Center for Economic Institutions

Working Paper Series

"Allocating Risk Across Pyramidal Tiers: Evidence from Thai Business Groups"

March 2008

Pramuan Bunkanwanicha and Yupana Wiwattanakantang

Center for Economic
Institutions

Working Paper Series

Allocating Risk Across Pyramidal Tiers:

Evidence from Thai Business Groups

Pramuan Bunkanwanicha[†]
ESCP-EAP

Yupana Wiwattanakantang[‡]
Hitotsubashi University

April 22, 2008

[†]ESCP-EAP European School of Management, 79 avenue de la République 75011 Paris, France. Tel: +33 1 49 23 58 03; Fax: +33 1 49 23 20 80; E-mail: pbunkanwanicha@escp-eap.net

[‡]Institute of Economic Research, Hitotsubashi University 2-1 Naka, Kunitachi, Tokyo 186-8603 Japan. Tel: +81 42 580 8374; Fax: +81 42 580 8333; E-mail: yupana@ier.hit-u.ac.jp

Allocating Risk Across Pyramidal Tiers:

Evidence from Thai Business Groups

Abstract

This paper shows that pyramidal ownership can be used to control downside risk. The research setting is Thailand before and after the 1997 Asian crisis. The focus is on family business groups that owned banks. The results show that the controlling family pursues different investment strategies for banks across pyramidal tiers in order to mitigate the entire group risk. Lower tier banks are used to undertake risky loans, while upper tier banks carry out more profitable investments. After the crisis hit, upper tier banks survived and almost all lower tier banks went bankrupt. By letting lower tier banks fail, the controlling family was able to save the rest of the group's firms.

1   Introduction

Recent research shows that in emerging economies the typical corporate organization is a pyramidal group. Yet, the reasons why a controlling owner builds pyramids are not fully understood by economists. There are at least two views. On the one hand, pyramids are said to be created to extract private benefits at the expense of minority shareholders (e.g., Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000). On the other hand, pyramids allow the controlling owner access to retained earnings which can be utilized by any of the group's firms. Profits are used to finance expansions at firms with profitable growth opportunities and cover losses at weaker firms (e.g., Khanna and Palepu, 1997, 2000, Almeida and Wolfenzon, 2006, and Gopalan, Nanda, and Seru, 2007). As the internal market makes up for a lack of access to financial markets, family group firms, therefore, can prosper.[1]

This study examines an unexplored issue in this literature. We investigate the role played by pyramidal tiers in terms of risk allocation. The hypothesis is that the controlling family chooses the positions of the firms in pyramids to minimize the overall group risk. Because the family has access to internal funds, the family can design investment strategies for the entire group's firms based on their position in the pyramid. Firms lower in the pyramid are used to undertake risky investments, while the firms nearest the apex carry out safer investments. If the risky investment is unprofitable, these lower tier firms can be sold and the group will not lose significant control over its other firms. Pyramids, therefore, can help insulate the entire group from negative returns and shocks.

Thailand provides insights to test empirically the effect of pyramidal tiers in limiting the bankruptcy risk of the whole business group. Thailand went through a boom period (1992-1996) and a bust period during the 1997 Asian financial crisis. This setting provides a unique experiment to understand the investment strategies of the firms within the pyramid: how the group is structured to shield family wealth from downside risk.

The empirical analysis is based on an original ownership data set of family business

---

[1] In a different context, Fan, Wong, and Zhang (2007) study Chinese firms and argue that pyramids are not used by a controlling owner to consume private benefits. Instead, pyramids allow the controlling owner (the government) to credibly decentralize decision rights to firms' management without selling off their ownership. Therefore, pyramids are associated with higher labor and investment efficiency.

groups in Thailand. The focus is on the groups that owned *banks and financial companies* (hereafter called "banks") because the nature of their investments is similar, concentrated on lending. We test whether banks located in a higher tier and a lower tier have different lending strategies prior to the crisis. The first task is to draw the ownership structure of the entire business group. Pyramidal ownership is often complex as the controlling family owns a company via a chain of other companies. We construct detailed ownership data that allow us to precisely define the locations of banks within a group. Figure 1 shows the ownership structure of the Ayudhya Group owned by the Ratanarak family. Prior to the crisis, this family owned one bank, one finance company, two insurance companies, and a number of other nonfinancial firms. The family only owned a 0.18% stake in the Bank of Ayudhya. However, via an ownership arrangement with the other 13 group companies, the family held 31.6% of voting rights and 21.40% of cash-flow rights.

A similar pyramidal structure is observed in other groups as well. Interestingly, the cash-flow stake in the hands of the controlling family is not low (as the expropriation theory would imply). The average controlling family owned 21.2% of the cash-flow stake and 27.7% of the voting rights. In other words, the ultimate ownership is concentrated and the cash-flow rights are closely aligned with the voting rights. This evidence is indeed similar to the findings in recent studies from Europe, Canada, Turkey, and Brazil.[2] Their findings show that the controlling family holds a high cash-flow stake; this is not consistent with the traditional view that pyramids are built to expropriate minority shareholders. All this evidence suggests that there might be other reasons for building pyramids, which the second analysis in this paper shows.

Our results show that lower tier banks are likely to take on riskier projects with low profitability. Prior to the crisis, on average, lower tier banks experienced about 50% more loan growth than upper tier banks. Moreover, these lower tier banks had about 21% and 50% lower profitability than higher tier banks in terms of ROA and ROE, respectively. To further substantiate these results, we investigate what happened to the upper and lower tier banks after Thailand experienced a severe negative shock in 1997. Very interestingly, after

---

[2]Section 2 provides a detailed discussion.

the crisis, almost all the lower tier banks failed because most of their loans went bad. To cope with the crisis, the controlling families undertook massive restructuring. Whereas the families completely lost control of lower tier banks, about 70% of the upper tier banks were solvent and remained in the family group. Thanks to their pyramidal structure, none of these business groups disappeared.[3]

Overall, this study shows that pyramidal tiers shield the entire group from financial distress. By allocating risky projects to lower tier firms, the pyramidal structure protects the controlling family's wealth from downside risk when the risky investments do not pay off. If this ownership configuration permits the group to explore and invest in various risky ventures, there ought to be a positive effect on the growth of the economy as a whole (see Morck and Nakamura, 2007).

The evidence from this paper can also be applied to other countries where large banks are part of family owned business groups. For example, Hong Kong's largest locally owned bank, the Bank of East Asia, is owned by the David Li family. Sweden's largest bank, the SEB Bank, is controlled by the Wallenberg family. In Chile, the Banco de Chile is controlled by one of the country's wealthiest families, the Luksić family. In the Philippines and Indonesia, more than two-thirds of the banks are family owned. Turkey presents a more extreme case where almost all banks are owned by families.

The remainder of the paper is organized as follows. Section 2 reviews the existing literature on pyramids and describes our testable hypotheses. Section 3 presents the data and sample. Section 4 discusses the ownership structure of family groups. Section 5 presents the empirical results. Section 6 discusses what happened to banks in different locations in the pyramids after the 1997 financial crisis. Section 7 concludes the paper.

[Figure 1 about here]

---

[3]Similar evidence that groups have survived despite the crisis is also observed in other East Asian countries, namely Malaysia, Korea, Taiwan, and Singapore. Chang (2006) and Khanna and Yafeh (2007) provide a detailed discussion on this issue.

2 Hypothesis development

2.1 Related literature on pyramids

Extensive studies have emerged in recent years addressing the ambiguities surrounding the creation of business groups, particularly why business groups are typically organized as pyramids. The conventional view argues that pyramids are chosen by the controlling family to maintain or increase its control of several firms within a business group. Pyramids create a separation of ownership from control that induces families to divert resources among the firms at the expense of minority shareholders (e.g., Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000; and Morck, Wolfenzon, and Yeung, 2005). A large body of empirical research finds that group firms with a divergence of cash-flow rights and control rights have lower firm valuations.[4]

The traditional view is being challenged by recent empirical findings, however. In many countries the controlling family owns large cash-flow stakes. Besides, pyramids do not necessarily separate cash-flow rights from voting rights. Almeida and Wolfenzon (2006) propose an alternative view based on evidence coming from many countries. For example, Attig, Fischer, and Gadhoum (2003) find that in Canada the average controlling family owns 31.78% of the cash-flow rights. Faccio and Lang (2002), Dermirag and Serter (2003), and Valadares and Leal (1999) find that in the case of firms in Europe, Turkey, and Brazil, the separation of ownership and control is minimal. Similarly, Polsiri and Wiwattanakantang (2006) show that in the case of nonfinancial companies in Thailand, the controlling family owns on average about 39% of the cash-flow rights.

Morck, Strangeland, and Yeung (2000), Khanna and Yafeh (2007), among others, develop arguments which call into question the "expropriation" hypothesis. Why, for example, do outsiders invest in firms where their capital is likely to be expropriated? Perhaps it is a fair game as rational investors expecting expropriation losses would discount share prices accordingly. Therefore, they would buy the shares only if the prices were low enough. In other words, investors would earn equilibrium risk-adjusted returns. Indeed, Faccio, Lang,

---

[4]See, e.g., Bertrand, Mehta, and Mullainathan (2002); Claessens, Djankov, Fan, and Lang (2002); Mitton (2002); Lins (2003); Lemmon and Lins (2003); and Joh (2003) etc.

and Young (2001) show that business groups pay high dividends to compensate for the expropriation risk.

A growing body of research has provided other rationales for building pyramids. Most of which are based on the conventional theory that pyramids create a group's internal capital market. Pyramidal structure can be used to subsidize growth across firms and industries. For example, Almeida and Wolfenzon (2006) draw a rigorous model showing that the family is able to exploit profitable growth opportunities across industries, and becomes diversified. The ability to use the retained earnings of existing group firms allows the controlling family to design their investment strategies across the group more efficiently. By pooling and transferring funds, group firms can share the costs of low-profit investment. Pyramids offer optimal solutions as they allow the family to set up new firms that require high investment that generate low profits at the early stage. The outcome is that low profit firms end up being lower in the pyramids. Therefore, the negative relationship between pyramidal ownership and firm performance does not always imply expropriation as suggested by the expropriation hypothesis. Instead, it is due to a selection effect. Firms are chosen to be in pyramids to undertake less-profitable projects.

A few studies show empirically that internal markets have several advantages. Khanna and Yafeh (2005) argue that internal capital markets provide efficient mutual insurance or risk sharing among group firms: a downturn in one firm is likely to be offset by an upturn in another. This risk sharing advantage is valuable particularly in the countries where external financial markets are less developed. Using the data from Japan, Yafeh (2003) shows that internal markets solve the hold up problems. Gopalan, Nanda, and Seru (2007) study business groups in India and find that stronger firms tend to rescue firms in times of distress to avoid default. The incentives are to protect the entire group's reputation. They show that news of bankruptcy indeed has a negative spillover effect on the rest of the group's firms. These groups face difficulties in raising external finance and further damage the groups' investment prospects. The incentives to support weak firms are, therefore, different from those identified by Friedman, Johnson, and Mitton (2003) who argue that the controlling family does so to keep the option to expropriate in the future.

2.2   Hypotheses

We develop our hypotheses based on the argument put forward by Morck and Nakamura (2004). In this study, they analyze the ownership structure of the top six family business groups during the pre-World War I period in Japan or *zaibatsu*. Morck and Nakamura argue that the controlling family has an interest in the profitability of the entire group. The controlling family does not only carefully select how much stake each company should own in other group firms but also where each firm should be located within the group. Core firms that the family considers important to the group are closer to the apex, while noncore firms are located at the lower level in the pyramid.

We extend this argument and test it empirically. We hypothesize that the controlling family chooses the pyramidal structure to maximize the entire group's profits while minimizing its risk. Firms are positioned in different tiers in the pyramid to serve this purpose. Lower tier firms are used to undertake newer and riskier investment projects. If the projects do not pay off, the lower tier firms can be terminated while upper tier firms are less affected. Therefore, multiple layers of firms in pyramids can shield the entire group from downside risk. This enables the family to exploit profitable growth opportunities across industries so as to maximize the family's returns as the group expands.

Figure 2 illustrates the basic idea. Family Z owns a bank and a number of other firms in the business group. There are two cases of different ownership structure. In Case 1, Bank X is in the second tier, indicating the importance of this bank for the controlling family. In Case 2, Bank Y is in the third tier, indicating that Bank Y is not a core firm for this family. With both Bank X and Bank Y, however, the ratio of ownership to control rights in the hands of the controlling family is exactly the same. In each case, the expropriation hypothesis suggests that the degree of expropriation by the controlling family should be the same for both Bank X and Bank Y. Hence, Bank X and Bank Y should have similar investment behavior and performance.

However, our hypothesis predicts otherwise. Because the controlling family has a great concern for the stability of the entire group, different firms will be assigned investment projects with different levels of risk. So, a bank in a higher tier should pursue less risky

6

investments. As our focus is on lending behavior, our hypothesis suggests that Bank Y is more likely to extend riskier loans. These loans have a higher chance of default. Bank X, which is in a higher tier, is more likely to hold safer loans. Because in "bad" states the return of riskier projects is less than that of safer projects, the return of Bank Y is, therefore, lower than that of Bank X. When the downside of these risky loans is extremely high, the family group can also decide to sell poorly performing banks in lower tiers. In Case 1, if the family relinquishes Bank X, the group will lose control of two companies, B and C. In Case 2, however, the controlling family will lose control of Company C if Bank Y is liquidated. Pyramids, therefore, make the entire group less sensitive to negative shocks.

[Figure 2 about here]

3   Data

3.1   Sample

This study investigates the business groups that owned commercial banks and finance companies prior to the 1997 financial crisis. Hereafter, "banks" will be used to refer to both banks and finance companies. The period of study is divided into pre-crisis (1992-1996) and post-crisis (1997-2000). The focuses are on all commercial banks and finance companies that were listed on the Stock Exchange of Thailand. Our sample consists of 215 bank-year observations including 13 commercial banks and 36 finance companies. The number of banks varies each year due to exit and entry patterns within the exchange. The number of banks declined sharply after 1997. The sample coverage accounts for 71.2% of the total assets of the financial sector. The rest banks that are not in the sample are state-owned banks and foreign banks that were not publicly listed.

Until 1997, these family-owned banks had long enjoyed a high degree of protection against competition from both local and foreign competitors in two important ways. First, there was a moratorium on the granting of new licenses by the central bank. Second, foreign shareholding was limited to 25%.

[Table 1 about here]

7

3.2 Ownership data

To construct the ownership structures of family groups and trace the ultimate ownership, we use the standard method suggested by La Porta, Lopez-de-Silanes, and Shleifer (1999); Claessens, Djankov, and Lang (2000); and Faccio and Lang (2002). In this study, a 10% threshold of control rights is employed to define the ultimate owner.

A number of databases are used to trace the ultimate ownership. First, the company annual report (FM 56-1) includes shareholders with shareholdings of at least 0.5% and a list of affiliated companies and their shareholdings. The annual reports are reproduced by the Stock Exchange of Thailand in two databases, the I-SIM CD-ROM and the SETSMART online service. Second, the Business On Line (BOL) database is used to obtain the ownership information of nonlisted companies. The BOL is the sole agent with a license from the Ministry of Commerce to reproduce the accounting and ownership information of all companies registered at the Ministry of Commerce.

Third, the information on family trees is hand-collected from multiple sources. The most important source is the cremation volumes that are published and distributed as gifts on the occasion of cremation ceremonies. The data from these booklets include detailed genealogical diagrams of the family of the deceased and related families. These booklets are obtained from the cremation volume collection at the National Library of Thailand (which, according to its own rules, receives a copy of every book published in the country). Additional information is collected from the annual reports and a number of books namely Brooker Group (2001) Sappaiboon (2000, 2001).

All family members as well as companies ultimately owned by these members are considered as a single shareholder to account for the fact that it is a common practice in Thailand for businesses to be closely tied to an extensive family. A shareholder, therefore, includes individuals with the same surname as well as extended families linked through marriage. Surnames can be used to trace family relationships as family names in Thailand are unique and only people belonging to a family may use that family's name.

3.3 The pyramidal structure

In the following analysis, we draw the ownership structure to identify in which tier banks are located within a family business group. We stop drawing pyramidal tiers when all banks and other listed companies that a family owns are identified. Figure 1 present an example of ownership structure to illustrate our database and variables: how we allocate the firms to each of the pyramidal tiers and calculate cash flow and voting rights. This figure show the ownership structure of the Ratanarak group as of 1996. This family is also known as the Ayudhya Group following the name of the group's core bank. The Ratanarak family formed an enormous pyramid with both financial and nonfinancial companies. Seven out of which were publicly traded firms. This family group is one of the most complex cases in our sample.

The Ratanaraks owned one bank, the Bank of Ayudhya PLC. (BAY), and one finance company, the Ayudhya Investment and Trust PLC. (AITCO). BAY and AITCO are our focus in this study. Both BAY and AITCO are controlled by the Ratanarak family, characteristically through a pyramid of companies that have shares with a variance between cash flow and voting rights. More specifically, the Ratanarak family places five holding companies at the apex of the pyramid—the Ratanarak Company, the K Group, the CKR Company, Super Assets, and CKS Holding—to control other companies within the group. Besides these holding companies, the Bangkok Broadcasting & TV Co., Ltd. (BBTV), which operates a military TV channel, is also positioned at the apex. The Ratanaraks directly control 29.3% and indirectly, via CKS Holding, 26.2% of the voting rights of BBTV. Since there are more direct shareholdings than indirect shareholdings, we place BBTV in the first tier. BBTV in turn owns the following three holding companies: Great Luck Equity (30% of the votes), Great Fortune Equity (100% of the votes), and BBTV Asset Management (25% of the votes). So, Great Fortune Equity and BBTV Asset Management are placed in the second tier of the pyramid.

The mechanism the Ratanarak family used to control BAY is not straightforward. The Ratanaraks directly own only a 0.18% stake in BAY. But a control arrangement with 13 group companies gives the family control over 31.6% of voting rights and 21.40% of cash

flow rights in BAY. Each of these 13 companies actually owns a small stake that ranges from 0.57% to a maximum of 5%. Since 17.24% of the voting rights in BAY are owned by the group's first-tier firms, we place BAY in the second tier.

The Ratanaraks also control three other listed companies in the financial services industry that are in the third tier. AITCO is included in our analysis because it is a finance company. The Ratanaraks control 59.63% of the voting rights and 35.45% of the cash flow rights of AITCO. Their direct ownership constitutes only 9.21%. The rest is controlled through a chain of group companies, namely BAY (10%), Super Assets (3.58%), Great Luck Equity (8%), Great Fortune Equity (6.23%), BBTV (7.05%), CKS Holding (5.33%), AYUD (4.1%), and AYUCO (6.13%). We place AITCO in the third tier in the pyramid because its voting rights are concentrated in the second-tier companies, specifically BAY (10%), Great Luck Equity (8%), and Great Fortune (6.23%).

In sum, the location of companies appears to be consistent with the fact that banking has been the Ratanarak family's primary line of business since the group was established in the 1960s. Accordingly, BAY has served as a core firm of the group, accounting for its position near the apex. The group was diversified into financial services and insurance. Another significant expansion was the addition of nonfinancial businesses, namely construction materials. Therefore, the bank is in a high tier, with the other firms filling the lower tiers.

[Figure 2 about here]

4   Empirical analysis

This section investigates empirically how a pyramidal ownership structure affects a bank's lending behavior and its profitability. Our hypothesis asserts that banks near the bottom tiers on the pyramid are more likely to extend riskier loans with low profitability. Therefore, bottom tier banks should experience poorer performance.

4.1 Methodology

4.1.1 The position of banks in pyramids

The analysis begins by classifying the banks in our sample based on their location in the pyramid. Table 2A exhibits the results. We observe four tiers in the pyramid. None of the banks was placed in the first tier. Banks were concentrated mostly in the second and third tiers. Only three banks were placed in the fourth tier. Due to the small sample size of the fourth tier banks, it is not possible to compare the investment activities and performance of the banks by specific tier. Therefore, in the following analysis, the banks are classified into two groups: top tier and bottom tier. A bank is classified as bottom tier if it is located in the third or fourth tier. Otherwise, a bank is classified as top tier. The top tier banks account for 33% and the bottom tier banks 67% of the total sample.

Table 2B shows the ultimate ownership stake of the controlling family. The results based on the whole sample show that the controlling family owned a large stake. The mean voting rights is 27.7%, while the mean cash flow rights is slightly lower, at 21.2%. The mean deviation of the ownership and control of banks in our sample is 0.73, which is not very high. In the top tier banks, on average the controlling family owns 23.3% of the cash flow rights and 28.9% of the voting rights. In the lower tier banks, the controlling family owns 20.3% of the cash flow rights and 27.1% of the voting rights. The univariate tests show that ownership by the controlling family is not significantly different between the top tier and bottom tier banks.

4.1.2 Definition of risky investments and profitability

Following the literature on the East Asian financial crisis, we consider high loan growth as a sign of risky investment. Since 1992, bank lending to the private sector grew rapidly. Financial claims on the private sector rose from 98.4% of GDP in 1992 to 128.1% in 1994 and 141.9% by end 1996. Krugman (1998) argues that this lending was "excessive risky lending", which was partly due to an implicit government guarantee in the financial system. Charumilind, Kali, and Wiwattanakantang (2006) argue that many of the loans were granted based on personal connections rather than proper credit evaluation. The incentives of such

11

connected lending are private benefits to be obtained by the owners of banks. The favors may be bestowed in various forms such as new contracts and investment opportunities to other firms that belong to the group.

We measure loan growth as the percentage change in total outstanding loans. To investigate whether or not the lending is excessively risky, we relate loan growth to performance. Specifically, if the lending was risky, it would result in poor performance. We measure profitability by the ratio of earnings before interest and taxes (EBIT) to total assets, ROA.

[Table 2A and Table 2B about here]

4.2 Univariate analysis

Table 3 presents the univariate tests comparing loan growth, profitability, and other firm characteristics of the top and bottom tier banks. The results strongly support our hypothesis. The bottom tier banks have higher loan growth and lower profitability than the top tier banks. The t-statistics of the test of means (t-test) and the z-statistics of the test of medians (Wilcoxon rank-sum test) are strongly significant at the 1% level. More specifically, the average loan growth was 31% for the bottom-tier banks, which is significantly higher than the 20.9% increase for the top tier banks. Regarding profitability, the average ROA for the bottom tier banks is 1.9%, which is significantly lower than the 2.3% of the top tier banks. Similar results are observed for another performance measure, the ratio of EBIT to equity (ROE).

Regarding other firm characteristics, top tier banks are significantly larger than bottom tier banks. Otherwise, both groups are similar in terms of the ratio of equity capital to total assets and the ratio of total loans to total assets.

[Table 3 about here]

12

4.3 Multivariate analysis

4.3.1 Model specification

We employ regression analysis to investigate whether the location in a pyramid affects a bank's lending behavior and profitability. To measure pyramidal tiers, we use a dummy variable "*bottom tier*" set to one if the bank is in the third and fourth tier, and zero otherwise. The benchmark banks, therefore, are the top tier banks. To relate pyramidal tiers to lending and profitability, we employ two regression models. In the first model, the dependent variable is loan growth. In the second model, the dependent variable is the ROA.

In the loan-growth regression, we control for the effect of profitability and risk factors. If higher profitability increases a bank's cash flow, it improves its lending capacity. The ratio of the book value of equity capital to total assets is included as a measure for the bank's specific risk. The capital ratio may be negatively related to loan growth. Low-capitalized banks may have more incentives to take higher risk to boost profits by extending loans more aggressively.

In the profitability equation, we include a loan-growth variable to capture the risk effects of loan portfolio on profitability. Compared with other assets, loans are often regarded as more risky. We include squared loan growth to account for any nonlinear effects of loan growth on profitability. Also, we include the capital ratio to capture bank-specific risk factors. Previous literature suggests both negative and positive relationships between capital and profits. On the negative relationship, as noted earlier, lower-capitalized banks may have stronger incentives to take more risk to increase profitability. However, the level of capital can be positively related to the bank's profitability due to earnings retention.

In both models, we control for the ownership effects by including the percentage of cash flow rights and the ratio of cash flow to control rights by the controlling owner. Another control variable is size. Size is measured by the logarithm of total assets. Theoretically, the relationship between size and loan growth is unclear. Size captures loan-supply conditions. Larger banks often have more branches, allowing them to acquire more deposits and extend more loans. However, smaller banks may pursue a more aggressive lending policy to seek

13

new investment opportunities to replace low-return lending.

A dummy variable, "*finance company*", that equals one for finance companies, and zero otherwise, is included to control for bank types. Finally, year dummies are included to control for the economic conditions and the effect of any changes in regulations.

The following two sets of regression techniques are employed. First, we use the pooled OLS regression analysis in which the standard errors are adjusted by clustering at the bank level. Second, we employ the random-effects panel data model to address the potential biases arising from individual bank heterogeneity. Fixed-effects regressions are not feasible in our analysis because there is no within-bank position variation in the pyramids. In other words, our main explanatory variable, the pyramidal tier, is a time-invariant variable. We also perform Breusch and Pagan (1980) Lagrange multiplier tests to examine whether errors are independent (OLS vs. random effects).

4.3.2 Pyramidal tiers and loan growth

Table 4 reports the regression results when the dependent variable is loan growth. The results are consistent with the univariate tests. The estimated coefficients on the *bottom tier* dummy variable are positive and strongly significant at the 1% level in all of the regressions. The evidence suggests that banks in the bottom tiers tend to pursue a more aggressive lending policy than banks in the top tiers of the pyramid. The estimated coefficients indicate that on average the bottom tier banks extend more loans than the top tier banks by about 9.5 percentage points.

Interestingly, in all of the regressions, none of the estimated coefficients on the traditional ownership variables, the cash-flow rights, and the ratio of cash-flow to control rights is statistically significant. The results support our hypothesis that location in the pyramids does matter in explaining the variation in loan growth.

Regarding the control variables, the coefficients are as expected. Bank size is negatively and significantly associated with loan growth. So, larger banks are more reluctant to pursue riskier lending than smaller ones. Higher-capital banks appear to have lower loan growth. In addition, more profitable banks tend to lend more. Concerning the effect of bank type,

the results show that lending behavior is not different between the commercial banks and finance companies.

[Table 4 about here]

4.3.3 Pyramidal tiers and profitability

Table 5 presents the regression results of the relationship between the pyramidal tiers and profitability. Consistent with the univariate tests, we find that the estimated coefficients on the *bottom tier* dummy variable are negative and strongly significant in all models at the 1% level. The regression results indicate that on average the ROA of the bottom tier banks is about one percentage point lower than that of the top tier peers.

Similar to the previous regression results of loan growth, the estimated coefficients on the cash-flow rights and the ratio of cash-flow to control rights are not statistically significant in all models. These results suggest that there is no relationship between the traditional ownership variables and profitability.

The estimated results on other control variables are as expected. The results indicate that larger banks are more profitable than smaller banks. We find a strong relationship between capital ratio and profitability. Concerning the relation between profitability and loan growth, the estimated coefficients are not significant in all the OLS regressions. In the random-effects regressions, loan growth is positively associated with profitability. Finally, we find that finance companies are more profitable than commercial banks.

In sum, we find that banks located at the lower level in the pyramids perform worse than those near the apex. The magnitude of the estimates indicates that the difference in profitability between lower and higher tier banks is economically significant. Bottom tier banks experience ROA of about 0.01 percentage points lower than top tier banks. This difference in ROA is remarkable, as it indicates a profitability gap of more than 21% over the average bottom tier bank's ROA of 1.9%. Making risky loans may be one of the reasons that bottom tier banks perform more poorly than top tier banks. Our empirical results show that banks in the bottom tiers extend about 9.5 percentage points more loans than top tier banks. This 9.5 difference represents about 48.3% of the average bottom tier bank's loan

growth of 31% and therefore is of important economic significance. As bottom tier banks have significantly lower profitability than higher tier banks, these results suggest that loan growth can be considered risky.

Overall, our results show that lower tier banks lend more aggressively and hence end up performing more poorly than upper tier banks. Indeed, the fact that many bottom tier banks eventually failed after the 1997 financial crisis is consistent with our hypothesis that families chose the ownership structure to maximize the growth and stability of the group. The results in Section 5 discuss the banks' fate.

[Table 5 about here]

4.3.4 Robustness checks

To check the robustness of our findings, we perform the following analyses.

Endogeneity between loan growth and profitability

We address potential concerns about the endogeneity of loan growth and profitability. We employ the two-stage least squares (2SLS) estimation technique and estimate two equations in which loan growth and performance are simultaneously determined (Molyneux, Remolona, and Seth, 1998). To identify the equations system, we add one instrumental variable in the loan-growth and profitability equations. In the loan-growth equation, we include the rate of loan growth in the previous year. In the profitability equation, the ratio of staff costs to total operating expenses is included. Table 7 presents the regression results. Our findings are robust compared with those of the estimation method. In the loan-growth regression, the estimated coefficients on the *bottom tier* dummy are positive and statistically significant at the 5% level. In the ROA and ROE regressions, the estimated coefficients on the *bottom tier* dummy are negative. The coefficients are strongly significant at the 1% level in all regression models. The estimates from the 2SLS regressions are also close to the estimates using the OLS and the random effects methods. The results of Durbin-Wu-Hausman tests indicate that the pooled OLS estimates are unlikely to be biased due to the endogeneity problem.

Alternative measures of performance

To test whether our results are robust compared with alternative profitability measures, we use ROE in lieu of ROA. ROE is defined as the ratio of the EBIT to the book value of equity. Table 6 presents the regression results. Our major finding remains the same. The estimated coefficients on the *bottom tier* are negative and strongly significant at the 5% and 1% levels. The coefficients indicate that lower tier banks are associated with about 11 percentage points lower ROE than top tier banks. Economically, the difference of 11 percentage points is also very important, as it is equal to about 50% more than the average bottom-tier bank's ROE of 18.1%. In unreported results, we repeated the analysis using the net interest margin as an alternative measure of a bank's profitability. The results are qualitatively similar to our main findings.

Sub-sample analysis

To test whether our results were biased from the non-homogeneous pooling sample of commercial banks and finance companies, we ran regressions of the sub-sample that included only finance companies. Our main results remained unchanged. The bottom tier finance companies are positively related to loan growth and negatively related to ROA and ROE. The estimated coefficients on the *bottom tier* dummy are larger than the results of all samples presented in Table 4 and Table 5.

[Table 6 and Table 7 about here]

5 Did family-owned banks prevail after the financial crisis?

This section investigates what happened to the banks after the 1997 financial crisis. If banks located in lower tiers undertook risky loans, lower tier banks were more likely to be hit harder by the crisis and hence would be in financial trouble. A bank is defined as a failed bank if it was either closed down or nationalized by the government. Table 8 shows the number of banks in 2003 compared with the number in 1996. Banks were categorized based on their placement in the pyramids. Interestingly, the survival rate of banks in upper

tiers is significantly higher. Statistically, about 70% of the banks in the second tier survived. In contrast, only about 10% of the third-tier banks survived. The extreme cases are the fourth-tier banks: None of the three banks in the fourth tier survived.

All the groups, however, have survived. As shown by Polsiri and Wiwattanakantang (2006), most business groups were dramatically restructured. Companies were rearranged throughout the pyramid. For example, the Ratanarak group reorganized the group to be more focused on the financial services business, which was the family's original strength. Accordingly, the Ratanaraks sold out their controlling stake in Siam Cement City PLC. (SCCC), Karat Sanitaryware PLC. (KARAT), and many other nonlisted companies in the construction materials business. The funds from selling stakes in these noncore businesses were used to save core businesses in the financial services industry, in particular the Bank of Ayudhya (BAY).

[Table 8 about here]

6 Conclusion

This paper investigates business groups that owned banks in Thailand. Our investigation shows that these families own an extensive empire that includes banks and other nonfinancial firms in various industries. The mechanisms that the families use to control these firms are pyramids. On average families set up pyramids of four tiers. A number of holding companies were often placed at the apex. These holding companies controlled other firms in the family group. About one-third of the banks in our sample were in the second tier in the pyramids, categorized as top tier banks. The other two-thirds were in the third and fourth tiers, classified as bottom tier banks. The results show that bottom tier banks tend to extend more loans and perform more poorly. This suggests that bottom tier banks undertake risky investments. Interestingly, we find that while most top tier banks survived after the crisis, almost all lower tier banks failed.

This evidence is consistent with the notion that the controlling shareholder chooses not only what stakes to hold in each firm but also where to place the firms in the pyramids.

Location in the pyramids is relevant because the controlling shareholder can choose different investment strategies for each firm. While "good investment" is concentrated in upper tier firms, lower tier firms are more likely to engage in risky investment. This ownership configuration, therefore, can insulate the entire group from the adverse effect in "bad states" if an investment does not pay off, in which case the controlling family is able to maintain control over the other firms by selling poorly performing firms in the lower tiers.

It is important to note here, however, that while pyramids can be efficient for the family, they do not necessarily increase social welfare. For example, pyramids can be welfare detracting if the firms that constitute them over invest.

References

Almeida, Heitor, and Daniel Wolfenzon, 2006, Should business groups be dismantled? The equilibrium costs of efficient internal capital markets, *Journal of Financial Economics* 79, 99–144.

Attig, Najah, Klaus Fischer, and Yoser Gadhoum, 2003, On the determinants of pyramidal ownership: Evidence on expropriation of minority interests, mimeo.

Bertrand, Marianne, Paras Mehta, and Sendhil Mullainathan, 2002, Ferreting out tunneling: An application to Indian business groups, *Quarterly Journal of Economics* 117, 121–148.

Breusch, Trevor, and Adrian Rodney Pagan, 1980, The lagrange multiplier test and its applications to model specification in econometrics, *Review of Economic Studies* 47, 239–253.

Brooker Group, 2001, *Thai Business Groups 2001: A Unique Guide to Who Owns What* (The Brooker Group: Bangkok).

Chang, Sea-Jin, 2006, *Business Groups in East Asia: Financial Crisis, Restructuring, and New Growth* (Oxford University Press: Oxford).

Charumilind, Chutatong, Raja Kali, and Yupana Wiwattanakantang, 2006, Connected lending: Thailand before the financial crisis, *Journal of Business* 79, 181–218.

Claessens, Stijn, Simeon Djankov, Joseph P. H. Fan, and Larry H. P. Lang, 2002, Disentangling the incentive and entrenchment effects of large shareholdings, *Journal of Finance* 57, 2741–2771.

Claessens, Stijn, Simeon Djankov, and Larry H. P. Lang, 2000, The separation of ownership and control in East Asian corporations, *Journal of Financial Economics* 58, 81–112.

Demirag, Istemi, and Mehmet Serter, 2003, Ownership patterns and control in Turkish listed companies, *Corporate Governance* 11, 40–51.

Faccio, Mara, and Larry H. P. Lang, 2002, The ultimate ownership of Western European corporations, *Journal of Financial Economics* 65, 365–395.

———, and Leslie Young, 2001, Dividends and expropriation, *American Economic Review* 91, 54–78.

Fan, Joseph P.H., T.J. Wong, and Tianyu Zhang, 2007, Organizational structure as a decentralization device: Evidence from corporate pyramids, mimeo.

Friedman, Eric, Simon Johnson, and Todd Mitton, 2003, Propping and tunneling, *Journal of Comparative Economics* 31, 732–750.

Gopalan, Radhakrishnan, Vikram Nanda, and Amit Seru, 2007, Affiliated firms and financial support: Evidence from Indian business groups, *Journal of Financial Economics* 86, 759–795.

Joh, Sung Wook, 2003, Corporate governance and firm profitability: Evidence from Korea before the economic crisis, *Journal of Financial Economics* 68, 287–322.

Johnson, Simon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2000, Tunneling, *American Economic Review Papers and Proceedings* 90, 22–27.

Khanna, Tarun, and Krishna Palepu, 1997, Why focused strategies may be wrong for emerging markets, *Harvard Business Review* 75, 41–51.

———, 2000, Is group affiliation profitable in emerging markets? An analysis of diversified Indian business groups, *Journal of Finance* 55, 867–891.

Khanna, Tarun, and Yishay Yafeh, 2005, Business groups and risk sharing around the world, *Journal of Business* 78, 301–340.

———, 2007, Business groups in emerging markets: Paragons or parasites?, *Journal of Economic Literature* 45, 331–373.

Krugman, Paul, 1998, What happened to Asia?, mimeo.

La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer, 1999, Corporate ownership around the world, *Journal of Finance* 54, 471–518.

Lemmon, Michael L., and Karl V. Lins, 2003, Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis, *Journal of Finance* 58, 1445–1468.

Lins, Karl V., 2003, Equity ownership and firm value in emerging markets, *Journal of Financial and Quantitative Analysis* 38, 159–184.

Mitton, Todd, 2002, A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis, *Journal of Financial Economics* 64, 215–241.

Molyneux, Philip, Eli Remolona, and Rama Seth, 1998, Modeling foreign bank performance, and lending behavior, *Financial Markets, Institutions, and Instruments* 7, 26–41.

Morck, Randall, and Masao Nakamura, 2004, A frog in a well knows nothing of the ocean: A history of corporate ownership in Japan, in Randall Morck, ed.: *A Global History of Corporate Governance* (University of Chicago Press: Chicago).

———, 2007, Business groups and the big push: Meiji Japan's mass privatization and subsequent growth, *Enterprise and Society* 8, 543–601.

Morck, Randall, David Stangeland, and Bernard Yeung, 2000, Inherited wealth, corporate control, and economic growth?, in Randall Morck, ed.: *Concentrated Corporate Ownership* (University of Chicago Press: Chicago).

Morck, Randall, Daniel Wolfenzon, and Bernard Yeung, 2005, Corporate governance, economic entrenchment, and growth, *Journal of Economic Literature* 43, 655–720.

Polsiri, Piruna, and Yupana Wiwattanakantang, 2006, Thai business groups: Crisis and restructuring, in Sea-Jin Chang, ed.: *Business Groups in East Asia: Financial Crisis, Restructuring, and New Growth* (Oxford University Press: Oxford).

Sappaiboon, Thanawat, 2000, *The Fifty-Five Most Well-known Families: Version 1* (Nation Multimedia Group: Bangkok) in Thai.

——— , 2001, *The Fifty-Five Most Well-known Families: Version 2* (Nation Multimedia Group: Bangkok) in Thai.

Valadares, Silvia M., and Ricardo Leal, 1999, Ownership and control structure of Brazilian companies, *Revista ABANTE* 3, 29–56.

Yafeh, Yishay, 2003, An international perspective of corporate groups and their prospects, in M. Blomstrom, J. Corbett, F. Hayashi, and A. Kashyap, ed.: *Structural Impediments to Growth in Japan* (University of Chicago Press: Chcago).

Figure 1: Pyramids

CASE 1	CASE 2	
Family Z	**Family Z**	

↓ 25%	↓ 50%	- - - - - -
Company A O=25%, C=25% O/C=1.00	**Company A** O=50%, C=50% O/C=1.00	**Tier 1**
↓ 25%	↓ 50%	- - - - - -
Bank X O=6.25%, C=25% O/C=0.25	**Company B** O=25%, C=50% O/C=0.50	**Tier 2**
↓ 25%	↓ 50%	- - - - - -
Company B O=1.56%, C=25% O/C=0.063	**Bank Y** O=12.5%, C=50% O/C=0.25	**Tier 3**
↓ 25%	↓ 50%	- - - - - -
Company C O=0.39%, C=25% O/C=0.016	**Company C** O=6.25%, C=50% O/C=0.125	**Tier 4**
		- - - - - -
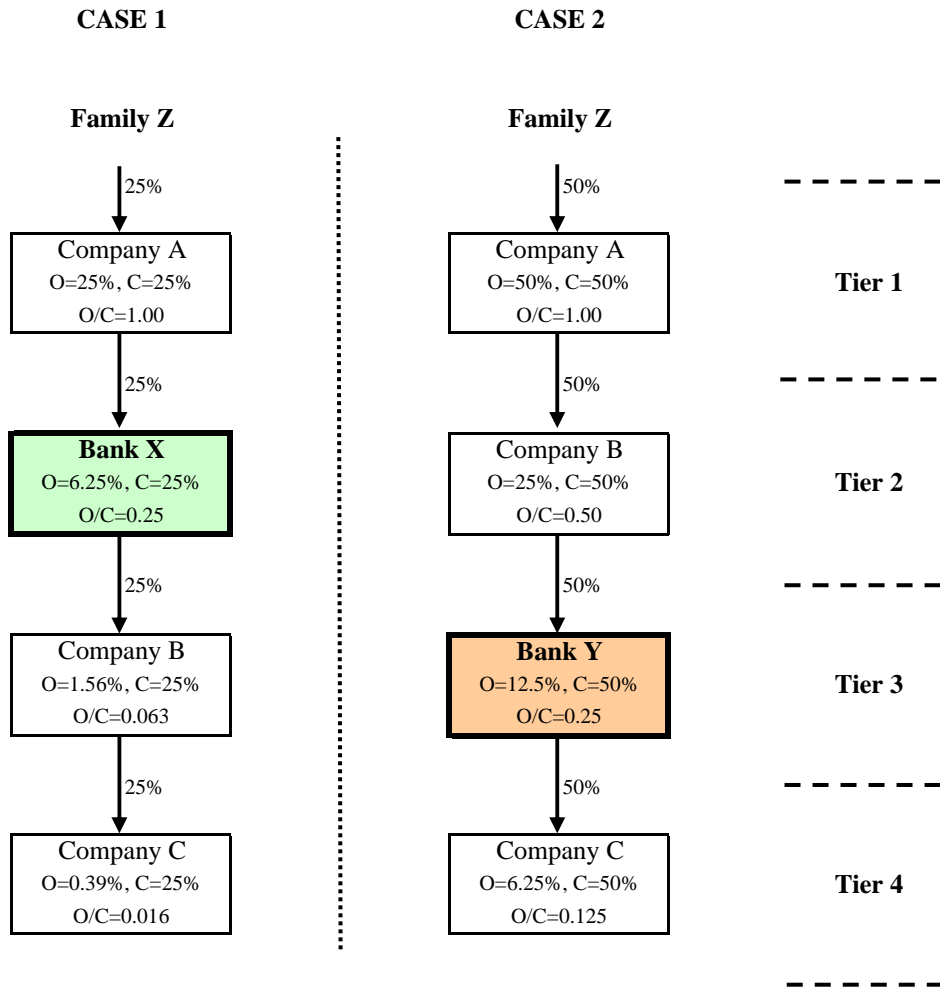
O = Ownership (cash flow rights)
C = Control rights (voting rights)
O/C = Ratio of ownership to control rights

Figure 2: The Ratanarak business group
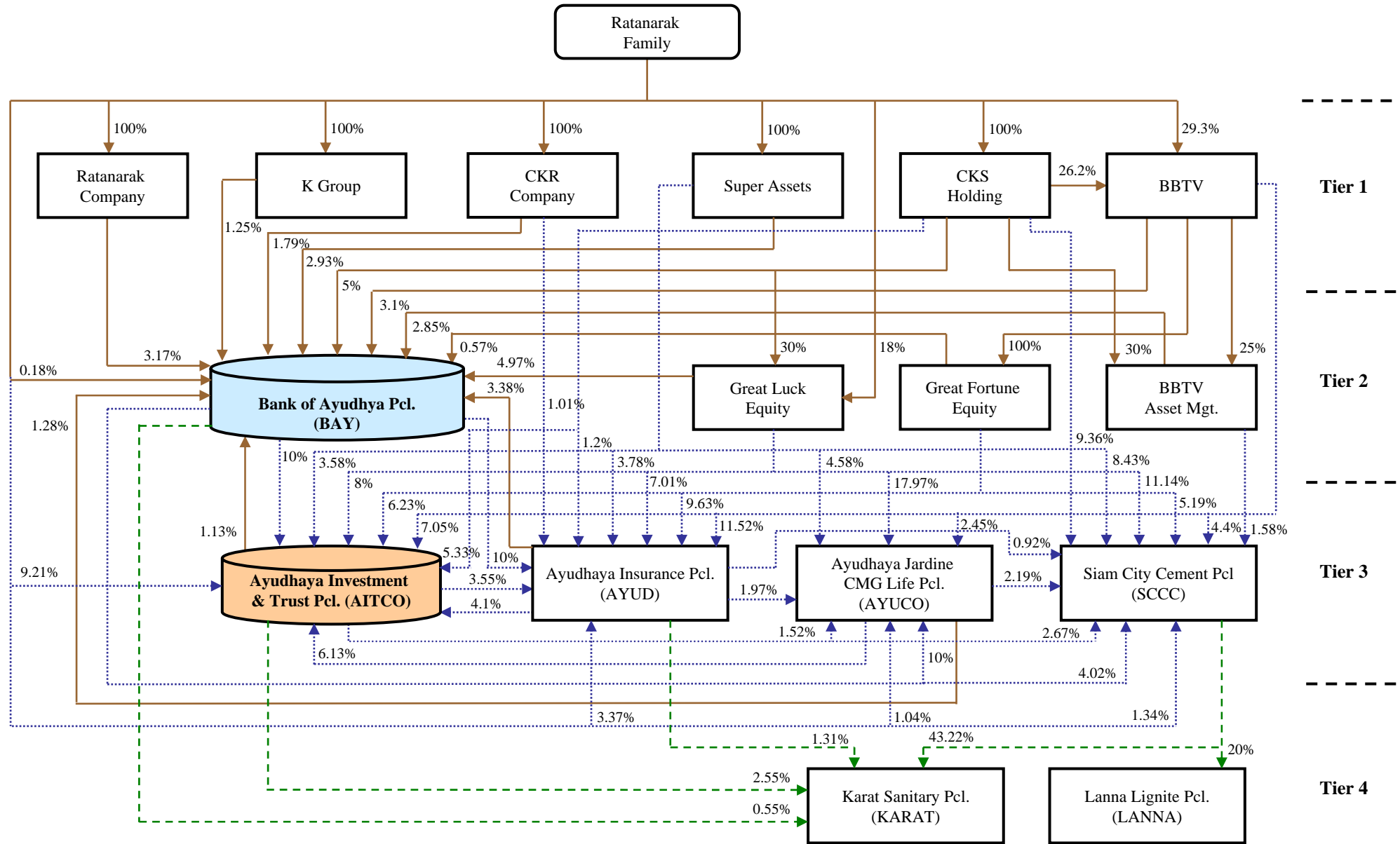
BAY: Ownership "O" = 21.40%, Control rights "C" = 31.60%, Ratio of ownership to control rights ("O/C") = 0.6772
AITCO: Ownership "O" = 35.45%, Control rights "C" = 59.63%, Ratio of ownership to control rights ("O/C") = 0.5945

Table 1: The sample

The sample includes all family-owned banks listed in the Stock Exchange of Thailand during 1992-1996.

	1992		1993		1994		1995		1996	
	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial banks	13	33.3%	13	31.0%	13	30.2%	12	27.9%	12	25.0%
Finance companies	26	66.7%	29	69.0%	30	69.8%	31	72.1%	36	75.0%
Total sample	39	100.0%	42	100.0%	43	100.0%	43	100.0%	48	100.0%

Table 2A: Pyramidal tiers

The table reports the distribution of the sample classified according to which tiers in the pyramid the banks are located.

	1992		1993		1994		1995		1996	
	No.	%	No.	%	No.	%	No.	%	No.	%
Top tier banks										
Tier 1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Tier 2	14	35.9%	14	33.3%	14	32.6%	14	32.6%	14	29.2%
Bottom tier banks										
Tier 3	23	59.0%	25	59.5%	26	60.5%	26	60.5%	31	64.6%
Tier 4	2	5.1%	3	7.1%	3	7.0%	3	7.0%	3	6.3%
Total sample	39	100.0%	42	100.0%	43	100.0%	43	100.0%	48	100.0%

Table 2B: Ownership structure

The table reports the ownership structure according to which tiers in the pyramid the banks are located.

		Cash-flow rights	Control rights	Cash-flow rights/ Control rights
		"O"	"C"	"O/C"
All banks	Mean	21.2%	27.7%	0.73
	Median	19.3%	28.2%	0.78
	Std. Dev.	13.5%	12.5%	0.25
Top tier banks	Mean	23.3%	28.9%	0.76
	Median	21.2%	30.7%	0.79
	Std. Dev.	14.8%	13.3%	0.20
Bottom tier banks	Mean	20.3%	27.1%	0.71
	Median	18.9%	25.7%	0.78
	Std. Dev.	12.8%	12.0%	0.27
Difference in mean [Top - Bottom]		3.0%	1.8%	0.04
t-statistics (t-test)		(1.55)	(1.01)	(1.20)
Difference in median [Top - Bottom]		2.3%	5.0%	0.01
z-statistics (Wilcoxon rank-sum test)		(1.21)	(1.00)	(1.00)

Table 3: Summary statistics

The table reports summary statistics. Bottom tier banks are the banks that are placed at the third and fourth tiers in the pyramid. Top tier banks are the banks that are placed at the second tier of the pyramid. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

		Bottom tier banks	Top tier banks	Difference [Bottom-Top]	t-statistics (t-test)	z-statistics (Wilcoxon rank-sum test)
Loan growth	Mean	0.310	0.209	0.101	3.19***	3.13***
	[Median]	[0.252]	[0.198]	[0.054]		
Return on assets (ROA)	Mean	0.019	0.023	-0.004	-2.92***	-3.29***
	[Median]	[0.019]	[0.024]	[-0.005]		
Return on equity (ROE)	Mean	0.181	0.270	-0.089	-3.46***	-4.58***
	[Median]	[0.167]	[0.261]	[-0.094]		
Log (total assets)	Mean	4.420	4.809	-0.389	-5.25***	-4.24***
	[Median]	[4.337]	[4.731]	[-0.394]		
Book equity/total assets	Mean	0.104	0.099	0.005	0.89	0.97
	[Median]	[0.095]	[0.089]	[0.006]		
Total loan/total assets	Mean	0.811	0.822	-0.011	-1.33	-1.58
	[Median]	[0.829]	[0.833]	[-0.004]		

Table 4: Pyramidal tiers and loan growth

The dependent variable is loan growth. Column 1-3 show pooled OLS regression results. Column 4-6 show random-effects regression results. Loan growth is defined as the one-year growth rate of the total outstanding loan. *Bottom tier* equals one if the bank is located at the third and fourth tiers, and zero otherwise. Cash flow rights is the percentage of ownership held by the controlling family. Cash flow rights/control rights is the ratio of cash flow rights to control rights held by the controlling family. Size is the logarithm of total assets. Capital/total assets is defined as total equity divided by total assets. ROA is defined as earnings before interest and taxes (EBIT) divided by total assets. *Finance company* equals one if the bank is a finance company, and zero otherwise. Numbers in parentheses of OLS regressions are *t*-statistics from heteroskedasticity-robust standard errors with clustering at the bank level. Numbers in parentheses of random-effects regressions are *z*-statistics from heteroskedasticity-robust standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	OLS			Random-effects		
	[1]	[2]	[3]	[4]	[5]	[6]
Bottom tier	0.094***	0.099***	0.095***	0.094***	0.099***	0.094***
	(2.75)	(2.94)	(2.74)	(2.60)	(2.69)	(2.60)
Cash flow rights/100		0.115			0.113	
		(1.05)			(0.92)	
Cash flow rights/control rights			0.016			0.013
			(0.23)			(0.19)
Size	-0.087**	-0.075*	-0.083*	-0.083*	-0.071	-0.080*
	(-2.06)	(-1.86)	(-1.93)	(-1.86)	(-1.51)	(-1.68)
Capital/total assets	-1.434***	-1.488***	-1.454**	-1.475***	-1.523***	-1.489***
	(-2.71)	(-2.80)	(-2.58)	(-2.95)	(-3.02)	(-2.94)
ROA	2.446*	2.389*	2.457*	2.501**	2.455**	2.508**
	(1.94)	(1.94)	(1.94)	(2.55)	(2.50)	(2.55)
Finance company	0.022	0.027	0.026	0.025	0.031	0.029
	(0.41)	(0.50)	(0.44)	(0.45)	(0.54)	(0.49)
Constant	0.605***	0.523**	0.575**	0.589**	0.505*	0.562**
	(2.67)	(2.40)	(2.37)	(2.39)	(1.92)	(2.00)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	204	204	204	204	204	204
Adjusted R-squared	0.231	0.235	0.231	0.231	0.235	0.231
p-value of Breusch and Pagan Lagrangian multiplier test				0.329	0.394	0.335

Table 5: Pyramidal tiers and return on assets (ROA)

The dependent variable is profitability (ROA). Column 1-3 show pooled OLS regression results. Column 4-6 show random-effects regression results. ROA is defined as earnings before interest and taxes (EBIT) divided by total assets. *Bottom tier* equals one if the bank is located at the third and fourth tiers, and zero otherwise. Cash flow rights is the percentage of ownership held by the controlling family. Cash flow rights/control rights is the ratio of cash flow rights to control rights held by the controlling family. Size is the logarithm of total assets. Capital/total assets is defined as total equity divided by total assets. Loan growth is defined as the one-year growth rate of the total outstanding loan. *Finance company* equals one if the bank is a finance company, and zero otherwise. Numbers in parentheses of OLS regressions are *t*-statistics from heteroskedasticity-robust standard errors with clustering at the bank level. Numbers in parentheses of random-effects regressions are *z*-statistics from heteroskedasticity-robust standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	OLS			Random-effects		
	[1]	[2]	[3]	[4]	[5]	[6]
Bottom tier	-0.010***	-0.010**	-0.010***	-0.010***	-0.010***	-0.010***
	(-2.72)	(-2.62)	(-2.73)	(-3.72)	(-3.52)	(-3.72)
Cash flow rights		0.005			0.006	
		(1.09)			(0.63)	
Cash flow rights/control rights			-0.003			-0.003
			(-0.93)			(-0.55)
Size	0.008***	0.009***	0.007**	0.008**	0.009**	0.008**
	(3.01)	(3.02)	(2.51)	(2.45)	(2.52)	(2.08)
Capital/total assets	0.176***	0.173***	0.180***	0.159***	0.156***	0.161***
	(5.07)	(4.88)	(5.14)	(4.49)	(4.38)	(4.49)
Loan growth	0.027	0.027	0.027	0.029**	0.029**	0.029**
	(1.41)	(1.41)	(1.42)	(2.42)	(2.42)	(2.42)
Loan growth-squared	-0.014	-0.014	-0.014	-0.016	-0.016	-0.016
	(-0.88)	(-0.90)	(-0.90)	(-1.48)	(-1.51)	(-1.48)
Finance company	0.013***	0.014***	0.012**	0.014***	0.015***	0.014***
	(2.84)	(2.86)	(2.62)	(3.48)	(3.51)	(3.05)
Constant	-0.054***	-0.057***	-0.047**	-0.053***	-0.057***	-0.047**
	(-3.31)	(-3.30)	(-2.61)	(-2.83)	(-2.87)	(-2.17)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	204	204	204	204	204	204
Adjusted R-squared	0.448	0.450	0.450	0.447	0.449	0.449
p-value of Breusch and Pagan Lagrangian multiplier test				0.000***	0.000***	0.000***

Table 6: Pyramidal tiers and return on equity (ROE)

The dependent variable is ROE. Column 1-3 show pooled OLS regression results. Column 4-6 show random-effects regression results. ROE is defined as earnings before interest and taxes (EBIT) divided by total equity. *Bottom tier* equals one if the bank is located at the third and fourth tiers, and zero otherwise. Cash flow rights is the percentage of ownership held by the controlling family. Cash flow rights/control rights is the ratio of cash flow rights to control rights held by the controlling family. Size is the logarithm of total assets. Capital/total assets is defined as total equity divided by total assets. Loan growth is defined as the one-year growth rate of the total outstanding loan. *Finance company* equals one if the bank is a finance company, and zero otherwise. Numbers in parentheses of OLS regressions are *t*-statistics from heteroskedasticity-robust standard errors with clustering at the bank level. Numbers in parentheses of random-effects regressions are *z*-statistics from heteroskedasticity-robust standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	OLS			Random-effects		
	[1]	[2]	[3]	[4]	[5]	[6]
Bottom tier	-0.104**	-0.103**	-0.105**	-0.108***	-0.106***	-0.109***
	(-2.65)	(-2.61)	(-2.64)	(-3.64)	(-3.48)	-3.62
Cash flow rights		0.025			0.032	
		(0.58)			(0.32)	
Cash flow rights/control rights			-0.020			-0.018
			(-0.70)			(-0.32)
Size	0.091***	0.094***	0.086***	0.092**	0.095**	0.087**
	(3.85)	(3.83)	(3.49)	(2.49)	(2.46)	(2.20)
Capital/total assets	-0.148	-0.163	-0.123	-0.317	-0.338	-0.308
	(-0.67)	(-0.74)	(-0.55)	(-0.83)	(-0.87)	(-0.79)
Loan growth	0.341	0.341	0.342	0.349***	0.350***	0.349***
	(1.49)	(1.49)	(1.50)	(2.70)	(2.69)	(2.69)
Loan growth-squared	-0.198	-0.197	-0.198	-0.210*	-0.212*	-0.211*
	(-1.04)	(-1.05)	(-1.05)	(-1.82)	(-1.83)	(-1.82)
Finance company	0.139**	0.141**	0.133**	0.150***	0.152***	0.145***
	(2.61)	(2.61)	(2.55)	(3.38)	(3.37)	(3.04)
Constant	-0.399***	-0.416***	-0.359**	-0.390*	-0.412*	-0.353
	(-2.74)	(-2.71)	(-2.32)	(-1.93)	(-1.91)	(-1.51)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	204	204	204	204	204	204
Adjusted R-squared	0.340	0.340	0.341	0.339	0.340	0.340
p-value of Breusch and Pagan Lagrangian multiplier test				0.001***	0.001***	0.001***

Table 7: Two-stage least squares (2SLS) regression

The table reports two stage least squares regression results. The dependent variable is loan growth in Column 1-3, ROA in Column 4-6, and ROE in Column 7-9, respectively. Loan growth is defined as the one-year growth rate of the total outstanding loan. ROA is defined as earnings before interest and taxes (EBIT) divided by total assets. ROE is defined as earnings before interest and taxes (EBIT) divided by total equity. *Bottom tier* equals one if the bank is located at the third and fourth tiers, and zero otherwise. Cash flow rights is the percentage of ownership held by the controlling family. Cash flow rights/control rights is the ratio of cash flow rights to control rights held by the controlling family. Other control variables are defined in Table 4-6. Numbers in parentheses are *t*-statistics from heteroskedasticity-robust standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Loan growth			Profitability					
				ROA			ROE		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Bottom tier	0.085**	0.089**	0.087**	-0.008***	-0.008***	-0.008***	-0.085***	-0.084***	-0.085***
	(1.97)	(2.09)	(1.98)	(-3.06)	(-2.96)	(-3.08)	(-3.10)	(-3.03)	(-3.09)
Cash flow rights		0.176			0.003			0.013	
		(1.57)			(0.32)			(0.13)	
Cash flow rights/control rights			0.040			-0.003			-0.011
			(0.60)			(-0.60)			(-0.19)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	204	204	204	204	204	204	204	204	204
Adjusted R-squared	0.210	0.225	0.205	0.451	0.448	0.449	0.320	0.317	0.317
p-value of Durbin-Wu-Hausman test	0.514	0.587	0.501	0.842	0.854	0.847	0.888	0.893	0.889

Table 8: Family-owned banks after the financial crisis

The table shows the number of family-owned banks before and after the 1997 financial crisis. Pre-crisis is as of 1996. Post-crisis is as of 2003. A bank is defined as failure if it was either closed down or nationalized.

	Pre-crisis (as of 1996)	Post-crisis (as of 2003)			
		Survival		Failure	
		No.	%	No.	%
Top tier banks					
Tier 1	0	0	0.0%	0	0.0%
Tier 2	14	10	71.4%	4	28.6%
Bottom tier banks					
Tier 3	31	3	9.7%	28	90.3%
Tier 4	3	0	0.0%	3	100.0%
Total sample	48	13	27.1%	35	72.9%