

# Fund Mobilization and Investment Behavior in Thai Manufacturing Firms in the Early 1990s\*

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This paper investigates capital structure and investment behavior in Thailand in the early 1990s. Various features of financial markets are considered, and the possibility of applying the ‘pecking order hypothesis’ to developing countries is discussed. By estimating the determinants of the capital structure and the investment functions, three major results are obtained. First, the lower debt ratio of listed firms is realized by an increase in the capital surplus gained by initial public offering. Second, firms’ participation in the securities market accommodates agency costs both in the equity and bank-loan markets. Third, ‘financial conglomerate’ firms are inactive investors and are dependent upon informal financial transactions, whereas foreign firms borrow less and invest more.

*Keywords:* capital structure, investment, financial system, Thailand.

*JEL classification codes:* E22, G32, O16.

## I. Introduction

The purpose of this paper is to investigate features of capital structure and their effects on investment behavior in Thai manufacturing firms, including non-listed firms, in the first half of the 1990s. After the financial crisis of 1997, the fundraising behavior of Thai firms, particularly their excess dependence on debt financing, was criticized in academic and policy research. Most studies cite the vulnerability of high debt financing as a major cause of the financial crisis and discuss ways of diversifying firms’ fundraising behavior by using the capital market through equity financing or issuing bonds (e.g. Claessens et al., 1998; World Bank, 1998).

However, the existing published empirical studies have not completely elucidated Thai firms’ capital structures and their effects on investment behavior both before and after the crisis. Observing the corporate financial structure in the

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early 1990s, Amano and Mieno (1998) identify several characteristics, including the 'estranged' relationship between banks and manufacturing firms in financial groups. Wiwattanakantang (1999) examines the determinants of the capital structures of firms listed on the Stock Exchange of Thailand (SET) in 1994, focusing on firm ownership and business group affiliation. She finds that the concentration of shares is negatively correlated with the debt ratio, and that firms owned by single families have relatively high debt ratios.<sup>1</sup>

Several cross-country comparative studies refer to Thai corporate financial structure. Singh and Hamid (1992) point out that the debt ratios in developing countries (including Thailand) were generally high in the 1980s. Conversely, Claessens et al. (1998) assert that excessive dependence on indirect finance among Asian countries in the 1990s was a major cause of the financial crisis.<sup>2</sup>

Although previous studies have brought some issues to light, unresolved issues remain. The first relates to sample selection problems. Most existing studies, including Wiwattanakantang (1999) and Claessens et al. (1998), cover only some of the companies listed on SET. However, in Thailand (as in most developing countries), only a limited number of major firms participate in organized securities markets. Moreover, their listing behavior might depend on aspects of ownership, such as business group affiliation or nationality, suggesting that firms' listing behavior is itself a kind of fund mobilization. Accordingly, restricting analysis to listed firms might induce sample-selection bias. Second, most studies focus only on the debt ratio (leverage). However, in developing countries, the share of formal debt composition in total liabilities is generally low, and informal financial transactions represent a large share of total liabilities. Because informal financial transactions are significant in developing economies and their agency cost structures might differ from bank loans or bond issues, it is important to focus on these transactions.

The present paper aims to overcome the limitations of the existing studies. First, in relation to the dataset, both listed and non-listed firms in those manufacturing sectors that have driven Thai industrialization are covered. Second, in addition to the debt ratio, bank borrowing and informal borrowing compositions are examined. Total bank loans and their decomposition into short-term and long-term loans are evaluated. Third, a neoclassical-type investment function is estimated to examine the effect of fund-mobilizing methods on equipment investment.<sup>3</sup>

1. In relation to this argument, Wiwattanakantang (2001) and Suehiro (2000) examine the corporate governance structure of Thai firms. Suehiro presents a skeptical, suspicious view of linear causality between the governance structure and corporate performance.

2. Booth et al. (2001) stress that simple application of the general theory of the determination of the capital structure is not rational for developing countries.

3. Amano and Mieno (1998) attempt to estimate a Tobin's-Q type investment function for Thai manufacturing firms to investigate their investment behavior in relation to subsidies. However, stable estimation results are not obtained.

This paper proceeds as follows. Section II summarizes firms' fundraising and investment behavior in Thailand and examines its determinants. Aggregated data and descriptive measures are presented in Section III, followed by empirical investigations of the capital structure and investment behavior using firm-level micro data in Sections IV and V, respectively. Section VI concludes the paper.

## II. Determinants of Bank Loans and Investment

### *II.1 Agency costs, fundraising and investment*

Myers (1984) and Myers and Majluf (1984) point out the difference between capital costs in internal finance and debt finance arising from agency costs. They also present a notion of firms' preferences in fundraising methods, known as the 'pecking order hypothesis', in the context of which the model is simplified to allow only two types of method: equity and debt. Based on this hypothesis, a series of empirical studies on developed countries, following the pioneering work of Fazzari et al. (1988), reveal that the capital costs for investment depend upon the fundraising method. Specifically, the lower the agency costs associated with the fundraising method, the lower are the capital costs. Recently, the relevant discussions have been further developed to form the field of comparative financial systems. Allen and Gale (2000) compare financial systems in developed countries, focusing on the determinants of bank-based or market-based features, and discuss possible explanations from the viewpoint of agency costs, informational asymmetry and treatment of risk.<sup>4</sup>

Taking into account features of financial markets in developing economies, the following modified determining mechanisms should be considered in an analysis of capital structure and average capital cost. First, firms face restrictions on using particular methods because of factors such as the absence of the bond market and limited access to the capital market, particularly for non-listed firms. Second, under this environment, the composition of each method is determined in equilibrium where all transaction costs, or agency costs, are equal. Third, investment is determined by the minimum average capital cost given the expected earnings of the investment.

When the pecking order hypothesis is applied to developing countries, more subtle factors should be taken into account. Several methods of fund mobilization are absent, or at least underdeveloped, and some methods are available only to particular firms. First, corporate debt and equity markets work only for firms that participate in organized capital markets where they exist. Second, the

4. In regard to developing economies, Herring and Chatusripitak (2000) discuss why they lack bond markets and, consequently, have bank-oriented systems from the perspective of the features of a market-based debt contract and an equity contract. They also point out that the absence of a bond market creates instability and inefficiency in other markets because of the failure of correct pricing of risk in the market place.

market for bank loans works effectively only in places where banks provide information efficiently and agency costs are sufficiently low to make transactions feasible. These two issues are raised as crucial problems for the analysis of developing economies.

*Underdevelopment of capital markets and firm behavior when going public*

Capital markets do not function effectively as sources of fundraising in most developing countries. Although there are organized capital markets in which investors place funds in most developing countries, the role of the capital market in mobilizing funds for firms is limited in many countries. For company owners, participation in the capital market is the only alternative, given its merits as a source of finance and its disadvantages, which are a result mainly of diluting control rights originally assigned to the owners or their families. Hence, for firms, the choice of equity finance as a fundraising method is made in two stages: participation in the market (initial public offering (IPO)); and issuing new bonds or equity. Furthermore, it is noteworthy that the IPO itself could represent important fundraising behavior as it gains firms a stock premium.

*Two types of informal credit channel*

In developing countries, loan–debt ratios are not necessarily high, and a large part of debt composition consists of informal factors or funds from internal capital markets. Allen and Gale (2000) point out that it is inevitable that internal finance will become dominant when there are serious agency costs and information asymmetries. They insist that firms generally prefer internal cash to external finance because of the existence of agency costs, and that shareholders might allow managers to retain cash in hand as a second-best optimal strategy even if their interests are not perfectly aligned. Moreover, firms exert financial functions to provide and receive funds in order to allocate their surpluses most efficiently. In some particular cases, the transactions could be more stylized to form an internal capital market between business groups.<sup>5</sup>

In our empirical observations, informal finance is classified into two forms. The first is credit from the usual trade finance, which is approximately equal to accounts payable and deferred payments in the balance sheet. The second is credit from an internal capital market of related parties such as owners, managers, affiliated firms and subsidiaries. The latter is considered to be closer to self-finance rather than debt because the agency costs are close to zero. It is referred to as ‘quasi self-finance’.

In sum, this paper examines six significant fundraising methods: (i) self-finance; (ii) quasi self-finance; (iii) bank borrowing; (iv) informal debt; (v) equity finance;

5. Moreover, Herring and Chatusripitak (2000) discuss the possibility that when a bond market is absent, firms have an incentive to affiliate with a bank to create an internal finance chain and virtually assure their long-term debt. In such cases, the business groups grow to become financial conglomerates.

and (vi) stock premiums gained by IPO. The function of long-term credit is also analyzed by decomposing (iii), bank borrowing, into short-term and long-term borrowing. The pecking order or the level of agency costs, in the sense of Myers (1984), is expected to be such that  $(i) < (iii) < (v)$  and  $(i) < (iv) < (v)$ . The agency costs of (ii) and (vi) are thought to be close to that of (i) or zero. The difference between the agency costs of (iii) and (iv) is unclear. Short-term borrowing and long-term borrowing are thought to be equivalent to (iii) in relation to agency costs.

## *II.2 Corporate ownership and the capital market in Thailand*

This subsection examines how the unique features of the financial system and firms in Thailand can be combined with the above discussions on agency costs and comparative financial system issues to create an analytical framework.

### *Business groups in Thailand*

The first factor that might influence the capital structure of Thai firms is the relationship between firms and business groups. Most Thai business groups originated from export merchants dealing in primary products such as sugar, rice and wooden products. These groups have been operating since the late 1940s. Thai business groups usually comprise a core (or parent) company and many affiliated companies owned by owner-families, family-owned holding companies and cross-holdings (Suehiro, 1989).

Suehiro (1989) classifies Thai business groups into three categories based on their origins and major businesses: the financial conglomerates, the industry group, and the agribusiness group.<sup>6</sup> Suehiro finds that financial conglomerates generally limit their business activities to the finance and commerce sector and are wary of engaging in manufacturing. The industry group and the agribusiness group are generally excluded from commercial banking and credit channels. Hence, they tend to establish joint ventures with foreign capital to expand their businesses.

Commercial banks emerged in Thailand after World War II and were formed as a part of, and have grown simultaneously with, the financial conglomerates (which have developed their businesses primarily in non-manufacturing sectors). Before the mid-1980s the share of commercial bank loans for the manufacturing sector was negligible, and before the financial crisis of 1997 their ownership was concentrated among particular families, although ownership gradually diversified after commercial banking laws were amended in 1979.

Considering the development process of industries and the financial system from a historical perspective, the unique features of the Thai financial system are

6. The financial conglomerates group centers on the commercial banks. The industry group includes those that have been expanding mainly in the textile and apparel industry, and the footwear industry since the 1960s. The agribusiness group is based on exporters of agro-products.

observed. First, given that the bond market has remained virtually non-existent and the equity market underdeveloped, the role of banks' intermediation is biased and limited because bank loans are directed almost exclusively to the financial conglomerates. Although commercial banks have grown rapidly since the 1960s, their information-processing functions have remained inefficient and unstable. Instead, banks have behaved as part of the internal financial tools of some non-manufacturing sectors. Second, it is highly possible that self-finance and internal financial transactions were the most common form of fund-mobilization in the manufacturing sector amongst firms without affiliated banks. This might have been the result of prohibitively high agency costs for external finance caused by imperfect functioning of banks outside their own business groups.

In the context of the history of the banking sector in Thailand, two factors for commercial banks should be considered. First, bank loans might not play a significant role in firms' fund mobilization because banks are merely financial entities for each financial conglomerate and have limited capability for financial intermediation.<sup>7</sup> Second, the availability of bank loans for individual firms might depend upon the features of the business groups to which the firms belong.

#### *Foreign firms*

Foreign firms have played a significant role in Thailand's economic development. In the context of establishing new local firms, the most popular form is a joint venture in which both foreign multinational corporations and local partners invest. The *Alien Business Law* typically limits the foreign firm's share to 50 percent. The following possibilities in relation to the fundraising behavior of foreign firms are considered. First, these firms might be able to retain links with their parent companies in the form of intra-firm credit and capital increases. Second, foreign firms are more accessible to the local branches of foreign banks from the same country because informational asymmetries are reduced by links to the parent companies and foreign banks in the home countries.

#### *Firms' participation in the securities market*

The Securities Exchange of Thailand (the SET from 1991) was established in 1975. However, it was not until 1992 when comprehensive reforms to the capital market were implemented to relax rules on listing, which activated transactions in the Thai securities market. The number of listed firms peaked at 454 in 1996, just before the financial crisis. However, even in the early 1990s, the number of listed firms was less than half that of major firms. In Thailand not all major firms use the securities market for fund mobilization, and participation in the market is a matter of choice for individual firms.

Underdevelopment of the securities market is related to two important features of firms' capital structure. First, their affiliation to business groups

7. This implies that informal finance or alternative methods might be widely used.

might influence their participation in the securities market. By listing on the market, individual firms can diversify their methods of fund mobilization through equities and bonds. However, they have to release their control rights because of the rules and the regulations of the listing code. Hence, whether firms list is determined by factors such as the availability of alternative fundraising methods and firms' attitudes to giving up control rights. Group-affiliated firms might hesitate to participate in the securities market to retain control rights. Financial conglomerate firms might be more reluctant to participate because they might have internal fund channels with commercial banks.

Second, listing might have indirect effects on firms' capital structures in the developing financial markets, where bank loans are unevenly distributed. Listing realizes the disclosure and diffusion of company information, which reduces the agency problem in financial markets overall. Therefore, it might also stimulate bank lending in the indirect financial market.

### *II.3 The macroeconomic environment in the 1990s*

Based on these features of corporate ownership and capital markets, the Thai financial market experienced tremendous environmental changes from the early to mid-1990s under financial liberalization. This time-specific factor might have influenced the firms' fund mobilization behavior in our analysis.

Financial liberalization in Thailand began with a gradual relaxation of operative regulations in the late 1980s. After 1990, the reform was extended to cover various banking operations to enhance competition between the financial institutions. After 1993, the reforms continued with the relaxation of foreign capital regulations, particularly the regulations governing capital inflows through commercial banks. After the offshore market (Bangkok International Banking Facilities (BIBF)) was founded in 1992, the inflow of foreign capital in the form of borrowed funds, particularly short-term capital flows, increased rapidly. Net capital inflows surged from 262 billion baht in 1991 to 518 billion baht in 1995. It is widely believed that firms expanded their borrowings in terms of foreign currency and undertook unproductive investments.

The macroeconomic environment is likely to have influenced the corporate finance structure. First, the role of commercial bank loans in firms' fundraising might have strengthened during this period, as reflected in the inflow of foreign capital through the banking sector from the offshore market.<sup>8</sup> Second, booming securities markets might have activated equity finance. The extent of the boom can be gauged from the fact that 30–40 firms implemented IPO every year in the period from 1988 to 1996.

8. Claessens et al. (1998) point out the trend towards increasing debt ratios in the 1990s and argue that this was a major reason why Thailand was vulnerable to the financial distress that occurred in 1997.

### III. Descriptive Measures

#### III.1 *The data*

This section describes the trends in firms' capital structures and investment behavior using the present study's dataset. The sample data used for analysis is firm-level financial data on 320 major manufacturing firms, including listed and non-listed firms, from 1991 to 1995. There are a total of 748 observations.<sup>9</sup> The information on firm profiles is based on Manager Information Services (1996), which covers 992 manufacturing firms. The financial data on each firm are from the database provided by the same information services company, which covers 2164 manufacturing firms. Matching the two sets of information has produced data on 685 firms. The data on 320 large-sized firms, defined as those firms possessing total assets over 1 billion baht, are used because information on the business-group affiliations of smaller firms is virtually unavailable, and most small firms are non-listed firms.<sup>10</sup> This group of large-sized firms comprises 111 listed firms and 209 non-listed firms.

The procedure used to identify affiliation to business group and foreign ownership is as follows. Suehiro (1989, 2001) classifies the 65 major Thai business groups and their associated firm affiliations primarily on the basis of group or firm histories and ownership. He also classified business groups into three types: financial conglomerates, industry groups and agribusiness. Based on this classification, the affiliations of the 320 firms to 27 major business groups are confirmed. The business groups are also classified into two categories: financial conglomerates and manufacturing groups, where manufacturing groups consist of industry groups and agribusiness from Suehiro's (1989) classification. Foreign firms are defined as those in which more than 40 percent of the shares are owned by foreign firms, based on Suehiro (2000) and various company directories.<sup>11</sup>

#### III.2 *Distribution of the samples*

Tables 1 and 2 present the characteristics of the distribution of the samples. According to Table 1, the largest numbers of firms are in the manufacturing groups and foreign firms, followed by financial conglomerates. The table seems

9. This indicates that the dataset used in the present study is unbalanced panel data.

10. The definition of 'large firms' follows the criteria adopted by the Industrial Financial Corporation of Thailand in 1998. In 1996, the total number of listed firms was 454, and between 120 and 140 of them could be regarded as manufacturing firms according to the industrial classification in 'Financial Day 2000'. This means that the sample covers more than 78 percent of all listed manufacturing firms and non-listed manufacturing firms of a similar size.

11. The Alien Business Act of the early 1990s does not allow foreigners to hold more than 50 percent of the shares in a Thai company. Hence, the investment shares of multinational corporations are usually between 40 and 49 percent at most.



**Table 1** Number of samples and firms

	<i>Financial conglomerate</i>	<i>Foreign owned</i>	<i>Others</i>	<i>Total</i>	
					<i>Listed</i>
Samples					
1991	19	66	200	285	106
1992	20	64	214	298	109
1993	20	66	220	306	109
1994	20	67	225	312	110
1995	21	62	212	295	109
Total	100	325	1071	1496	543
Firms					
Full Panel	18	52	178	248	104
4 years	2	15	34	51	4
3 years	1	2	18	21	3
Total	21	69	230	320	111

to support the suggestion of Suehiro (1989) that private capital formation resulted in segregation between financial conglomerates, which developed primarily in service sectors, and firms in the industry group, which developed only in manufacturing sectors.

For 1994, the total number of firms in the sample is 312, which includes 110 listed firms. This implies that the samples cover the great majority of the listed firms because the total number of listed firms in 1994 was 389 and the number of firms in manufacturing sectors is thought to be 150–170. However, the number of listed firms as a proportion of representative large-sized firms is no more than 35.2 percent. Table 2 indicates that listed firms have a relatively high share in some of the light industries, such as textiles and garment and wooden products, whereas their share is relatively low in the heavy industries, such as fabricated metal and machinery, although this tendency is less marked than for light industries. According to the classifications for business group and ownership nationality, there appear to be more listed firms among non-group firms, and fewer among financial conglomerates and foreign firms.

### *III.3 Capital structure*

Table 3 summarizes the balance sheets of the firms in 1994 by business group and ownership type. Comparing listed and non-listed firms, the debt ratio of the former (55.3 percent) is much lower than that of the latter (70.9 percent). However, there is little difference in the bank-borrowing ratios (denominated by total assets). This implies that the difference in the debt ratios is a result of the difference in other liabilities, such as debt from affiliated firms and deferred payments. Equities are higher for listed firms, evidently because of different capital reserves, rather than differences in paid-in capital or retained earnings.

**Table 2** Distribution of firms by type of business group

<i>Industrial classification</i>	<i>Financial conglomerate</i>			<i>Manufacturing group</i>			<i>Foreign owned</i>			<i>Others</i>			<i>Total</i>		
	<i>Listed (%)</i>			<i>Listed (%)</i>			<i>Listed (%)</i>			<i>Listed (%)</i>			<i>Listed (%)</i>		
Food processing	13	2	(15)	14	8	(57)	9	3	(33)	34	11	(32)	70	24	(34)
Textile and garment	0	0	—	13	9	(69)	6	3	(50)	23	13	(57)	42	25	(60)
Wooden products	0	0	—	0	0	—	1	1	(100)	7	3	(43)	8	4	(50)
Pulp and paper	2	1	(50)	7	0	(0)	2	1	(50)	12	6	(50)	23	8	(35)
Chemical products	0	0	—	11	5	(45)	15	2	(13)	20	7	(35)	46	14	(30)
Non-ferrous metal	1	0	(0)	7	1	(14)	3	3	(100)	16	10	(63)	27	14	(52)
Primary metal	0	0	—	0	0	—	1	0	(0)	0	0	—	1	0	(0)
Fabricated metal and machinery	3	0	(0)	14	1	(7)	27	4	(15)	26	11	(42)	70	16	(23)
Total	19	3	(16)	66	24	(36)	64	17	(27)	138	61	(44)	287	105	(37)

Notes: Based on the sample of 1994. —, no data.

**Table 3 Capital structure classified by type of business group and ownership nationality**

	<i>All firms</i>	<i>Financial conglomerate</i>	<i>Foreign owned</i>	<i>Non-group</i>
	(%)	(%)	(%)	(%)
<b>Listed firms</b>				
Debt	55.3	55.7	48.8	56.4
Bank borrowing	42.6	50.0	32.9	44.1
Short-term	24.5	45.2	20.7	24.5
Long-term	18.1	4.8	12.2	19.6
Quasi self-finance	0.7	0.0	2.2	0.4
Borrowings from managers and employees	0.0	0.0	0.0	0.0
Borrowings from affiliated companies	0.6	0.0	2.2	0.4
Others	10.6	6.8	9.9	10.9
Trade accounts and note payable	5.3	3.4	4.9	5.4
Others	6.7	2.3	8.8	6.5
Equity	44.8	46.8	51.2	43.6
Paid-in capital	13.8	16.5	12.9	13.9
Retained earnings	20.0	16.4	25.9	19.1
Capital surplus and others	10.9	14.0	12.4	10.5
<b>Non-listed firms</b>				
Debt	70.9	81.8	65.5	72.4
Bank borrowing	42.4	23.2	32.3	48.8
Short-term	22.0	11.8	20.3	23.7
Long-term	20.4	11.4	11.9	25.1
Quasi self-finance	7.9	13.6	13.3	4.9
Borrowings from managers and employees	0.9	1.0	0.7	0.9
Borrowings from affiliated companies	7.1	12.6	12.7	4.0
Others	20.7	45.0	19.9	18.8
Trade accounts and note payable	13.0	10.6	12.6	13.4
Others	7.6	34.4	7.3	5.4
Equity	30.4	18.2	34.5	29.6
Paid-in capital	13.8	12.2	11.8	14.9
Retained earnings	17.6	6.7	20.2	17.4
Capital surplus and others	-1.0	-0.7	2.5	-2.7

Among non-listed firms included in financial conglomerates, the bank-borrowing ratio is unexpectedly below average, and higher in other liabilities, resulting in a higher debt ratio. By contrast, among listed firms included in financial conglomerates, the ratio of other liabilities is lower, and that in bank borrowing is higher. For foreign firms, the debt ratio is approximately average for listed and non-listed firms, but the bank-borrowing ratio is lower.<sup>12</sup>

Table 4 reports capital structures by year, calculated from a 5-year full-panel sample. For listed firms, structures hardly changed, except for a slight increase

12. This might suggest that foreign-owned firms depend on credit channels with parent multinational firms in the form of capital increases and intra-firm credit.

**Table 4 Capital structure classified by years (percent except number of samples)**

	1991	1992	1993	1994	1995
<b>Listed firms</b>					
Number of samples	84	84	84	84	84
Debt	58.5	57.1	57.1	55.6	60.7
Bank borrowing	44.7	45.1	35.8	43.4	47.7
Short-term	21.6	23.2	21.4	24.1	24.7
Long-term	23.1	21.9	14.4	19.2	23.0
Quasi self-finance	1.3	1.1	1.6	0.4	0.8
Borrowings from managers and employees	0.1	0.1	0.7	0.0	0.0
Borrowings from affiliated companies	1.2	1.0	0.9	0.4	0.8
Others	12.5	10.9	19.7	11.8	12.1
Trade accounts and note payable	5.8	5.4	7.1	5.3	5.2
Others	6.7	5.5	12.6	6.5	6.9
Equity	41.5	43.4	42.9	44.4	40.3
Paid-in capital	13.8	13.7	13.7	13.5	12.1
Retained earnings	16.1	17.4	17.3	19.9	19.0
Capital surplus and others	12.2	12.8	14.3	14.3	13.6
<b>Non-listed firms</b>					
Number of samples	90	90	90	90	90
Debt	77.7	77.9	78.2	71.5	69.7
Bank borrowing	48.2	50.2	50.4	48.2	45.9
Short-term	19.2	22.3	21.4	22.4	22.2
Long-term	29.0	27.9	29.0	25.7	23.6
Quasi Self-finance	3.9	4.6	4.1	4.9	3.6
Borrowings from managers and employees	0.7	0.5	0.8	1.0	0.4
Borrowings from affiliated companies	3.2	4.1	3.3	3.9	3.2
Others	25.6	23.1	24.0	18.4	20.2
Trade accounts and note payable	15.2	14.4	16.4	13.7	12.5
Others	10.4	8.7	7.6	4.7	7.7
Equity	23.1	22.7	22.2	29.5	31.4
Paid-in capital	14.1	13.1	12.7	14.1	13.6
Retained earnings	10.4	10.3	11.4	16.9	18.0
Capital surplus and others	1.8	2.1	2.5	2.7	3.4

in retained earnings from 1991 to 1995. For non-listed firms, there was a sharp decline in the debt ratio after 1994, which was reflected by the increase in retained earnings. This implies that non-listed manufacturing firms had decreased their debt ratios by increasing their dependence on self-financing when the economy was expanding. In addition, it is noteworthy that the bank-borrowing ratio for non-listed firms exhibited a stable declining trend for long-term borrowing, implying that the term composition of bank loans changed to a more short-term basis. This suggests that non-listed firms were not dependent on the bank loan market for fundraising and that they reduced their dependence on debt and bank lending, despite the expansion of the real economy and increased

**Table 5 The Level of equipment investment classified by year  
(percent except where noted)**

	1991	1992	1993	1994	1995
Listed firms					
Fixed asset/TA	43.5	43.1	38.4	40.0	38.2
Rate of change	—	14.1	-0.9	24.0	13.4
Investment/TA	—	6.15	-0.38	9.21	5.37
Average TA <sup>a</sup>	2462	2838	3155	3760	4465
Rate of change	—	15.3	11.2	19.2	18.7
Non-listed firms					
Fixed asset/TA	40.6	37.9	37.6	49.3	48.7
Rate of change	—	24.8	13.3	52.8	23.9
Investment/TA	—	10.1	5.1	19.9	11.8
Average TA <sup>a</sup>	2040	2729	3119	3637	4559
Rate of change	—	33.8	14.3	16.6	25.3

Notes: TA, total assets; —, no data. <sup>a</sup> Millions of baht.

**Table 6 The level of equipment investment classified by business group and  
ownership nationality (percent except where noted)**

	<i>All firms</i>	<i>Financial conglomerate</i>	<i>Foreign owned</i>	<i>Others</i>
Listed firms				
Fixed asset/TA	38.7	23.9	35.6	45.1
Investment/TA	5.3	1.8	6.9	7.3
Average TA <sup>a</sup>	3488	3206	3211	2549
Non-listed Firms				
Fixed-asset/TA	43.2	19.3	46.5	49.0
Investment/TA	10.9	2.8	10.7	15.7
Average TA <sup>a</sup>	3328	2024	3663	2779

Notes: TA, total assets. <sup>a</sup> Millions of baht.

inflows of foreign capital through the banking sector following financial liberalization of the 1990s.<sup>13</sup>

### III.4 Equipment investment

Tables 5 and 6 report fixed-asset ratios and equipment investment ratios (denominated by total assets) by type of business group and by year, respectively. The fixed assets of non-listed firms are generally greater than those of listed firms. By business-group classification, the ratio is higher for non-group firms

13. This finding is in a sharp contrast to the assertion that Thai firms became more dependent on debt finance during the 1990s (e.g. Claessens et al., 1998).

and foreign firms, and lower for financial conglomerates. The time-series trend is not clear, except for the sharp increase in 1994, when the Bangkok Offshore Market began to operate.

There is no clear difference between the equipment investment ratios of listed and non-listed firms. The trend in this ratio is very similar to that in the fixed-assets ratio. The ratio tends to increase, particularly after 1994.

### III.5 Effects of initial public offering behavior

Table 7 reports the trend of changes in capital structure and equipment investment between the pre-IPO and post-IPO years. The data cover only the 77 firms that floated on the SET between 1992 and 1995. Three interesting facts are observed. First, in the year of IPO, debt ratios and bank-borrowing ratios declined sharply, and capital surplus consequently increased. Second, one year prior to IPO, debt ratios and bank-borrowing ratios were lower than average and retained earnings were above average. This suggests that firms' efforts to satisfy the IPO requirements set by the SET or the Securities and Exchange Committee reduced firms' dependence on debt finance. Third, bank-borrowing ratios recovered slightly in the post-IPO period.

Importantly, long-term borrowing sharply declined in the year of IPO, and it continued on its downward trend in the post-IPO period. By contrast, short-term borrowing increased following IPO. This suggests that increased cash flow on

**Table 7 Change of capital structures and equipment investment before and after IPO (percent except where noted)**

Period (0 = the period of IPO)	-2	-1	0	1	2
Number of samples	12	23	33	40	43
Debt	73.3	60.7	52.2	54.8	52.2
Bank borrowing	55.5	43.0	37.4	39.4	36.6
Short-term	23.0	24.9	24.3	27.3	27.5
Long-term	32.5	18.1	13.1	12.1	9.0
Quasi self-finance	2.9	3.5	2.0	1.4	2.1
Borrowings from managers and employees	0.0	0.3	0.2	0.1	0.0
Borrowings from affiliated companies	2.8	3.2	1.8	1.3	2.0
Others	14.9	14.2	12.7	14.1	13.5
Trade accounts and note payable	8.2	6.2	6.4	6.7	5.6
Others	6.8	8.0	6.4	7.4	7.9
Equity	33.0	39.3	47.8	45.2	47.8
Paid-in capital	24.8	20.8	17.9	16.7	15.8
Retained earnings	8.3	10.7	11.4	11.0	12.9
Capital surplus and others	0.5	7.8	19.9	17.9	20.3
Fixed asset/TA	66.4	30.3	45.3	41.2	31.2
Investment/TA	2.5	-15.6	29.1	7.3	6.2
Average TA <sup>a</sup>	2703	2622	2449	2553	2617

Notes: IPO, initial public offering; TA, total assets. <sup>a</sup> Millions of baht.

the equity side at going public substituted primarily for long-term borrowing on the debt side.

It is noteworthy to observe that the shift in the capital structure towards equity finance occurred only during the IPO period and the year preceding it, seemingly caused by raising cash as capital increased. Despite the prosperity of the securities market on the surface during this period, Tables 4 and 7 give no clear evidence that listed firms continuously used the securities market as a source of equity finance, such as in the form of an increase in capital.<sup>14</sup>

There is a clear trend in equipment investment. Investment was evidently restricted in the pre-IPO period and increased when the firm floated. The investment rates in periods 1 and 2 are consistent with those reported in Tables 6 and 7, which show that listed firms had lower investment rates (at around 6 percent) than non-listed firms.

#### IV. Estimation of the Capital Structure

In this section, the determinants of capital structure are empirically investigated. Five types of debt are considered for dependent variables. In addition to basic control factors, cash-flow factors and firm attributes are introduced as independent variables.

##### IV.1 Model and variables

###### *Dependent variables*

The dependent variables used for estimation are as follows:

- Debt ratio = debt/total assets<sup>15</sup>
- Bank-borrowing ratio = bank borrowing/total assets
- Other liabilities = (debt – bank borrowing)/total assets<sup>16</sup>
- Borrowing/liability = bank borrowing/total liabilities
- Short-term borrowing ratio = short-term borrowing/total assets
- Long-term borrowing ratio = long-term borrowing/total assets

In this context, bank borrowing = short-term borrowing ratio + long-term borrowing ratio, and total liabilities = bank borrowings + other liabilities. Other liabilities consists mainly of deferred payments, notes payable and other liabilities that could be interpreted as informal financial transactions.

14. In the short run, inefficient IPO pricing is a crucial motive for listing. The widely-known underpricing problem might give the firms incentive for listing for gaining stock premiums. The long-run underperformance bias after IPO also implies such behavior by firms. Although the stock market was booming in Thailand in the 1990s, the firms' performance after IPO had a declining trend (Kim et al., 2004), suggesting that the IPO boom during the period was caused by such motivations.

15. In actual calculations, 'quasi self-finance' compositions are deduced from debt.

16. Please refer to footnote 9.

*Control variables*

For control variables, the variables that have been shown to affect agency costs in previous studies are introduced. First, the non-debt tax shield is known to be a primary influence on tax saving through debt. Debt incurs tax saving because interest expenses are treated as deductions from taxable income. However, the magnitude of the effect depends on the scope for accounting for it, or on the residual of the total tax shield minus the non-debt tax shield. Therefore, the tax-saving effect through debt is influenced by the non-debt tax shield. Many previous studies have identified the influence of the tax-saving shield on firms' debt finance and use the depreciation rate to proxy the non-debt tax shield. However, this proxy is not available in our dataset. The non-debt tax shield is directly calculated by following the method presented in Titman and Wessels (1988). Corporation tax,  $T$ , is  $T = \tau(OI - I - NDT)$ , where  $\tau$  is the tax rate,  $OI$  is operating income,  $I$  is interest expenses, and  $NDT$  is the non-debt tax shield. Hence, the non-debt tax shield is:

$$NDT = OI - I - (T/\tau). \quad (1)$$

Previous studies have obtained positive correlations between cash flow and the debt ratio. According to the pecking order hypothesis, a firm prefers cash flow to debt, because the agency costs are lower than that of debt. Some studies adopt retained earnings in the balance sheet as a proxy for cash flow itself. Because retained earnings are a stock variable, it differs from cash flow, which is available to firms at any time. Many studies deal with this problem by using the profit rate as the proxy. In the present study, both proxies are used.<sup>17</sup>

The other problem, as mentioned in Section II, is whether it is appropriate to treat cash flow as only on the equity side for developing economies. Taking ownership and the governance structure into account, some liability items, such as borrowing from managers and employees and borrowing from affiliated firms, could be considered as being similar to self-finance. These are regarded as types of self-finance and we treat quasi self-finance as being defined in terms of the following explanatory variables:

$$\begin{aligned} \text{Quasi self-finance} = & (\text{borrowing from managers and employees} \\ & + \text{borrowing from affiliated firms}) / \text{Total assets} \end{aligned} \quad (2)$$

Third, the coefficient of variation for profit and total assets are introduced as a risk factor and a proxy for firm size, respectively. Although the theoretical justification might be rather weak, these variables are found to be statistically significant in many studies. Arguably, the higher the risk and the smaller the size, the lower is the debt ratio.

17. As a result, there is little difference between the two variables in the context of estimation. We adopt retained earnings as a variable because the profit ratio does not fit the estimation model and causes some inconsistent results.



The differences in technology between industries are controlled. In industries in which technology is highly specific (so that informational asymmetries are serious), the agency costs associated with debt finance are generally thought to be relatively high. R&D expenses and advertising expenditures are appropriate proxies for such technology specificity. In addition, in an economy such as Thailand where heavy industries are at the initial growth stage, the magnitude of the information asymmetries might differ between the heavy and light industries. For our analysis, industry dummies (at the International Standard Industrial Classification two-digit level) are used given data availability.

### *Determinants*

Three features of Thai corporate financial structure are highlighted. The first is the relationship between firm age and mobilization methods. It is generally considered that firms begin their operations mainly with their own resources and gradually expand their external finance because the problem of information asymmetry is serious at the initial stage. If a financial market functions well, information problems will weaken as transaction experiences accumulate. This effect on Thai firms is examined by introducing the firms' ages with logarithmic form as an explanatory variable.

The second feature is the relationship between a firm's IPO behavior and its capital structure. On the one hand, a major incentive for firms to participate in organized securities markets is to diversify their financial resources towards equity finance. This means that listing has a negative effect on the debt ratio. On the other hand, firms' listing behavior might induce disclosure, which might reduce the agency costs of financial transactions as a whole. This might promote debt finance. Furthermore, if the agency costs of bank borrowing and other forms of informal borrowing differ, their 'pecking order' preference might change in the way that debt composition changes. This hypothesis can be tested by introducing a dummy variable for listed firms.

The third feature is the effect of firms' attributes in relation to business-group affiliation and foreign ownership. For example, given the close and long-standing relationship between manufacturing firms in the financial conglomerates group and commercial banks, these firms have easy access to bank loans. In contrast, foreign firms might have easy access to equity finance and intra-firm credit through their inner fund channels with parent multinational corporations. Hence, the dummy variables for financial conglomerates and foreign firms are included in the estimation.

### *VI.2 Estimation results*

The estimation results are summarized in Table 8. Because panel data with various dummy variables are used, it might be necessary to consider the individual and time effects in the estimation. If such effects are non-trivial, the OLS estimation will be inefficient. To deal with this problem, the estimations using

Table 8 Estimation results for capital structure (all firms)

	<i>Dependent variables</i>						
	<i>Debt ratio</i>	<i>Debt ratio</i>	<i>Bank borrowing</i>	<i>Other liabilities</i>	<i>Bank borrowing/liability</i>	<i>Short-term loan</i>	<i>Long-term loan</i>
<b>Control variables</b>							
Constant	0.6183*** (28.725)	0.6125*** (18.596)	0.4592*** (13.926)	0.1540*** (5.271)	0.7828*** (16.419)	0.1976*** (6.727)	0.2619*** (9.401)
Total assets <sup>a</sup>	0.0043*** (2.990)	0.0021 (1.310)	0.0038** (2.328)	-0.0017 (-1.196)	0.0049** (2.132)	-0.0017 (-1.269)	0.0055*** (3.955)
Variation of profit	-0.4429*** (-6.810)	-0.2646*** (-4.419)	-0.2592*** (-4.307)	-0.0009 (-0.017)	-0.3631*** (-4.271)	-0.1170** (-2.394)	-0.1391*** (-2.701)
Retained earning	0.0042 (0.195)	-0.0021 (-0.084)	-0.0384 (-1.531)	0.0335 (1.555)	-0.0829** (-2.317)	-0.0010 (-0.045)	-0.0397* (-1.855)
Non-debt tax shield <sup>a</sup>	-0.0312 (-1.545)	-0.0325* (-1.824)	-0.0301* (-1.680)	-0.0027 (-0.176)	-0.0256 (-1.011)	-0.0062 (-0.429)	-0.0243 (-1.584)
<b>Determinant factors</b>							
Quasi self-finance	-0.5281*** (-17.121)	-0.5052*** (-16.399)	-0.2712*** (-8.761)	-0.2367*** (-9.010)	-0.1617*** (-3.690)	-0.1209*** (-4.772)	-0.1458*** (-5.511)
Dummy for financial conglomerate	-0.0039 (-0.171)	-0.0275 (-0.748)	-0.0927** (-2.522)	0.0646* (1.980)	-0.1059** (-1.989)	-0.0742** (-2.255)	-0.0195 (-0.628)
Dummy for foreign firms	-0.0483*** (-3.381)	-0.0620** (-2.748)	-0.0720*** (-3.188)	0.0105 (0.522)	-0.0947*** (-2.895)	-0.0318 (-1.572)	-0.0404** (-2.117)
Dummy for listed firms	-0.1436*** (-11.987)	-0.1455*** (-7.536)	-0.0528*** (-2.733)	-0.0929*** (-5.409)	0.0987*** (3.529)	0.0138 (0.796)	-0.0663*** (-4.065)

Table 8 (continued)

	<i>Dependent variables</i>						
	<i>Debt ratio</i>	<i>Debt ratio</i>	<i>Bank borrowing</i>	<i>Other liabilities</i>	<i>Bank borrowing/liability</i>	<i>Short-term loan</i>	<i>Long-term loan</i>
Industry dummy							
Food processing	0.0824*** (3.627)	0.0784** (2.184)	-0.0075 (-0.210)	0.0864*** (2.709)	-0.1037** (-1.993)	0.0417 (1.298)	-0.0489 (-1.611)
Textiles and garment	-0.0269 (-1.092)	-0.0322 (-0.823)	-0.0749* (-1.909)	0.0430 (1.233)	-0.1149** (-2.023)	0.0263 (0.748)	-0.1010*** (-3.049)
Wooden products	-0.0382 (-1.006)	-0.0409 (-0.661)	-0.1132* (-1.827)	0.0726 (1.319)	-0.1570* (-1.750)	-0.0721 (-1.298)	-0.0417 (-0.798)
Chemical products	0.0331*** (1.369)	0.0362 (0.942)	-0.0625 (-1.625)	0.0993*** (2.907)	-0.1412** (-2.535)	-0.0179 (-0.519)	-0.0444 (-1.367)
Non-ferrous metal	-0.0111 (-0.420)	-0.0094 (-0.221)	-0.0636 (-1.502)	0.0548 (1.456)	-0.1163* (-1.895)	-0.0618 (-1.629)	-0.0015 (-0.043)
Primary metal	-0.0344 (-0.368)	-0.0232 (-0.149)	0.0095 (0.061)	-0.0337 (-0.244)	0.0376 (0.167)	0.1455 (1.043)	-0.1361 (-1.037)
Fabricated metal and machinery	0.0071 (0.307)	0.0072 (0.199)	-0.0698* (-1.919)	0.0776** (2.405)	-0.1457*** (-2.769)	0.0159 (0.488)	-0.0852*** (-2.775)
Adjusted $R^2$	0.343	0.344	0.226	0.139	0.194	0.110	0.207
Number of samples	748	748	748	748	748	748	748
Estimation method	OLS	REM	REM	REM	REM	REM	REM

Notes:  $t$ -statistics are given in parentheses. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level, respectively.

<sup>a</sup> The units of 'total assets' and 'non-debt tax shield' are billion baht. REM, random effect model.

the random effect model (variance component model) are implemented.<sup>18</sup> The first and second rows of Table 8 compare the results of the estimation using OLS with the results using the random effect model in the case where the debt ratio is a dependent variable. Although the significance of coefficients in some control variables is different, the effects on determinant factors are basically the same.

The coefficient on total assets is positive but statistically insignificant when the dependent variable is the debt ratio, whereas it is positive and significant in the bank borrowing equation, and negative and insignificant in the other liabilities equation. The positive effect on total assets is significant at the 1 percent level in the long-term loans equation, which suggests that large firms tend to be more dependent on formal bank loans than on informal borrowing, probably because of their capacity for repayment. The coefficient on the risk factor, variation of profit, is negative and significant in most of the equations, which is consistent with results from previous studies. In addition, the results for the non-debt tax shield are consistent with prevailing knowledge, presenting a negative effect in all equations, but significant at the 10 percent level only in the debt ratio and bank borrowing equations.

With regard to the results of the industrial dummy benchmarked by the pulp and paper industry, the ratios of bank borrowing, particularly of long-term borrowing, are found to be lower both in light industry groups (textiles and garment and wooden products), where there is a large proportion of listed firms, and in heavy industry groups (chemical products and metal and machinery), where the proportion of listed firms is lower.<sup>19</sup>

#### *Cash flow and quasi self-finance*

The coefficient on retained earnings used as a proxy for cash flow is small and insignificant when the dependent variable is the debt ratio. It is negative in the bank borrowing (but insignificant), borrowing-liability ratio, and long-term loan equations. In addition, it is positive but insignificant in the other liabilities equation. The negative correlation between cash flow and bank loans, and between cash flow and borrowing-liability ratio, is consistent with the pecking order hypothesis. That is, firms with large cash flows tend to use them rather than use bank loans because the agency costs of the former are lower. At the same time, firms with large cash flows tend to use informal financial transactions instead of bank loans.

18. In our estimation, the fixed effect model was unavailable because of the complete multicollinearity between the explanatory dummy variables (e.g. financial conglomerate dummy, listed dummy and industrial dummies) and time and firm individual dummies.

19. This common trend results from different reasons. The low ratio of long-term borrowing in light industries, where firms are inclined to participate in the securities market, seems to result from a diversification of fund mobilization. By contrast, in heavy industries, where many firms are non-listed, the low ratio might result from a high dependence on the internal funds as an investment source.

The results clearly show that quasi self-finance is negatively correlated with all the debt indicators: debt ratio, bank borrowing and other liabilities. The results suggest that quasi self-finance resembles self-finance with low agency costs. Furthermore, firms' preference order for quasi self-finance is before other liabilities. In other words, quasi self-finance is similar to genuine self-finance.

#### *Firm age and fund mobilization*

Table 9 provides the results of the estimations when firm age is included as an explanatory variable, with the samples divided into listed and non-listed firms. The sample size is considerably smaller because information on the year of establishment is unavailable for approximately half of the sample firms. According to the estimation results, age has a negative and significant effect on bank borrowing for non-listed firms, and a positive and significant effect on other liabilities for listed firms. The coefficients on firm age have opposite signs between listed and non-listed firms when the dependent variable is the debt ratio, but neither is statistically significant.

Contrary to the conventional understanding, non-listed older firms actively utilize informal financial transactions and are inactive in bank loan transactions. Although the relationship between age and bank loan transactions is insignificant for listed firms, it is observed that older firms rely on informal financial transactions. This suggests that the manufacturing firms tended to utilize informal finance, such as internal or trade finance, during their initial growth process because information processing by banks and, thereby, loan markets did not work perfectly in Thailand in the 1990s.

#### *Participation in organized capital markets*

The results in Table 8 reveal that the dummy for listed firms significantly affects the debt ratio, which is consistent with the descriptive observations in Section III. The magnitude of the negative effect of the listing dummy is greater in the other liabilities equation than in the bank borrowing equation. In addition, the sign of the coefficient on the listing dummy in the borrowing/liability equation is positive and significant at the 1 percent level.

In our framework, the results can be interpreted as follows. Participation in the capital market reduces the agency costs of equity finance, thereby making the agency costs of bank borrowings and informal finance relatively higher. However, the effect on the agency costs is weaker for bank borrowing than for informal finance, causing an increasing divergence in the agency costs for these forms of fundraising. The result is an increase in the share of bank borrowings in debt composition. In short, firms' IPO behavior has the effect of activating the bank loan markets. This suggests that firms' participation in organized capital markets has the 'by-product effect' of reducing informational asymmetries through the disclosure of information not only in the securities market, but also in bank loan markets. In other words, the listing behavior of firms creates an externality regarding information.

**Table 9 Estimation results for capital structure, listed and non-listed firms**

	<i>Dependent variables</i>					
	<i>Debt ratio</i>		<i>Bank borrowing</i>		<i>Other liabilities</i>	
	<i>Listed</i>	<i>Non-listed</i>	<i>Listed</i>	<i>Non-listed</i>	<i>Listed</i>	<i>Non-listed</i>
Control variables						
Constant	0.4393*** (4.419)	0.7594*** (10.245)	0.3488*** (3.391)	0.6505*** (9.343)	0.0860 (0.962)	0.1053 (1.425)
Total assets <sup>a</sup>	0.0033 (1.121)	0.0031 (1.415)	0.0059** (2.005)	0.0058*** (2.669)	-0.0028 (-1.281)	-0.0018 (-0.803)
Variation of profit	-0.1062	-0.1742**	-0.2702	-0.2015**	0.2048	0.0196
Retained earning	-0.0621 (-0.977)	0.0058 (0.124)	-0.0269 (-0.420)	-0.0038 (-0.081)	-0.0288 (-0.584)	0.0121 (0.259)
Non-debt tax shield <sup>a</sup>	-0.0009 (-0.024)	-0.0557** (-2.121)	-0.0085 (-0.230)	-0.0383 (-1.380)	0.0022 (0.083)	-0.0201 (-0.764)
Determinant factors						
Quasi self-finance	-0.3974*** (-3.028)	-0.5028*** (-10.596)	-0.1475 (-1.128)	-0.2275*** (-4.544)	-0.2891*** (-2.985)	-0.2900*** (-6.099)
Dummy for financial conglomerate	0.5274*** (5.350)	-0.0583 (-1.050)	0.4315*** (4.209)	-0.1101** (-2.139)	0.0896 (0.984)	0.0538 (0.973)
Dummy for foreign firms	-0.0184 (-0.543)	-0.0981** (-2.510)	-0.0399 (-1.135)	-0.0964*** (-2.650)	0.0192 (0.619)	0.0032 (0.081)
Log of firm age	0.0295 (1.135)	-0.0414* (-1.875)	-0.0080 (-0.300)	-0.0761*** (-3.576)	0.0386* (1.687)	0.0345 (1.569)

**Table 9** Estimation results for capital structure, listed and non-listed firms

	<i>Dependent variables</i>					
	<i>Debt ratio</i>		<i>Bank borrowing</i>		<i>Other liabilities</i>	
	<i>Listed</i>	<i>Non-listed</i>	<i>Listed</i>	<i>Non-listed</i>	<i>Listed</i>	<i>Non-listed</i>
Industrial dummy						
Food processing	-0.0301 (-0.399)	0.0460 (0.668)	0.0463 (0.593)	-0.0544 (-0.853)	-0.0796 (-1.154)	0.1029 (1.498)
Textiles and garment	-0.1114 (-1.502)	-0.0845 (-0.876)	-0.0638 (-0.828)	-0.0060 (-0.067)	-0.0512 (-0.750)	-0.0755 (-0.786)
Wooden products	-0.2034 (-1.655)	—	-0.1259 (-0.986)	—	-0.0848 (-0.752)	—
Chemical products	-0.0060 (-0.080)	0.0113 (0.160)	0.0335 (0.431)	-0.1236* (-1.887)	-0.0397 (-0.575)	0.1334* (1.890)
Non-ferrous metal	-0.0540 (-0.659)	-0.1534* (-1.667)	-0.0302 (-0.354)	-0.1806** (-2.132)	-0.0211 (-0.280)	0.0298 (0.325)
Primary metal	0.0116 (0.144)	-0.0188 (-0.284)	0.0418 (0.500)	-0.0928 (-1.515)	-0.0304 (-0.414)	0.0732 (1.109)
Fabricated metal and machinery	—	—	—	—	—	—
Adjusted $R^2$	0.345	0.353	0.334	0.298	0.045	0.154
Number of samples	219	369	219	369	219	369
Estimation method	REM	REM	REM	REM	REM	REM

Notes:  $t$ -statistics are given in parentheses. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level, respectively.

<sup>a</sup> The units of 'total assets' and 'non-debt tax shield' are billion baht. REM, random effect model; —, not applicable.

*Business-group affiliation and foreign ownership*

The estimated coefficient on the foreign firm dummy suggests that the effects on debt ratios and bank borrowing are relatively low. Foreign firms tend to rely less on debt finance and more on equity finance. This finding is consistent with the fact that many foreign firms have been established by direct investment, with their capital being formed by multinational firms.

Unexpected results are obtained with respect to the effect of the financial conglomerate dummy. Firms affiliated to this business group have average debt ratios. However, with regard to debt composition, the coefficient on this dummy is negative and significant when the dependent variable is bank borrowing and positive and significant when it is other liabilities. It is difficult to imagine that such firms face stricter credit restrictions than other firms because commercial banks are overwhelmingly the major suppliers of credit in Thai financial markets. Hence, their high dependence on other liabilities suggests that group-affiliated firms tend to access commercial bank credit not through formal bank loans, but through informal channels redirected by affiliated firms or owner-families.

*Short-term and long-term loans*

Table 8 also presents the estimation results when the dependent variables are short-term and long-term loans. The coefficients of the control variables are almost the same as those of the bank borrowing equation. With regard to firm ownership, the foreign firm dummy is negative and significant at the 1 percent level for long-term borrowing, whereas it is negative but not statistically significant for short-term borrowing.

The coefficient on the financial conglomerate dummy is not significant in the long-term loans equation, but is negative and significant in the short-term loans equation. Firms affiliated with financial conglomerates depend less on short-term bank loans, which can be substituted by informal credit. The coefficient on the listing dummy is not significant for short-term borrowing, but is negative and significant at the 1 percent level for long-term borrowing. This suggests that listed firms would be able to substitute the funds raised from the capital market for long-term loans.

**V. Estimation of Equipment Investment***V.1 Model and variables*

In this section, the impact of firm ownership and capital structure on firms' investment behavior is examined by estimating a simple investment function. Given data availability and accuracy, the following reduced-form equation based on the neo-classical-type investment function is estimated:

$$\begin{aligned}
 INV = & \alpha_0 + \alpha_1 ROA + \alpha_2 CAC + \alpha_3 FIXASSET + \alpha_4 DR + \alpha_5 BU \\
 & + \alpha_6 LONG + \alpha_7 FCD + \alpha_8 FOD + \alpha_9 LIST + \alpha_{10} IND, \quad (3)
 \end{aligned}$$



where

*INV* = equipment investment =  $\log$  (fixed assets/fixed assets in the previous year);

*ROA* = return on assets = profit before tax/total assets;

*CAC* = capital cost = interest expenses/debt;

*FIXASSET* = fixed assets =  $\log$  (fixed assets);

*DR* = debt ratio = debt/total assets;

*BU* = bank borrowing = bank borrowing/total assets;

*LONG* = long-term loans = long-term loans/total assets;

*FCD* = financial conglomerate dummy;

*FOD* = foreign dummy;

*LIST* = listing dummy;

*IND* = industrial dummy (vector).

The first four variables are typical control variables for an investment function. *IND* controls for differences in technology. An estimation of Equation (3) allows one to examine the effects of firm characteristics and indicators of the capital structure (e.g. debt ratio, bank borrowing and long-term borrowing) on credit restrictions and the agency costs associated with investment.

Unfortunately, because our dataset does not include depreciation, the investment level is crudely measured. The estimation of a Tobin's Q-type investment function was attempted but not succeeded. Our estimation follows Suto (2003), who dealt with similar data availability problems to estimate investment functions for Malaysian firms.

## V.2 Estimation results

The estimation results are presented in Table 10. Of the control variables, the coefficients on return on assets are either not significant or negative and significant. The coefficients on the capital cost and fixed assets have the expected negative signs, with the latter being highly significant. The estimation results could be seen as reasonable.

Our findings on the effect of the capital structure are noteworthy. The coefficient on the debt ratio itself is not significant. However, when bank borrowing is included as an independent variable, the coefficient on the debt ratio is still insignificant, but that on bank borrowing is positive and highly significant. This suggests that debt itself does not promote investment, but bank borrowing does so strongly. When long-term loans is included in the estimated equation, the coefficient on bank borrowing becomes insignificant, but that on long-term loans is positive and significant at the 1 percent level. This implies that long-term loans promote investment, probably more effectively than bank borrowing overall.

The coefficient on the financial conglomerate dummy is negative and significant at the 10 percent level in two of the three cases. Investment by foreign firms, indicated by the coefficient on the foreign dummy, is slightly

**Table 10 Estimation results for investment functions**

	<i>Coefficient</i>	<i>Coefficient</i>	<i>Coefficient</i>
Adjusted least squares	0.113	0.119	0.131
Control variables			
Constant	4.1122*** (11.767)	4.3368*** (12.121)	4.5856*** (12.717)
Return on assets	-0.4872* (-1.932)	-0.4348* (-1.726)	-0.3574 (-1.424)
Capital cost <sup>a</sup>	-0.0121 (-1.445)	-0.0093 (-1.114)	-0.0103 (-1.241)
Log of fixed asset at last period	-0.1938*** (-11.515)	-0.2048*** (-11.875)	-0.2174*** (-12.487)
Determinant factors			
Debt ratio	0.0706 (0.825)	-0.1543 (-1.302)	-0.1152 (-0.976)
Bank borrowing		0.3486*** (2.736)	0.0639 (0.441)
Long-term loans			0.5340*** (4.023)
Dummy for financial conglomerate	-0.1232* (-1.719)	-0.1053 (-1.469)	-0.1307* (-1.829)
Dummy for foreign firms	0.0685 (1.516)	0.0777* (1.720)	0.0803* (1.791)
Dummy for listed firms	0.0337 (0.881)	0.0229 (0.599)	0.0455 (1.185)
Industrial dummy			
Food processing	-0.1436*** (-2.786)	-0.1444*** (-2.813)	-0.1512*** (-2.964)
Textile and garment	-0.1188** (-1.990)	-0.1214** (-2.040)	-0.1130* (-1.912)
Wooden products	-0.0554 (-0.499)	-0.0520 (-0.471)	-0.0881 (-0.800)
Pulp and paper	0.0743 (1.037)	0.0570 (0.795)	0.0339 (0.475)
Chemical products	0.0283 (0.515)	0.0378 (0.687)	0.0145 (0.265)
Non-ferrous metal	0.0619 (0.921)	0.0632 (0.944)	0.0223 (0.331)
Primary metal	0.1925 (0.678)	0.1438 (0.507)	0.1684 (0.598)

Notes: *t*-statistics are given in parentheses. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level, respectively. <sup>a</sup> The units of 'capital cost' are thousand baht.

above average. No significant differences in investment between listed and non-listed firms are found.

## VI. Concluding Remarks

This paper has examined the capital structure and investment behavior of firms in Thailand in the early 1990s. Five important results are obtained. First, there are serious information problems between manufacturing firms and financial institutions. The intimate and long-term relationship between them is not formed in the process of their mutual transactions. Rather, firms become self-reliant in terms of fund mobilization during their initial growth process.

Second, the debt ratio depends upon whether firms are listed on the securities exchange. The debt ratios of listed firms are higher than those of non-listed firms. For both types of firm, there was no evidence that debt ratios increased in the early 1990s. This finding contrasts with the results of Claessens et al. (1998) and the World Bank (1998).

Third, the low debt ratios of listed firms are simply a reflection of increased capital accounts generated by initial public offerings in the form of stock premiums or capital surpluses. By contrast, listed firms' ratios of other liabilities in debt composition are much lower than those of non-listed firms, whereas bank-borrowing ratios hardly differ. Listing on the stock exchange seems to reduce the agency costs of equity finance. More importantly, however, it also seems to widen the disparity in the agency costs associated with bank borrowing and informal borrowing, leading firms to prefer bank borrowing. This might be a result of the enhanced disclosure of information required by the capital market, which represents an externality effect of listing by firms.

Fourth, in contrast to the a priori expectation, firms in the financial conglomerates groups depend more on informal finance and less on bank loans, particularly on short-term loans. They are also relatively inactive investors. Although foreign firms also depend less on bank loans, their investment ratios are higher. This suggests that capital and credit transfers from parent multinational firms reduce capital costs, thereby promoting investment.

Lastly, a clear relationship between capital structure and investment is found for bank loans and long-term loans, but not for the debt ratio. Bank loans, particularly long-term loans, weaken credit restrictions, and lower capital costs promote investment. Moreover, in listed firms long-term loans as a proportion of total loans is very low. The long-term loans of listed firms are evidently replaced by cash or credit from the capital market. Such substitution, however, does not promote firms' equipment investment.

In terms of its role in fund mobilization, Thailand's capital market was not a substitute for, but a complement to, the indirect financial market in the early 1990s. However, bank loans, particularly long-term loans, promoted investment, whereas equity finance did not. This paper has identified some key features of the capital structure and their effects on investment behavior in Thai manufacturing

firms. The mechanisms behind these features require more investigation, which remains a task for future research.

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