foreign-owned firms in similar environments. Our findings are consistent with Nam et al. (2020) who highlight that corruption negatively affects the performance and survival of private firms, particularly domestic firms. The private domestic firms in developing countries often face excessive bureaucratic burdens and officials' exploitation directly (Nam et al, 2020).

The results with additional covariates (economic indices, population, and education input) related to corruption or firm insolvency, show that corruption is still positively and significantly affects the probability of insolvency for overall Thai SMEs, particularly mature firms and domestic Thai-owned firms. The magnitude of the corruption coefficient is significant and larger for mature firms and Thai-owned firms than for new firms and foreign-owned firms, respectively (see Panel A of Table A.2).

Thus, our findings suggest that corruption increases the risk of insolvency for Thai SMEs, particularly mature firms and both domestic Thai-owned and foreign-owned firms. This underscores the pervasive nature of corruption as a risk factor, regardless of ownership structure, and highlights its significant influence on Thai SMEs' stability. Specifically, the results show that the impact of corruption on insolvency risk is more pronounced for mature firms than for new firms, contrary to our hypothesis *H1(a)*. In terms of ownership type, the results indicate that the impact of corruption on insolvency risk is more pronounced for domestic Thai-owned firms than those under foreign-owned firms, supporting our hypothesis *H1(b)*.

The results in Table 4 show that most control variables exhibit the expected signs. ROA negatively impacts the probability of insolvency among Thai SMEs, particularly for mature firms and domestic Thai-owned firms, consistent with findings of Muñoz-Izquierdo et al. (2020) and Tian and Yu (2017).

Negative net income increases the probability of insolvency across all firm ages and ownership structures, which aligns with the research by Fuertes-Callén et al. (2022) and Tong and Serrasqueiro (2021). Interestingly, a higher cash ratio is associated with an increased probability of insolvency for both Thai- and foreign-owned firms and across all ages. High cash holdings may result in missed business opportunities and destroy firm value due to the cost of capital (Park, 2022). Additionally, medium-sized firms show a lower probability of insolvency compared to smaller firms, especially among mature firms and foreign-owned firms. Furthermore, the legal structure of the juristic ordinary partnership indicates a lower likelihood of insolvency than an ordinary partnership, while companies show a higher likelihood of insolvency than ordinary partnerships.

Table 4 Corruption and firm insolvency

Insolvent	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0907***	0.00268	0.0945***	0.0989***	0.0455***
	(0.00513)	(0.0353)	(0.00522)	(0.00610)	(0.0121)
Leverage	-0.0253	-0.248	-0.0228	-0.0333	0.0451
	(0.0175)	(0.181)	(0.0177)	(0.0218)	(0.0313)
Cash Ratio	4.637***	3.746***	4.673***	4.700***	4.641***
	(0.0916)	(0.419)	(0.0949)	(0.110)	(0.218)
ROA	-0.00264***	0.00226	-0.00292***	-0.00538***	0.00216
	(0.00100)	(0.00589)	(0.00103)	(0.00125)	(0.00191)
Negative NI	1.093***	0.716**	1.092***	1.275***	0.816***
	(0.0559)	(0.293)	(0.0578)	(0.0669)	(0.115)
Medium size	-0.547***	-1.539	-0.537***	-0.147	-0.442**
	(0.115)	(1.632)	(0.115)	(0.148)	(0.183)
Juristic Ordinary Partnership	-2.750***	-	-2.755***	-2.856***	-
	(0.278)		(0.279)	(0.286)	
Company	2.182***	2.154***	2.196***	3.086***	2.507***
	(0.0567)	(0.242)	(0.0594)	(0.0790)	(0.178)
Constant	-5.699***	-3.676***	-5.912***	-5.890***	-7.001***
	(0.192)	(0.702)	(0.202)	(0.236)	(0.525)
Observations	22,711	883	21,782	18,558	4,093
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.400	0.504	0.397	0.461	0.342
Difference in corruption coefficient		New vs. Mature firms		Thai vs. Foreign firms	
Wald Chi-square (χ^2)		6.630 **		15.460 ***	
[Prob > χ^2]		[0.0100]		[0.0001]	

Note: Robust standard errors are provided in parentheses below each coefficient estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

To test hypotheses *H2(a)*, *H2(b), H3(a),* and *H3(b)*, we examine how Thai SMEs adopt their financial policies in response to local officials' corruption or rent-seeking behaviors of public officials, which we refer to as the grabbing hand, in the different corrupt environments. To investigate the relationship between corruption and firm financial policies (cash holding and leverage) across subsample based on

firm age and ownership type, we use regression analysis and add firm-specific control variables, year, and industry dummies in the following models:

$$cash/assets_{i,t} = \alpha_0 + \alpha_1 corruption_{j,t} + \sum \alpha_k X_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (2)$$

where $cash/assets_{i,t}$ is firm cash holding measured by cash and equivalents divided by total assets. The vector of firm-specific control variables ($X_{i,t}$) in equation (2) include size, net working capital, net negative income, EBITDA, and leverage.

$$debt/assets_{i,t} = \alpha_0 + \alpha_1 corruption_{j,t} + \sum \alpha_k X_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (3)$$

where $debt/assets_{i,t}$ is firm leverage measured by total debt divided by total assets. The vector of firm-specific control variables ($X_{i,t}$) in equation (3) includes size, PPE, EBITDA, and natural log of sales.

The firm-specific control variables in cash holdings and leverage models are based on the literature (Cai et al., 2022; Li & Pan, 2023; Smith,2016).

Table 5 presents the regression results using the cash ratio as the dependent variable, including time and industry indicators. The overall result in Column (1) of Table 5 shows that corruption is positively associated with firms' cash holdings at a 1% level of significance. Columns (3), (4), and (5) of Table 5 indicate a significant positive association at the 1% level between corruption and the cash holdings of mature firms, domestic Thai-owned firms, and foreign-owned firms, respectively. However, corruption is not significantly associated with the cash holdings of new firms (see Column (2) of Table 5).

The positive association between corruption and firms' cash holdings remains consistent in the model with additional covariates (economic indices, population, and education input) for the overall model, mature firms Thai-owned firms, but not for foreign-owned firms (see Panel B of Table A.2).

The regression results for the control variables in the cash holdings model align with previous studies (Cai et al., 2022; Jayakody et al., 2023; Smith, 2016). The results suggest that firms with higher cash holdings tend to have lower working capital ratios, lower leverage, and higher net negative income. Additionally, medium-sized firms are less likely to maintain cash ratios compared to small firms.

Table 5 Corruption and cash holdings

Cash Ratio	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0038***	0.0022	0.0039***	0.0039***	0.0024***
	(0.0004)	(0.0028)	(0.0004)	(0.0004)	(0.0008)
Net Working Capital	-0.0645***	-0.1887***	-0.0618***	-0.0712***	-0.0403***
	(0.0035)	(0.0288)	(0.0035)	(0.0041)	(0.0066)
Negative NI	0.0554***	0.0191	0.0515***	0.0660***	0.0184**
	(0.0043)	(0.0222)	(0.0043)	(0.0050)	(0.0083)
EBITDA	0.0057	0.0118	0.0011	0.0017	0.0077
	(0.0093)	(0.0388)	(0.0096)	(0.0111)	(0.0177)
Leverage	-0.0076***	-0.1062***	-0.0060***	-0.0111***	0.0029
	(0.0021)	(0.0327)	(0.0021)	(0.0026)	(0.0038)
Medium size	-0.0516***	-0.1063**	-0.0479***	-0.0603***	-0.0185*
	(0.0065)	(0.0458)	(0.0065)	(0.0083)	(0.0109)
Constant	0.1061***	0.4577***	0.1001***	0.1143***	0.0965***
	(0.0096)	(0.0899)	(0.0095)	(0.0107)	(0.0211)
Observations	22,711	929	21,782	18,558	4,153
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.0632	0.172	0.0618	0.0725	0.0577

Note: Robust standard errors are provided in parentheses below each coefficient estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6 presents the regression results using leverage as the dependent variable, incorporating time and industry indicators. Column (1) of Table 6 shows that corruption is positively associated with Thai SMEs' leverage at a 1% level of significance. The subsample analyses reveal a similarly significant positive association at the 1% level between corruption and leverage for mature firms and domestic Thai-owned firms, as shown in Columns (3) and (4), respectively. However, corruption is not significantly associated with the leverage of new firms and foreign-owned firms as shown in Columns (2) and (5) of Table 6.

When additional covariates such as economic indices, population, and education inputs are included in the model, the association between corruption and firms' leverage becomes insignificant for both the overall sample and all subsamples (see Panel C of Table A.2). This suggests that the initial positive relationship between corruption and leverage may be sensitive to broader economic and social factors.

The regression results for control variables in the leverage model are consistent with previous literature. The result aligns with the findings of Smith (2016). These results suggest that firms with higher leverage typically exhibit lower EBITDA to total assets and higher sales. Additionally, property, plant, and equipment (PPE) shows a significant positive association with leverage for Thai-owned firms

but is insignificant for foreign-owned firms and across different firm age categories. This indicates that domestic Thai-owned firms with higher PPE tend to hold more leverage.

Table 6 Corruption and leverage

Leverage	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0105***	0.0109	0.0098***	0.0117***	0.0050
	(0.0024)	(0.0098)	(0.0024)	(0.0027)	(0.0055)
PPE	0.0438*	-0.0079	0.0406	0.0739***	-0.0537
	(0.0252)	(0.0312)	(0.0262)	(0.0276)	(0.0617)
EBITDA	-2.0322***	-0.8945***	-2.0832***	-1.9377***	-2.2011***
	(0.1135)	(0.2437)	(0.1180)	(0.1346)	(0.2149)
In (Sales)	0.0092***	0.0205***	0.0074***	0.0092***	0.0061
	(0.0022)	(0.0031)	(0.0024)	(0.0025)	(0.0050)
Medium size	0.0419	0.1978	0.0443*	0.0307	0.0184
	(0.0256)	(0.1331)	(0.0259)	(0.0277)	(0.0575)
Constant	0.3926***	-0.1748	0.4377***	0.2686***	0.9354***
	(0.0736)	(0.1499)	(0.0769)	(0.0708)	(0.2520)
Observations	22,711	929	21,782	18,558	4,153
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.155	0.290	0.157	0.145	0.197

Note: Robust standard errors are provided in parentheses below each coefficient estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Our findings in Tables 5 and 6 highlight the complex relationship between corruption and firms' financial policies in corrupt environments. The positive association between corruption and firms' cash holdings remains consistent, even after including additional control variables in the model. However, the positive association between corruption and leverage becomes insignificant once these additional control variables are introduced into the model.

According to Smith (2016), firms may increase leverage and obfuscate during conference calls (Chourou et al., 2024) as a protective measure to shield their assets in highly corrupt environments. However, in countries with high levels of corruption, government officials and politicians often exploit and extract wealth from entrepreneurs, and they would not respect the creditors' rights either (Park, 2022). This implies that asset shielding may not be effective in such environments.

The results from our study suggest that firms, especially mature Thai SMEs, Thai-owned firms, and foreign-owned firms increase their cash holdings in anticipation of potential bribe demands. This behavior reflects a strategic response to the corrupt environment, where liquidity becomes crucial for navigating operational challenges by grabbing hands. This finding is consistent with Tayem (2023), and Tran (2020), who reveal that corruption is positively associated with firms' cash holdings in international evidence because high liquidity makes it easy to pay bribes. Similarly, Thakur and

Kannadhasan (2019) and Seo and Han (2022) show that firms' cash holdings are positively related to corruption in emerging economies, benefiting from trading cash in a corrupt environment.

Although increasing liquidity through cash holdings is a primary strategy for Thai SME mature firms and domestic Thai-owned firms, these firms may also resort to taking on more debt when internal resources are insufficient. This indicates that alongside maintaining higher cash reserves, these firms in corrupt environments might leverage additional financing to ensure operational stability. This is in line with Park's (2022) study that firms in corrupt environments hold more cash and increase borrowing as the cost of capital becomes more expensive. However, foreign-owned firms do not increase their debt in corrupt environments, because taking on more debt presents disadvantages compared to domestic firms and increases business risk (Lindner et al., 2018).

The baseline results show that new firms are unlikely to increase cash holdings and leverage in response to corruption. This is because they face limited internal resources (La Rocca et al., 2011), which are primarily allocated to business operations, leaving little capacity to reserve cash for corrupt demands. Additionally, new firms often have restricted access to external financing (Chavis et al., 2011), making it difficult for them to navigate corrupt environments effectively. Our findings also support hypothesis *H2(a)*, indicating that new firms will not increase cash holdings and leverage when they operate in corrupt environments.

Additionally, the baseline results confirm our Hypotheses *H2(b)*, *and H3(a)*, showing that mature Thai SMEs and domestic Thai-owned firms tend to increase cash holdings in corrupt environments as a safeguard against these risks and mitigate the impact of public officials' expropriation. Mature firms and domestic Thai-owned firms operating in corrupt environments also tend to increase leverage as a financial strategy when internal resources are insufficient. For foreign-owned firms, cash holdings also tend to increase in corrupt environments; however, it is not significant that they increase leverage in response to corruption, offering partial support for our hypothesis *H3(b)*.

4.3. Instrumental variable approach estimation

We use the instrumental variable (IV) approach to mitigate the potential endogeneity issue that may arise from the omitted variable bias and measurement error (Park, 2022). Thus, we conduct an IV analysis to ensure that the associations between corruption and the probability of Thai SMEs' insolvency and their financial policies are not spurious and confirm that the results are consistent. We use the population percentage in urban areas in each province (*Concentration*) from the Department of Provincial Administration, Ministry of Interior of Thailand as an IV. The idea is that people in urban

areas or larger cities have more frequent contact with officials and carry out transactions than those in rural areas, consequently increasing their chances of being victims of corruption (Diana Orces, 2009).

Table 7 shows the IV probit regression results of the insolvency model. The tests for endogeneity tests show that the Wu-Hausman tests (*F*-statistics) reject the null hypothesis that corruption is exogenous for the overall and all subsample models. These endogeneity tests show that our instrument is appropriate for all models. Once the endogeneity problem is controlled, fitted corruption is positively related to the probability of insolvency of Thai SMEs at a 1% significance level for the overall samples, mature firms, domestic Thai-owned, and foreign-owned firms. The results are consistent with our baseline regressions. Although the fitted corruption of new firms is statistically significant, the IV is insignificant on corruption in the new firms' model. These findings align with the baseline regression results and support our hypothesis *H1(b)*, suggesting that corruption increases the insolvency risk of Thai-owned firms than foreign-owned firms. However, our hypothesis *H1(a)* is not supported regarding the exacerbation of corruption's effects on new firms compared to mature firms.

Tables 8 and 9 present the two-stage least square results of the cash ratio and leverage model, respectively. In the first stage, the *F*-statistics (Columns 1, 3, 5, 7, and 9 of Tables 8 and 9) are used to test the null hypothesis that the instrument is weak. The significant *F*-statistics across all models indicate that our instrument is not weak, confirming that the percentage of the province population living in urban areas is directly related to provincial corruption per capita. The Wu-Hausman test also shows that we reject the null hypothesis of exogenous corruption for all models, confirming the validity of our instrument.

The findings in the second stage reinforce the baseline regression results and confirm our hypothesis *H2 (a)*, suggesting that new firms will not increase cash holdings and leverage in corrupt environments due to their financial constraints. Furthermore, the IV approach findings strengthen our hypotheses *H2 (b)*, *H3 (a)*, and *H3 (b)*, suggesting that mature firms, Thai-owned and foreign-owned firms increase cash holdings in corrupt environments, respectively. This financial policy reflects the need to maintain liquidity to navigate potential corrupt demands or grabbing hands. Additionally, these firms increase leverage when external resources are required as part of their financial response to corruption.

Table 7 displays IV Probit regression results, illustrating the association between the probability of firm insolvency with corruption and allegation cases per 100,000. The instrumental variable is *concentration*, which is measured by the population percentage in urban areas in each province. Industry dummies are indicators for two-digit Thailand SIC codes. The exogeneity test is a Wu-Hausman test. The regression includes all controls used in the previous insolvency model, but the coefficients are not reported.

Table 7 Corruption and firm insolvency: Instrumental variable estimation

Insolvent	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABES	All firms-First Stage: Corruption	All firms-Second Stage: Insolvent	New firms-First Stage: Corruption	New firms-Second Stage: Insolvent	Mature firms-First Stage: Corruption	Mature firms-Second Stage: Insolvent	Thai firms-First Stage: Corruption	Thai firms-Second Stage: Insolvent	Foreign firms-First Stage: Corruption	Foreign firms-Second Stage: Insolvent
Concentration	0.1151***		-0.0062		0.1169***		0.1196***		0.1039***	
	(0.0017)		(0.0090)		(0.0017)		(0.0018)		(0.0042)	
Fitted Corruptions		0.1453***		-0.3127***		0.1439***		0.1686***		0.1615***
		(0.0036)		(0.0089)		(0.0036)		(0.0036)		(0.0090)
Constant	9.0213***	-3.7734***	7.9345***	2.2525***	8.9927***	-3.8371***	8.5765***	-3.8249***	10.1021***	-4.8976***
	(0.1413)	(0.0911)	(0.6698)	(0.3814)	(0.1437)	(0.0958)	(0.1540)	(0.1049)	(0.3424)	(0.2026)
Observations	22,711	22,711	883	883	21,782	21,782	18,558	18,558	4,093	4,093
Wald chi2 (χ^2)		6,845.37***		1,922.16***		6,380.02***		6,120.18***		1,430.90***
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exogeneity Test	761.20***		4.368**		717.77***		994.26***		183.20***	
Difference in corruption coefficient				New vs. Mature firms				Thai vs. Foreign firms		
Wald Chi-square (χ^2)				2,282.11**				0.54		
[Prob > χ^2]				[0.0000]				[0.4612]		

Note: Robust standard errors are provided in parentheses below each coefficient estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8 displays two-stage least squares regression results, illustrating the association between cash holdings with corruption and allegation cases per 100,000. The instrumental variable is *concentration*, which is measured by the population percentage in urban areas in each province. Industry dummies are indicators for two-digit Thailand SIC codes. The weak IV test is *F*-statistics. The exogeneity test is a Wu-Hausman test. The regression includes all controls used in the previous cash holdings model, but the coefficients are not reported.

Table 8 Corruption and cash holdings: Instrumental variable estimation

Cash Ratio	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	All firms-First Stage: Corruption	All firms-Second Stage: Cash Ratio	New firms-First Stage: Corruption	New firms-Second Stage: Cash Ratio	Mature firms-First Stage: Corruption	Mature firms-Second Stage: Cash Ratio	Thai firms-First Stage: Corruption	Thai firms-Second Stage: Cash Ratio	Foreign firms-First Stage: Corruption	Foreign firms-Second Stage: Cash Ratio
Concentration	0.1229***		0.0120		0.1249***		0.1273***		0.1154***	
	(0.0015)		(0.0104)		(0.0015)		(0.0017)		(0.0037)	
Fitted Corruptions		0.0098***		0.0112		0.0101***		0.0097***		0.0088***
		(0.0007)		(0.0655)		(0.0007)		(0.0008)		(0.0015)
Constant	8.7841***	0.0391***	11.5591***	0.3505	8.7447***	0.0312***	8.4757***	0.0510***	9.8050***	0.0164
	(0.1402)	(0.0117)	(1.1355)	(0.7819)	(0.1426)	(0.0116)	(0.1547)	(0.0130)	(0.3172)	(0.0268)
Observations	22,711	22,711	929	929	21,782	21,782	18,558	18,558	4,153	4,153
R-squared	0.417	0.050	0.151	0.184	0.425	0.047	0.427	0.061	0.431	0.047
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.416	0.0491	0.127	0.161	0.424	0.0461	0.426	0.0595	0.428	0.0415
Weak IV test	6,340.87***		3.74333*		6,571.08***		5,732.39***		955.298***	
Exogeneity test	114.62***		2.54903		129.04***		86.7399***		27.4459***	

Note: Robust standard errors are provided in parentheses below each coefficient estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 9 displays two-stage least squares regression results, illustrating the association between leverage with corruption and allegation cases per 100,000. The instrumental variable is *concentration*, which is measured by the population percentage in urban areas in each province. Industry dummies are indicators for two-digit Thailand SIC codes. The weak IV test is *F*-statistics. The exogeneity test is a Wu-Hausman test. The regression includes all controls used in the previous leverage model, but the coefficients are not reported.

Table 9 Corruption and leverage: Instrumental variable estimation

Leverage	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	All firms-First Stage: Corruption	All firms-Second Stage: Leverage	New firms-First Stage: Corruption	New firms-Second Stage: Leverage	Mature firms-First Stage: Corruption	Mature firms-Second Stage: Leverage	Thai firms-First Stage: Corruption	Thai firms-Second Stage: Leverage	Foreign firms-First Stage: Corruption	Foreign firms-Second Stage: Leverage
Concentration	0.1227***		0.0165		0.1247***		0.1272***		0.1155***	
	(0.0015)		(0.0106)		(0.0015)		(0.0017)		(0.0037)	
Fitted Corruptions		0.0343***		0.3923		0.0321***		0.0362***		0.0224**
		(0.0050)		(0.2656)		(0.0050)		(0.0057)		(0.0101)
Constant	8.8945***	0.1016	10.9236***	-4.5373	8.8565***	0.1640*	8.5908***	-0.0260	9.7735***	0.7113**
	(0.1556)	(0.0889)	(1.0894)	(2.9668)	(0.1594)	(0.0915)	(0.1734)	(0.0893)	(0.3383)	(0.2843)
Observations	22,711	22,711	929	929	21,782	21,782	18,558	18,558	4,153	4,153
R-squared	0.417	0.149	0.143	0.00	0.425	0.152	0.427	0.138	0.432	0.199
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.416	0.148	0.120	0.00	0.424	0.151	0.426	0.137	0.428	0.194
Weak IV test	6,328.11***		2.4324		6,547.39***		5,720.57***		956.792***	
Exogeneity test	43.6161***		5.33892**		38.7803***		38.1754***		4.4068**	

Note: Robust standard errors are provided in parentheses below each coefficient estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.4. Channel analysis: Interaction effect of corruption and financial policies

In this section, we extend the analysis to determine whether financial policy choices in corrupt environments influence the likelihood of insolvency.

We examine how firms' financial policies (cash holdings and leverage) interact with the level of corruption in their province to assess the sensitivity of insolvency risk in their financial strategies. A significantly negative interaction term suggests that the chosen financial policy reduces the probability of insolvency in highly corrupt environments, while a significantly positive interaction indicates an increased risk of insolvency. To empirically test these relationships, we estimate the logistic regression models using equations (4) and (5):

$$Y_{i,t}(Insolvent) = \alpha_0 + \alpha_1\, corruption_{j,t} + \alpha_2\, cash_{i,t} + \alpha_3\, corruption_{j,t} * cash_{i,t} + \sum \alpha_k X_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (4)$$

$$Y_{i,t}(Insolvent) = \alpha_0 + \alpha_1\, corruption_{j,t} + \alpha_2\, leverage_{i,t} + \alpha_3\, corruption_{j,t} * leverage_{i,t} + \sum \alpha_k X_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (5)$$

where $X_{i,t}$ is a vector of firm-specific control variables consistent with those used in the baseline regressions provided in equation (1).

Table 10 presents the results of the logistic regression analysis incorporating the interaction term (*corruption * cash*) in the insolvency model. Corruption is positively associated with the probability of insolvency among Thai SMEs, consistent with our baseline results. The coefficient of the interaction term is negative and statistically significant at the 5% level for all firms, and 5% and 10% levels for mature firms and domestic Thai-owned firms, respectively. These findings suggest that mature firms and domestic Thai-owned firms with higher cash holdings are better able to mitigate the negative impact of corruption on insolvency. The unpredictable demands for bribes and other corrupt practices increase the financial burden on firms; therefore, firms with higher cash reserves are better equipped to handle these unexpected costs, thereby reducing the risk of insolvency. Conversely, the interaction term is not significant for foreign-owned firms indicating higher cash holdings in corrupt environments cannot mitigate the risk of insolvency for foreign-owned firms.

Table 11 presents the results of the logistic regression analysis incorporating the interaction term (*corruption * leverage*) in the insolvency model. The positive association between corruption and the insolvency of Thai SMEs remains consistent with our baseline regression. The coefficient for the interaction term is positive and significant at the 1% level for all Thai SMEs, mature firms, and domestic

Thai-owned firms. It is also significantly positive at the 10% level for foreign-owned firms. These results suggest that higher leverage amplifies the negative impact of corruption on the probability of insolvency for mature firms, both domestic Thai-owned and foreign-owned firms. Firms with high leverage are less flexible and more vulnerable to the additional costs imposed by corrupt officials. Thus, these firms with higher leverage may lack the liquidity needed to manage corrupt demands, increasing their risk of insolvency.

The Wald Chi-square (χ^2) statistics presented in Tables 10 and 11 show significant differences in the corruption coefficients between new and mature firms, as well as between Thai-owned and foreign-owned firms. These results are consistent with the baseline findings, confirming that the impacts of corruption on firms' insolvency risk between these groups are not equal. These findings suggest that mature firms and domestic Thai-owned firms are more affected by corruption in terms of insolvency risk than new firms and foreign-owned firms, respectively.

Table 10 Corruption and firm insolvency: Cash holding channel analysis

Insolvent	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.102***	0.0755	0.106***	0.110***	0.0585***
	(0.00727)	(0.0538)	(0.00738)	(0.00869)	(0.0169)
Cash Ratio	5.031***	5.312***	5.054***	5.073***	5.098***
	(0.192)	(1.081)	(0.199)	(0.230)	(0.449)
Corruptions*Cash	-0.0386**	-0.199	-0.0369**	-0.0363*	-0.0473
	(0.0159)	(0.123)	(0.0162)	(0.0188)	(0.0393)
Constant	-5.834***	-4.278***	-6.042***	-6.015***	-7.160***
	(0.203)	(0.853)	(0.213)	(0.249)	(0.541)
Observations	22,711	883	21,782	18,558	4,093
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.400	0.507	0.397	0.462	0.343
Difference in corruption coefficient		New vs. Mature firms		Thai vs. Foreign firms	
Wald Chi-square (χ^2)		0.31		7.48***	
[Prob > χ^2]		[0.5794]		[0.0062]	

Note: Regression includes all controls used in our baseline regression, but the coefficients are not reported.

Table 11 Corruption and firm insolvency: Leverage channel analysis

Insolvent	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0835***	-0.0102	0.0876***	0.0911***	0.0360***
	(0.00538)	(0.0367)	(0.00548)	(0.00637)	(0.0136)
Leverage	-0.137***	-0.851	-0.128***	-0.168***	-0.0379
	(0.0367)	(0.642)	(0.0368)	(0.0484)	(0.0606)
Corruptions*Leverage	0.00985***	0.0359	0.00934***	0.0113***	0.00902*
	(0.00251)	(0.0305)	(0.00251)	(0.00310)	(0.00537)
Constant	-5.612***	-3.557***	-5.829***	-5.780***	-6.909***
	(0.193)	(0.710)	(0.202)	(0.239)	(0.535)
Observations	22,711	883	21,782	18,558	4,093
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.401	0.506	0.398	0.463	0.343
Difference in corruption coefficient		New vs. Mature firms		Thai vs. Foreign firms	
Wald Chi-square (χ^2)		6.94***		13.44***	
[Prob > χ^2]		[0.0084]		[0.0002]	

Note: Regression includes all controls used in our baseline regression, but the coefficients are not reported.

In summary, the persistence of a significant positive coefficient of corruption in the insolvency models, even with the inclusion of interaction terms, aligns with our baseline results. The adverse impact of corruption is more pronounced for mature firms than new firms which does not support our hypothesis *H1(a).* On the other hand, the negative impact of corruption on insolvency risk is more exacerbated for domestic Thai-owned firms compared to foreign-owned firms, which supports our hypothesis *H1(b)*. Furthermore, the results from the channel analysis suggest that firms prioritize to increase cash holdings as a financial strategy when operating in highly corrupt environments, which helps reduce the probability of insolvency for mature firms and domestic Thai-owned firms. Conversely, mature firms and both domestic Thai-owned and foreign-owned firms that increase leverage as a financial policy are more likely to become insolvent in highly corrupt environments.

4.5. Robustness tests

In this section, we conduct robustness tests to confirm the consistency and reliability of our findings. To strengthen our results, we apply several approaches, including propensity score matching estimation, an alternative measure of corruption, and further analyse the relationship between corruption and excess cash holdings, as well as excess leverage. These robustness checks are designed to ensure that our conclusions remain valid under different methodological frameworks and variable definitions, reinforcing the credibility of our results.

Propensity score matching estimation

Table 12 presents the Average Treatment Effect on the Treated (ATT) using Propensity Score Matching (PSM). This method matches treated and untreated (control) observations based on covariates using logistic regression (Guo & Fraser, 2014). We define treatment (control) firm-year observations as those having a location in a high-corrupt (low-corrupt) province if their province is equal to or above (below) the median number of corruption and allegation cases in the same year. Matched firms are chosen using a 1:1 nearest-neighbor propensity score matching with a caliper to minimize poor matches (Smith, 2016). Covariates include firm-year variables used in the previous analyses, location-specific variables, and controls for time and industry.

Panel A of Table 12 reports the ATT for the probability of insolvency, indicating that firms located in highly corrupt provinces are more likely to experience insolvency compared to firms in low-corrupt provinces. This finding holds for our overall sample, as well as in our subsample analyses of mature firms and Thai-owned firms. However, the effect is not significant for foreign-owned firms. Interestingly, new firms in highly corrupt provinces are less likely to become insolvent compared to those in low-corrupt provinces. The magnitude of the ATT for the probability of insolvency is greater for mature firms and Thai-owned firms than for new firms and foreign-owned firms, respectively which are consistent with our baseline results.

Panels B and C of Table 12 present the ATT for cash holdings and leverage, respectively. The results for cash holdings, Panel B of Table 12, are not statistically significant in both overall analysis and subsample analyses, which contrasts with earlier findings. Conversely, Panel C of Table 12 suggests that firms in highly corrupt environments tend to significantly increase leverage compared to firms in low-corrupt environments, particularly for mature firms and domestic Thai-owned firms.

The earlier results for cash holdings and leverage, derived from our baseline models, regressions with additional control variables, IV approaches, and channel analyses, are consistent and point in the same direction. However, the PSM results for cash holdings do not align with our previous findings. This discrepancy may come from underfitting during the matching process, as our dataset is highly diversified, making it challenging to find appropriate matches. Additionally, constructing matched samples reduces the overall sample size. After matching in cash holdings outcome, some mean differences between the two groups remain statistically significant. This suggests that our PSM sample has not successfully eliminated differences in the characteristics of the treatment and control groups. To further ensure the robustness of our findings, we will conduct additional tests using an alternative measure of corruption, and examine the impact of corruption on excess cash and excess leverage.

Table 12 Propensity score matching analysis

Average treatment effect of the treated (ATT)	(1) All firms	(2) New firms	(3) Mature firms	(4) Thai firms	(5) Foreign firms
Panel A: Outcome variable is **Insolvent**	0.0150***	-0.0778**	0.0174***	0.0139**	0.0112
(caliper = 0.032)	(0.0051)	(0.0321)	(0.0052)	(0.0056)	(0.0131)
Panel B: Outcome variable is **Cash/assets**	0.0029	-0.0291	0.0035	0.0044	-0.0079
(caliper = 0.031)	(0.0032)	(0.0194)	(0.0032)	(0.0036)	(0.0077)
Panel C: Outcome variable is **Leverage**	0.0349*	0.0048	0.0356*	0.0481**	0.0168
(caliper = 0.031)	(0.0184)	(0.0287)	(0.0193)	(0.0192)	(0.0561)
Firm-level effects	Yes	Yes	Yes	Yes	Yes
Location-level effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are below each treatment estimate in parentheses.

Alternative measure of corruption

As an alternative specification, we use a dummy variable (High Corrupt) which is equal to one if the province has the corruption and allegation cases per 100,000 people at or above the median for that year; otherwise, it is equal to zero. This concept of the alternative measure of corruption is similar to categorizing the treatment and control group in the PSM approach. The models include all the control variables present in our baseline regressions but do not report the coefficients in Tables 13 to 15.

Table 13 shows the robust evidence that corruption has a significant negative impact on the probability of insolvency among Thai SMEs, particularly in mature firms and domestic Thai-owned firms, significant at the 1% level. These findings are consistent with our main results, including those from our baseline analysis, IV approach, and channel analysis. However, the alternative corruption measure does not show a significant impact on the probability of insolvency for new firms or foreign-owned firms. These findings are consistent with Nam et al.'s study (2020), which suggests that corruption negatively impacts domestic firms because they often face direct exploitation by local officials, while foreign-owned firms are less likely to encounter such exploitation.

The Wald Chi-square (χ^2) test reveals a significant difference in corruption coefficients between Thai-owned and foreign-owned firms (see the final row of Table 13). The magnitude of the corruption coefficients remains significant and larger for mature firms compared to new firms and for Thai-owned firms compared to foreign-owned firms. Thus, the results using an alternative measure of corruption align and support our baseline results.

Tables 14 and 15 show robust evidence of a positive association between corruption and firms' cash holdings and leverage, respectively. The results of the cash holdings model and leverage model align

with our main findings, which show significant effects in the overall analysis as well as in the subsamples of mature firms and domestic Thai-owned firms. Conversely, the alternative corruption measure is insignificant on cash holdings and leverage for both new firms and foreign-owned firms.

In short, the robust results in all models (insolvency, cash holdings, and leverage outcome) using an alternative measure of corruption are statistically similar to our baseline results, particularly mature firms, and domestic Thai-owned firms.

Table 13 Corruption and firm insolvency: Alternative measure of corruption

Insolvent	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
High Corrupt	0.373***	0.0292	0.406***	0.374***	0.105
	(0.0476)	(0.234)	(0.0492)	(0.0563)	(0.102)
Constant	-4.762***	-3.666***	-4.943***	-4.936***	-6.441***
	(0.176)	(0.647)	(0.186)	(0.220)	(0.507)
Observations	22,711	883	21,782	18,558	4,093
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.387	0.504	0.382	0.447	0.339
Difference in corruption coefficient		New vs. Mature firms		Thai vs. Foreign firms	
Wald Chi-square (χ^2)		2.49		5.35**	
[Prob > χ^2]		[0.1146]		[0.0207]	

Note: Regression includes all controls used in our baseline regression, but the coefficients are not reported.

Table 14 Corruption and cash holdings: Alternative measure of corruption

Cash Ratio	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
High Corrupt	0.0133***	0.0004	0.0139***	0.0152***	-0.0009
	(0.0030)	(0.0170)	(0.0030)	(0.0033)	(0.0069)
Constant	0.1438***	0.4843***	0.1387***	0.1509***	0.1272***
	(0.0088)	(0.0858)	(0.0087)	(0.0098)	(0.0188)
Observations	22,711	929	21,782	18,558	4,153
R-squared	0.059	0.195	0.057	0.069	0.061
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.0583	0.172	0.0564	0.0678	0.0554

Note: Regression includes all controls used in our baseline regression, but the coefficients are not reported.

Table 15 Corruption and leverage: Alternative measure of corruption

Leverage	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
High Corrupt	0.0426**	0.0237	0.0402**	0.0510***	0.0345
	(0.0166)	(0.0340)	(0.0172)	(0.0175)	(0.0461)
Constant	0.5043***	-0.0555	0.5428***	0.3889***	0.9897***
	(0.0706)	(0.0658)	(0.0740)	(0.0666)	(0.2441)
Observations	22,711	929	21,782	18,558	4,153
R-squared	0.155	0.305	0.157	0.144	0.201
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.154	0.286	0.156	0.143	0.197

Note: Regression includes all controls used in our baseline regression, but the coefficients are not reported.

The effect of corruption on excess cash holding and excess leverage

In this section, we analyze the impact of corruption on excess cash holdings and excess leverage. Investigating these variables allows us to assess the liquidity motive for firms operating in highly corrupt environments. Prior research suggests that firms in more corrupt environments tend to hold more cash than optimal (Park, 2022). Several studies, including Li and Pan (2023) and Park (2022), estimate excess cash by regressing cash holdings on their determinants and using the residuals, following the method proposed by Opler et al. (1999).

Due to the limitations of Thai SME data, some variables used in Opler et al.'s model are unavailable, we cannot use this approach to estimate excess cash. Instead, we estimate a firm's excess cash by calculating the difference between the firm's cash ratio and the industry average cash ratio for the given year. Similarly, we define a firm's excess leverage as the difference between the firm's leverage and the industry average leverage for the same period.

The regression analysis used to examine the associations between corruption and excess cash holdings, as well as excess leverage, is based on the following models:

$$Excess\ Cash_{\ i,t} = \alpha_0 + \alpha_1 corruption_{j,t} + \sum \alpha_k X_{\ i,t} + Industry + Year + \varepsilon_{\ i,t} \quad (6)$$

where $X_{\ i,t}$ is a vector of firm-specific control variables consistent with those used in our baseline regressions provided in equation (2).

$$Excess\ Leverage_{\ i,t} = \alpha_0 + \alpha_1 corruption_{j,t} + \sum \alpha_k X_{\ i,t} + Industry + Year + \varepsilon_{\ i,t} \quad (7)$$

where $X_{\ i,t}$ is a vector of firm-specific control variables consistent with those used in our baseline regressions provided in equation (3).

Table 16 presents the regression results with excess cash as the dependent variable. The coefficient for corruption remains consistent with our baseline results—positive and statistically significant at the 1% level in the overall analysis, as well as in the subsample analyses of mature firms, domestic Thai-owned Thai firms, and foreign-owned firms. This indicates that firms increase their excess cash holdings in response to corruption from local officials (grabbing hand) and is consistent with findings from Li and Pan (2023) and Park (2022). The finding implies that firms in more corrupt environments may hold cash beyond their optimum level, and this excess cash can result in firms' value destruction (Banjade & Diltz, 2022; Park, 2022). Conversely, our result does not show a significant association between corruption and excess cash for new firms which is consistent with our baseline results.

Table 17 shows the regression results with excess leverage as the dependent variable. The coefficient for corruption, consistent with our baseline results, remains positive and statistically significant at the 1% level in the overall analysis and the subsample analyses of mature firms and domestic Thai-owned firms. However, corruption is insignificant in excess leverage for new firms, and foreign-owned firms. This suggests that mature firms and Thai-owned firms may resort to financing beyond their industry average in corrupt environments, whereas new firms and foreign-owned firms do not exhibit the same behavior, potentially indicating a different approach to managing corruption-related risks. Previous empirical studies suggest that multinational corporations typically maintain lower leverage than domestic firms, as higher leverage may lead to competitive disadvantages and increased agency costs for multinational corporations (Lindner et al., 2018; Melgarejo Duran & Stephen, 2020). Additionally, new firms often face greater challenges in accessing financing compared to more established firms (Robb, 2002).

These results align with our main findings and further support our hypothesis *H2 (a)*, which hypothesizes that new firms will not increase cash holdings and leverage when they operate in more corrupt environments due to both restricted internal resources and limited access to financing. Additionally, the results align with our hypotheses *H2 (b)*, *and H3 (a),* suggesting that mature firms and domestic Thai-owned firms retain liquidity (excess cash holdings) as a strategic response to corruption, while increase excess leverage in corrupt environments. Notably, foreign-owned firms raise their excess cash in corrupt environments but do not exceed industry-average financing levels. These findings partially support our hypothesis *H3 (b)*, indicating that while foreign-owned firms follow a liquidity-driven approach in corrupt environments, they avoid over-leveraging, as this could raise business costs and reduce their competitive advantage.

Table 16 Corruption and excess cash

Excess Cash	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0038***	0.0023	0.0039***	0.0039***	0.0025***
	(0.0004)	(0.0028)	(0.0004)	(0.0004)	(0.0008)
Constant	-0.0438***	0.2983***	-0.0496***	-0.0356***	-0.0538**
	(0.0096)	(0.0895)	(0.0095)	(0.0106)	(0.0210)
Observations	22,711	929	21,782	18,558	4,153
R-squared	0.048	0.164	0.049	0.058	0.046
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.0474	0.140	0.0478	0.0569	0.0404

Note: Regression includes all controls used in our baseline regression, but the coefficients are not reported.

Table 17 Corruption and excess leverage

Excess Leverage	(1)	(2)	(3)	(4)	(5)
VARIABLES	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0103***	0.0114	0.0096***	0.0114***	0.0054
	(0.0023)	(0.0095)	(0.0024)	(0.0026)	(0.0054)
Constant	-0.1892***	-0.7257***	-0.1450*	-0.3142***	0.3556
	(0.0719)	(0.1460)	(0.0752)	(0.0691)	(0.2468)
Observations	22,711	929	21,782	18,558	4,153
R-squared	0.147	0.348	0.148	0.134	0.209
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Adjusted R square	0.146	0.330	0.147	0.132	0.204

Note: Regression includes all controls used in our baseline regression, but the coefficients are not reported.

Overall, the results of the robustness tests confirm that corruption increases the risk of insolvency of Thai SMEs. Furthermore, the robustness tests show that the negative effect of corruption is not more pronounced for new firms than for mature firms, which does not support our hypothesis *H1(a)*. However, the robustness tests affirm that corruption has a more significant adverse effect on Thai-owned firms than on foreign-owned counterparts, further supporting our hypothesis *H1(b)*.

The results of robustness tests in Tables 13 to 17 strongly support the liquidity motive, indicating that mature firms, both domestic Thai-owned and foreign-owned firms increase cash holdings in response to corrupt environments. Moreover, when internal financing is insufficient, these firms except for foreign-owned firms resort to increased leverage by borrowing as well. The robustness tests for new firms are consistent with our baseline and IV approach, indicating that new firms will not increase cash holdings and leverage, reflecting their limited financial strategies to respond to the grabbing hands. Therefore, the robustness tests further support our hypotheses *H2 (a)*, *H2 (b), H3 (a)* and *H3 (b)*.

5. Conclusions

This study examines the impact of corruption on the insolvency risk of Thai SMEs and the association between corruption and firms' financial policies. It explores how firm characteristics, such as age and ownership type, are affected by corruption. The results remain robust across different model specifications. Our findings indicate that corruption significantly increases the insolvency risk for Thai SMEs, particularly for mature firms, domestic Thai-owned firms, and foreign-owned firms. This supports the "*sanding the wheels*" hypothesis, which suggests that corruption hinders business growth and economic development. Interestingly, the study does not find a significant negative impact of corruption on newly established firms. This may be because new firms often have fewer resources and may be less attractive targets for corrupt activities. When comparing the effects of corruption on firms with different characteristics, mature firms are more susceptible to insolvency as corruption levels increase, compared to new firms. Likewise, the domestic Thai-owned firms in highly corrupt environments face greater insolvency risks than their foreign-owned counterparts.

Thai SMEs, characterized as mature firms, Thai-owned firms, and foreign-owned firms, adopt their financial policies by holding the liquidity (cash holdings) in high-corrupt provinces to respond to the "Grabbing Hand", ensuring they have the resources necessary to secure public services and obtain approvals from local officials. Conversely, our findings do not show a significant association between corruption and financial strategies for new firms. New firms may lack knowledge, have insufficient resources to maintain liquidity, and have restricted access to financing. Although managers of mature firms and Thai-owned firms reserve more cash in corrupt environments, they may increase their leverage by borrowing when internal resources are insufficient to maintain their financial stability in corrupt environments. On the other hand, foreign-owned firms retain more cash in corrupt environments but do not take on additional or excess debt as a financial strategy, reflecting a different approach compared to domestic Thai-owned firms. This strategic use of liquidity and debt highlights the adaptive measures firms take in response to corruption or officials' expropriation. Additionally, the moderating effect of financial policies on the relationship between corruption and firm insolvency indicates that mature firms and domestic Thai-owned firms with higher cash holdings in corrupt environments can mitigate the impact of corruption on insolvency risk. Conversely, higher leverage in corrupt environments tends to exacerbate the insolvency risk of mature firms, Thai-owned firms, and foreign-owned firms.

The mature firms, as well as Thai-owned and foreign-owned firms, hold excess cash in high-corrupt environments beyond their industry average as a buffer against corruption-related uncertainties. In addition, mature firms and Thai-owned firms also carry excess leverage in these environments, further highlighting their reliance on external financing to navigate corrupt conditions. In contrast, foreign-

owned firms do not exhibit excess leverage, possibly reflecting differences in risk management approaches or access to capital.

The findings have significant implications for policymakers and regulators in Thailand, demonstrating that corruption is a major obstacle to the development of Thai SMEs. Firstly, corruption creates an environment that increases the likelihood of insolvency of Thai SMEs, particularly mature and domestic Thai-owned firms. The financial effect of corruption is costly in Thailand as the increasing insolvency risk of Thai SMEs reduces employment and economic growth. Secondly, the necessity to hold excess cash in a high-corrupt environment imposes an implicit cost to Thai SMEs, as it can diminish firm values. Excess cash beyond the firm's optimum level decreases business opportunities to invest and grow, thereby restricting the firm's ability to generate higher returns. Therefore, the Thai government and policymakers should prioritize anti-corruption efforts and develop tools to facilitate business operations by mitigating corruption concerns. One proposed solution is to establish business facilitation centers in each province, linked to the Office of Small and Medium Enterprises Promotion of Thailand (OSMEP). These centers would assist Thai SMEs with key operations, such as license approvals and public services, thereby reducing opportunities for corrupt practices and fostering a more business-friendly environment. This would enhance the business environment and improve Thailand's rankings in both the Ease of Doing Business Index and the Corruption Perception Index.

6. References

Angrist, J. D., & Imbens, G. W. (1995). Two-stage least squares estimation of average causal effects in models with variable treatment intensity. *Journal of the American Statistical Association*, *90*(430), 431.

Ashyrov, G., & Masso, J. (2020). Does corruption affect local and foreign-owned companies differently? Evidence from the BEEPS survey. *Post-Communist Economies*, *32*(3), 306–329.

Banjade, D., & Diltz, J. D. (2022). Excess cash holdings and firm performance in new and old economy firms. *The Quarterly Review of Economics and Finance*, *86*, 124–133.

Beck, T., Demirguc-Kunt, A., & Maksimovic, V. (2005). Financial and Legal Constraints to Growth: Does Firm Size Matter? *The Journal of Finance*, *60*(1), 137–177.

Brada, J. C., Drabek, Z., Mendez, J. A., & Perez, M. F. (2019). National levels of corruption and foreign direct investment. *Journal of Comparative Economics*, *47*(1), 31–49.

Cai, W., Hu, F., Xu, F., & Zheng, L. (2022). Anti-corruption campaign and corporate cash holdings: Evidence from China. *Emerging Markets Review*, *51*, 100843.

Chavis, L. W., Klapper, L. F., & Love, I. (2011). The impact of the business environment on young firm financing. *The World Bank Economic Review*, *25*(3), 486–507.

Chourou, L., Hossain, A. T., & Jha, A. (2024). US political corruption and quarterly conference calls. *Journal of Banking & Finance*, *161*, 107108.

Coad, A., Segarra, A., & Teruel, M. (2013). Like milk or wine: Does firm performance improve with age? *Structural Change and Economic Dynamics*, *24*(1), 173–189.

Cuervo-Cazurra, A. (2008). Better the devil you don't know: Types of corruption and FDI in transition economies. *Journal of International Management*, *14*(1), 12–27.

DeBacker, J., Heim, B. T., & Tran, A. (2015). Importing corruption culture from overseas: Evidence from corporate tax evasion in the United States. *Journal of Financial Economics*, *117*(1), 122–138.

Diana Orces, B. (2009). *Municipal corruption victimization*. www.AmericasBarometer.org

Dreher, A., & Gassebner, M. (2013). Greasing the wheels? The impact of regulations and corruption on firm entry. *Public Choice*, *155*(3–4), 413–432.

Fuertes-Callén, Y., Cuellar-Fernández, B., & Serrano-Cinca, C. (2022). Predicting startup survival using first years financial statements. *Journal of Small Business Management*, *60*(6), 1314–1350.

García-Gómez, C. D., Demir, E., Díez-Esteban, J. M., & Lizarzaburu Bolaños, E. (2022). Corruption, national culture and corporate investment: European evidence. *European Journal of Finance*.

Guo, S., & Fraser, M. W. (2014). *Propensity score analysis: Statistical methods and applications* (Second). SAGE Publications, Inc.

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (3rd ed.). Wiley.

Jayakody, S., Morelli, D., & Oberoi, J. (2023). Political uncertainty, corruption, and corporate cash holdings. *Journal of Corporate Finance*, *82*.

La Rocca, M., La Rocca, T., & Cariola, A. (2011). Capital structure decisions during a firm's life cycle. *Small Business Economics*, *37*(1), 107–130.

Li, Z., & Pan, X. (2023). Relationship investment and local corruption environment: Evidence from China. *Accounting & Finance*, *63*(4), 4597–4628.

Lindner, T., Klein, F., & Schmidt, S. (2018). The effect of internationalization on firm capital structure: A meta-analysis and exploration of institutional contingencies. *International Business Review*, *27*(6), 1238–1249.

Liu, B., Lin, Y., Chan, K. C., & Fung, H.-G. (2018). The dark side of rent-seeking: The impact of rent-seeking on earnings management. *Journal of Business Research*, *91*, 94–107.

Liu, X. (2016). Corruption culture and corporate misconduct. *Journal of Financial Economics*, *122*(2), 307–327.

Martins, L., Cerdeira, J., & A.C. Teixeira, A. (2020). Does corruption boost or harm firms' performance in developing and emerging economies? A firm-level study. *The World Economy*, *43*(8), 2119–2152.

Melgarejo Duran, M., & Stephen, S.-A. (2020). Internationalization and the capital structure of firms in emerging markets: Evidence from Latin America before and after the financial crisis. *Research in International Business and Finance*, *54*, 101288.

Méon, P.-G., & Sekkat, K. (2005). Does corruption grease or sand the wheels of growth? *Public Choice*, *122*(1–2), 69–97.

Muñoz-Izquierdo, N., Laitinen, E. K., Camacho-Miñano, M., & Pascual-Ezama, D. (2020). Does audit report information improve financial distress prediction over Altman's traditional *Z* -score model? *Journal of International Financial Management & Accounting*, *31*(1), 65–97.

Nam, V. H., Nguyen, M. N., Nguyen, D. A., & Luu, H. N. (2020). The impact of corruption on the performance of newly established enterprises: Empirical evidence from a transition economy. *Borsa Istanbul Review*, *20*(4), 383–395.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, *52*(1), 3–46.

Park, S. (2022). Liquid asset sheltering, or cost of capital? The effect of political corruption on corporate cash holdings. *International Review of Financial Analysis*, *82*, 102146.

Robb, A. M. (2002). Small business financing: Differences between young and old firms. *The Journal of Entrepreneurial Finance*, *7*(2), 45–65.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, *70*(1), 41.

Seo, D. W., & Han, S. H. (2022). Corruption and Corporate Cash Holdings. *Emerging Markets Finance and Trade*, *58*(5), 1441–1455.

Shleifer, A., & Vishny, R. W. (1998). *The Grabbing Hand*. Harvard University Press.

Smith, J. D. (2016). US political corruption and firm financial policies. *Journal of Financial Economics*, *121*(2), 350–367.

Tayem, G. (2023). The threat of political extraction and corporate cash holdings: The case of the GCC countries. *Cogent Economics & Finance*, *11*(1).
Thakur, B. P. S., & Kannadhasan, M. (2019). Corruption and cash holdings: Evidence from emerging market economies. *Emerging Markets Review*, *38*, 1–17.
The Office of Small and Medium Enterprises Promotion. (2022). *Annual report 2022*. https://www.sme.go.th/aboutus/AnnualReport
Tian, S., & Yu, Y. (2017). Financial ratios and bankruptcy predictions: An international evidence. *International Review of Economics & Finance*, *51*, 510–526.
Tong, Y., & Serrasqueiro, Z. (2021). Predictions of failure and financial distress: A study on Portuguese high and medium-high technology small and mid-sized enterprises. *Journal of International Studies*, *14*(2), 9–25.
Tran, Q. T. (2020). Corruption and corporate cash holdings: International evidence. *Journal of Multinational Financial Management*, *54*, 100611.
Transparency International. (2023). *Corruption Perceptions Index*.
Ullah, B. (2021). The differential effect of corruption on growth: Does firm origin matter? *Emerging Markets Finance and Trade*, *57*(14), 4036–4053.
Van Vu, H., Tran, T. Q., Van Nguyen, T., & Lim, S. (2018). Corruption, types of corruption and firm financial performance: New evidence from a transitional economy. *Journal of Business Ethics*, *148*(4), 847–858.
Wang, Y., & You, J. (2012). Corruption and firm growth: Evidence from China. *China Economic Review*, *23*(2), 415–433.
Wellalage, N., & Thrikawala, S. (2021). Does bribery sand or grease the wheels of firm level innovation: Evidence from Latin American countries. *Journal of Evolutionary Economics*, *31*(3), 891–929.
World Bank Group. (2017). *Report on the treatment of MSME insolvency*. www.worldbank.org

7. Appendix

A.1. Thai small and medium-sized enterprises definitions

Table A. 1 Definitions of Thai SMEs

Sector	Micro Enterprise		Small Enterprise		Medium Enterprise	
	Annual income (million Baht)	Employment (person)	Annual income (million Baht)	Employment (person)	Annual income (million Baht)	Employment (person)
Manufacture	not more than 1.8	not more than 5	more than 1.8, but not more than 100	more than 5, but not more than 50	more than 100, but not more than 500	more than 50, but not more than 200
Trade and Service	not more than 1.8	not more than 5	more than 1.8, but not more than 50	more than 5, but not more than 30	more than 50, but not more than 300	more than 30, but not more than 100

Note: If the number of employees fits one type of enterprise, but the revenue fits another type, whichever is higher determines the size of the enterprise.

Source: The Office of SMEs Promotion of Thailand

A.2. Additional results

Table A. 2 Regression results with additional control variables (economic indices, population characteristics, and education input)

	(1)	(2)	(3)	(4)	(5)
Panel A: Dependent variable is **Insolvent**	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0274***	0.00198	0.0292***	0.0295***	-0.00554
	(0.00589)	(0.0372)	(0.00604)	(0.00715)	(0.0132)
Constant	-17.38***	-17.05***	-17.52***	-22.57***	-24.56***
	(0.659)	(4.209)	(0.682)	(0.830)	(1.693)
Pseudo R square	0.437	0.525	0.434	0.511	0.406
Panel B: Dependent variable is **Cash Ratio**	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0025***	0.0038	0.0024***	0.0029***	-0.0004
	(0.0004)	(0.0030)	(0.0004)	(0.0004)	(0.0009)
Constant	-0.1749***	0.0007	-0.2029***	-0.1309***	-0.3501***
	(0.0406)	(0.3229)	(0.0408)	(0.0461)	(0.0910)
Adjusted R square	0.0715	0.176	0.0713	0.0803	0.0703
Panel B: Dependent variable is **Leverage**	All firms	New firms	Mature firms	Thai firms	Foreign firms
Corruption	0.0016	0.0105	0.0010	0.0032	-0.0049
	(0.0024)	(0.0103)	(0.0025)	(0.0025)	(0.0065)
Constant	-0.9091***	-0.9810	-0.8279***	-1.1967***	0.2804
	(0.2554)	(1.1901)	(0.2615)	(0.2871)	(0.6618)
Adjusted R square	0.158	0.299	0.160	0.148	0.199
Observations	22,711	883	21,782	18,558	4,093
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes

Note: GPP and ln (Per Capita Income) represent economic indices. ln (Population) represents population characteristics. Education Attainment represents education input. The variable definitions are provided in Table 1. The regression models include all controls used in our baseline regression, but the coefficients are not reported.