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Highlights

► We investigate the determinants of connections between banks and Thai firms. ► We examine the impact of bank connections on firm investment. ► Before the East Asian Financial Crisis of 1997–1998, bank connections were common. ► Pre-crisis, connections led to lower sensitivity of firm investment to cash flow. ► After the crisis, connections no longer affect investment–cash flow sensitivity.

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Bank connections, corporate investment and crisis

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ABSTRACT

Against the backdrop of a severe financial crisis and extensive restructuring of the financial sector, we investigate the evolution and determinants of connections between firms and banks, and the impact of bank connections on corporate investment. Our study examines Thai non-financial companies during 1995–2000, a period straddling the East Asian Financial Crisis of 1997–1998. Before the crisis, bank-connections are common and associated with significantly lower sensitivity of corporate investment to internal cash flow. After the crisis, and following substantial changes in bank ownership and governance due to financial-sector reforms and restructuring, far fewer firms are bank-connected, connections no longer affect investment–cash flow sensitivity, and investment decisions are more efficient in general.

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1. Introduction

“In Thailand, as elsewhere in Asia, the problem was private-sector debt, and it came with a special twist: an intricate web of connections among family-owned corporations, banks and the government that the World Bank says created ‘perverse’ incentives for lending and investment”.

Dow Jones International News 29 June 1998

This paper examines the impact of the East Asian Financial Crisis in 1997–1998 on corporate decision making, specifically on investment. Like the Credit Crunch of 2007–2008, the East Asian Financial Crisis led to the extensive restructuring of the banking and financial sector. Both crises resulted in major economic upheaval on a global scale; the Thai financial crisis engulfed almost the whole of South-East Asia and adversely affected capital markets worldwide. This paper aims to contribute to our understanding of the impact of a financial crisis, and of the restructuring and reform of the financial sector in the wake of the crisis, on the real investment decisions of companies. We focus on a specific transmission mechanism: ownership and board connections between financial institutions and non-financial companies, a key characteristic of Thailand before the crisis. Our sample period 1995–2000 straddles the crisis of 1997–1998. As the economic crisis

unfolded in Thailand, the Thai Baht was devalued by nearly 30% and the GDP fell by almost 32% (in US \$ terms) within a year after the crisis started. Lending by banks and financial companies completely collapsed and so did the equity and bond markets (see Tables A1 and A2 and Fig. 1 in Appendix A).

An important feature of the East Asian Financial Crisis¹ were the large amounts of bad (non-performing) loans, arguably the result of inefficient, “related” bank lending to the corporate sector due to “connections” between companies and financial institutions (Charumilind et al., 2006). We examine the extent of connections in Thailand between companies and financial institutions around the crisis. We define connections in several ways through both ownership and board membership of banks and companies to capture a broad range of origins and likely (beneficial and adverse) implications of connections. The results reported in this paper show substantial effects of financial-sector restructuring on corporate investment. Our interpretation of the findings is that restructuring in the face of the 1997–1998 crisis has resulted in more efficient investment decisions, a result which is of immense importance for regulators grappling with the current financial crisis.

The first part of this study focuses on connections, and examines the following research questions: What are the determinants of connections between banks and firms; and did the ownership restructuring in the banking and financial industry in the wake of the crisis affect the strength and prevalence of connections

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¹ Below we refer to the East Asian Financial Crisis simply as the crisis.

between firms and banks in Thailand? The second part focuses on investment decisions: Is corporate investment affected by internal cash flow, and if so, do bank connections have any effect on the investment cash flow sensitivity of a firm?

We use a sample of non-financial firms trading on the Stock Exchange of Thailand between 1995 and 2000. The characteristics of these firms, in terms of concentrated ownership and the role of family business groups, and their institutional context, specifically a comparatively weak legal system and poor minority shareholder protection, are similar to those of firms in many other emerging markets dominated by family firms (in East Asia and Latin America). The financial crisis divides our sample period into three distinct regimes: pre-crisis (1995–1996), crisis (1997–1998) and post-crisis (1999–2000).

Our results show that before the crisis almost 80% of the Thai firms in our sample were connected with banks via substantial joint ownership or joint board membership, or both. The percentage of connected firms dropped to just over 50% of our sample companies in the post-crisis period illustrating the dramatic impact of the restructuring of the Thai financial sector on the prevalence of connections between firms and banks. Interestingly, the presence of one specific type of connection, due to large company shareholders holding seats on the boards of Thai banks, almost completely vanished after the crisis.

We examine the determinants of connections and find that the likelihood of having ownership connections with banks is greater for companies that are part of a business group. However, after the crisis, this business group effect on connections is substantially reduced. Before the crisis, firms experiencing financial distress were more likely to have bank connections, but after the crisis distressed firms become less likely to be connected with banks because banks now take an arms-length approach when dealing with distressed firms.

Internal cash flow is significantly related to investment both before and after the crisis; we interpret this as evidence of companies' reliance on internal fund for investment. We find that before the crisis, connections with banks reduce the sensitivity of company investment to cash flow. After the crisis, however, bank connections no longer have a significant impact on investment–cash flow sensitivity.

We also investigate whether after the crisis there is a differential impact of cash flow on investment for firms that had connections pre-crisis and either kept or lost these connections after the crisis. The results show that there are no significant differences in the cash flow sensitivities across all three subgroups, that is between companies that never had connections and those with pre-crisis connections, and within the latter group between those that either stayed connected or lost their connections.

We suggest that the post-crisis disappearance of the investment–cash flow sensitivity may be due to financial sector restructuring and reforms that improved bank governance and lending practices, and along with the development of alternative non-bank funding sources, facilitated access to external funds for all firms irrespective of bank connections.

This study contributes to various strands of the literature. Our examination of the effect of the East Asian Crisis on company investment complements earlier studies that explore the impact of the crisis on company ownership (Khanthavit et al., 2003) and the cost of equity to family firms (Boubakri et al., 2010). Our paper examines the evolution and determinants of connections between companies and financial institutions in the context of an emerging economy with developing capital markets. Our perspective on connections as a transmission mechanism for reform and restructuring from the financial sector to the non-financial companies is novel. It arises from the specific institutional framework under study that differs in interesting ways from the settings of previous studies

of financial intermediaries and banks, and their monitoring role in the context of relationship banking in developed countries (e.g., Boot, 2000; Elyasiani and Goldberg, 2004). We use multiple definitions of bank connections to capture a wide range of aspects of the relationships between companies and banks in emerging economies, complementing research into bank connections in developed countries (e.g., Kaplan and Minton, 1994; Kroszner and Strahan, 2001). Specifically, we aim to capture the links between companies and financial institutions through joint ownership and board membership, based on carefully traced ultimate ownership and taking into account not only direct links through individuals but also through extended families. There is still too little known about the role of banks in East Asia (Claessens and Fan, 2002). Our study adds to our understanding of the impact of bank connections on firms' investment behaviour. It complements previous research on the impact of connections on corporate financing (Dinc, 2005; Khwaja and Mian, 2005) and company performance (Faccio, 2006). Our study provides new evidence about firms' investment–cash flow sensitivity in an emerging market complementing previous research in developed countries (e.g., Fazzari et al., 1988; Hoshi et al., 1991; Houston and James, 2001). Importantly, it examines the effect of a financial crisis resulting in extensive restructuring and reform of the financial sector, and the impact of this crisis and restructuring on corporate investment decisions through the transmission mechanism of bank connections. Particularly against the background of the current global financial crisis, a better understanding of these issues is urgently needed.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature and the Thai institutional background. Section 3 describes the data. Section 4 presents our empirical analysis of the evolution and determinants of bank connections. Section 5 examines the impact of connections on corporate investment behaviour and on the cash flow sensitivity of investment. Section 6 concludes the paper.

2. Related literature and the Thai economy

2.1. Connections

Connections are pervasive around the world. In the context of family business groups and a weak law enforcement system, connections help reduce asymmetric information problems and increase contract enforcement. Individuals and firms tend to develop connections based on reputation and trust in order to complement a lack of formal institutions and effective contracting (McMillan and Woodruff, 1999). Connections can reduce information search costs and result in more and better information. However, connections may also lead to corporate governance problems in some circumstances in that the connected parties may collude and hinder transparency (Rajan and Zingales, 1998) which may lead to unfair treatment of non-connected parties.

The presence of connections seems to be driven by characteristics of family institutions. Many firms and banks around the world are owned by families (La Porta et al., 1999; Caprio et al., 2007). In East Asia, family-owned firms are commonly found (Claessens et al., 2000). However, the East Asian Financial Crisis in 1997–1998 demonstrated that connections among family-owned institutions led to adverse effects in terms of misallocation of funds and related lending between firms and banks (Rajan and Zingales, 1998; Backman, 1999).

Prior studies often highlight the presence of connections between firms and banks in countries where the ownership structure is dispersed and banks play a key role in reducing agency problems between shareholders and managers (e.g., Aoki, 2000). Unlike in

such developed countries, in emerging markets where bank connections are driven by family ownership and social relations, connections may cause agency problems between major (family) shareholders and minority shareholders.

Previous studies find that connections can be crucial to firms and necessary for business operations (Agrawal and Knoeber, 2001). Connections may lead to higher firm performance and benefits (Faccio, 2006; Bae et al., 2002) and help firms to reduce the costs of external funds (Charumilind et al., 2006). In addition, connections appear to play a key role in allocating bank capital (La Porta et al., 2003; Dinc, 2005; Khwaja and Mian, 2005). Aoki (2000) uses the concept of information asymmetry and document that banks work closely with firms to gain information and to monitor firms' investments.

However, Rajan and Zingales (1998) highlight the negative attributes of connections in terms of expropriation, excessive borrowing and crony capitalism. In addition, La Porta et al. (2003) find that controlling shareholders of banks seem to use their control over lending policies to allocate banks' capital to related parties. Loans offered to persons and companies closest to the controllers of the banks are the worst performing loans, consistent with the argument of looting activities.

To summarise, connections have been interpreted as carrying both positive and negative attributes. In addition to the roles attributed by the previous literature, our paper show how connections can act as a transmission mechanism between the financial and corporate sectors of an economy.

2.2. Investment and cash flows

Prior research (e.g., Kadapakkam et al., 1998; Wei and Zhang, 2008) shows that corporate investment is sensitive to internal cash flow, and the availability of profitable investment opportunities is not the only factor affecting investment decisions. Previous studies use variables, such as retention ratio, business group membership, bank dependence, firm size, ownership structure and CEO incentives to proxy for the degree of financial constraints affecting companies due to information asymmetries or agency costs, or both.

Fazzari et al. (1988) use dividend policy to classify levels of firms' financial constraints and define firms with high dividend retention as highly constrained firms. They find that investment of firms with high dividend retention is more sensitive to liquidity measured by cash flow. Kaplan and Zingales (1997) (hereafter, KZ) find the least investment–cash flow sensitivity in the most financially constrained firms and argue that investment–cash flow sensitivity is not a measure of financial constraint. However, Allayannis and Mozumdar (2004) provide contrary evidence and argue that the conflicting findings in KZ are caused by small sample size and sample firms with negative cash flows. They show that the results of KZ are reversed when firms with negative cash flow are excluded.

Using institutional characteristics of business groups in the Japanese main bank system, Hoshi et al. (1991) and McGuire (2004) find that group firms are less financially constrained than independent firms and their investments are less sensitive to cash flow. Their findings show that connections with main banks bring about benefits of bank monitoring and help reduce asymmetric information problems between firms and banks. In addition, Gibson (1995) documents that investment of firms connected with low credit rating banks is less than those of firms connected with higher credit rating banks. It is possible that lower quality banks limit access to bank loans for their client firms.

Using Taiwanese bank transactions, Shen and Wang (2005) investigate the impact of banking relationships on financial constraints and define the strength of bank ties by the number of banks from which firms borrow, the loan amount and loan

duration. They find that investment of firms with strong bank relationships is less sensitive to their liquidity. In addition, Guner et al. (2008) use US firms to examine whether the financial expertise of directors affects firms' investment policy. They document that investment–cash flow sensitivity reduces when commercial bank executives join firms' boards of directors. Focusing on the capital structure and dependence on bank loans, however, the impact of bank connections may not be unambiguously favourable for the connected companies. Houston and James (2001) report that US firms with a high reliance on bank financing and with no access to public debt have greater investment–cash flow sensitivity.

Our paper contributes to this strand of the literature by examining an emerging market where many companies are connected with banks through family ties. The next section describes this institutional setting.

2.3. Thai institutional framework

The ownership structure of Thai firms is concentrated and families are the largest controlling shareholders of most Thai firms (e.g., Wiwattanakantang, 2001). The dominance of family-owned business has remained embedded in Thailand after the East Asian Financial Crisis of 1997–1998 as it was before (Anuchitworawong et al., 2003; Khanthavit et al., 2003).

Prior to the crisis, domestic commercial banks and finance companies were the dominant players in the Thai financial market.² Despite the growing importance since the 1980s of external equity financing raised on the Stock Exchange of Thailand (SET), loans by banks and finance companies remained the major sources of corporate financing prior to the crisis (see Fig. 1 and Table A2 in Appendix A). Given the importance of debt as a source of corporate finance, one would expect company connections to banks and finance companies to have a significant impact on corporate decisions, including investment decisions, by giving firms easier access to external funds (Charumilind et al., 2006).

Finance companies are non-bank financial institutions that are in the business of lending.³ Banks and finance companies primarily differ in terms of their methods of mobilising funds. Banks raise most of their funds through deposits from the public. By contrast, finance companies are not allowed to take deposits and instead receive their funding through the issue of debt securities (promissory notes) in the domestic and overseas markets (Luangpituksa, 1999).

Most Thai banks were founded between 1930 and 1950, in many cases (14 of 20 banks) by “Sino-Thai” families (Thai families of Chinese origin) to channel funds into other businesses owned by the families; the remaining 6 were set up by the Crown Property Bureau on behalf of the King of Thailand (Charumilind et al., 2006).⁴ Prior to the crisis of 1997–1998, the ownership structure of Thai banks and finance companies was concentrated. Anuchitworawong et al. (2003) document that about 70% of commercial banks and finance companies in Thailand were family-owned before the 1997–1998 crisis. The management of these financial institutions was dominated by family owners with members of controlling

² Lindgren et al. (1999) report total assets of the Thai financial system at the end of 1996 as 8.9 trillion baht (190% of GDP). They estimate that commercial banks accounted for 64% (121% of GDP) and finance companies for 20% (39% of GDP) of these assets. Specialised state banks accounted for a further 10% (8% of GDP).

³ Some studies include securities companies in their definition of “finance companies” (e.g., Luangpituksa, 1999), or consider the entire sector of “finance and securities companies” based on the industry classification of the Stock Exchange of Thailand; this sector also includes factoring and leasing companies (e.g., Anuchitworawong et al., 2003). Our study examines only finance companies listed on the Stock Exchange of Thailand. Our definition of finance company excludes non-bank investment institutions that do not lend (i.e., securities companies), factoring and leasing companies.

⁴ The Crown Property Bureau owns and manages assets of the King, the Thai royal household, and palace properties. It is independent of the Thai Government.

Table 1

Number of Thai listed commercial banks and finance companies, classified by the types of largest shareholder. The table shows the numbers of Thai commercial banks and finance companies that are listed on the Stock Exchange of Thailand (SET) classified by the type of their largest shareholder. The category of finance companies excludes securities companies that are not in the business of lending. The ownership structure of commercial banks and finance companies in 1997 and 1998 is reported using the last available information in each year as published by the SET. During 1997 and 1998, the ownership data may not have been promptly updated by SET to reflect the rapid and widespread changes in ownership. Source: Data collected from the ownership database of Thai banks and finance companies, as constructed by Anuchitworawong et al. (2003).

	1995	1996	1997	1998	1999	2000
<i>Commercial banks</i>						
Family/A group of related families	10	12	10	5	2	2
Crown Property Bureau	2	1	2	1	1	1
State	3	2	3	6	5	5
Foreign investors	0	0	0	1	5	5
Total commercial banks	15	15	15	13	13	13
<i>Finance companies</i>						
Family/A group of related families	24	28	6	3	2	2
Crown Property Bureau	4	4	4	3	4	4
State	4	6	4	1	2	2
Foreign investors	3	3	3	5	3	3
Total finance companies	35	41	17	12	11	11

shareholders holding key executive positions. Many finance companies were subsidiaries or affiliates of commercial banks that were in turn owned by families (Anuchitworawong et al., 2003). In our sample for 1995–1996, the largest shareholders of family-owned commercial banks also owned nearly two-thirds of the family-owned finance companies. Specifically, in 1995, 15 out of the 24 family-owned finance companies (in our sample of 35 finance companies) belonged to families that were also the largest shareholders of commercial banks.

In examining the effect of connections between companies and lending financial institutions, our study groups finance companies and banks together. Both banks and finance companies play an important role as lenders to companies before the crisis. Given the extensive links between the (family) ownership of banks and finance companies before the crisis, this study groups banks and finance companies together as it intends to capture the full effect of family ties on corporate investment.⁵ From Section 3 onwards, we use the term “bank” to include both banks and finance companies (unless otherwise specified).

The financial crisis of 1997–1998 prompted fundamental changes in the ownership structure of financial institutions and “rapidly and radically changed the structure of the Thai banking system” (Dixon, 2004, p. 53). Table 1 shows the evolution of the numbers of listed banks and finance companies during our sample period. For a detailed account of events during the crisis, see Lindgren et al. (1999). During the crisis, six failing banks were taken over by the state (four were absorbed into a state controlled bank or into a two newly founded state banks, while two continued to operate under state control). In another four banks, majority stakes were sold to foreign investors in 1999, and foreign ownership increased from 25% to between 40% and 49% in a further four banks (Dixon, 2004; Hewison, 2002). Family control of banking was considerably reduced by the restructuring. Before the crisis, 12 out of 15 banks were controlled by a Thai family; by the end of 1998 this had fallen to five (see Table 1). By 2002, a family was the largest shareholder in only one bank (Polsiri and Wiwattanakantang, 2006), although management control remained with a family in another two banks despite the dilution of the family ownership (Dixon, 2004). The number of finance companies also collapsed during the crisis. Table 1 shows the numbers of listed finance companies during our sample period. The majority of finance compa-

nies had been closed or merged following state intervention by 1999.

Prior to the 1997–1998 crisis, the banking system in Thailand was dominated by domestic banks owned by Thai families, the Crown and the state (see Table 1). Foreign banks were allowed to operate but there were close controls on their numbers and regulation restricting their branches, and effectively limiting their activities to wholesale operations and foreign trade finance (Dixon, 2004). In 1996, there were 14 branches of foreign banks in Thailand. Before the crisis of 1997–1998, foreign shareholdings in Thai banks were limited to a maximum of 25%. Four Thai banks had foreign-held stakes of 25% (Dixon, 2004; Hewison, 2002). The proportion of foreign directors on boards was also limited to 25%.

The crisis and the resulting pressure from the World Bank, IMF and foreign investors, provided the impetus for the Thai authorities to strengthen the regulation of financial institutions. In 1997 and 1998, the Thai government made several emergency amendments to the commercial banking and finance company laws, including the relaxation in June 1997 of restrictions on foreign ownership, and announced a comprehensive restructuring plan for the banking and financial sector (Polsiri and Wiwattanakantang, 2006). The new rules on the foreign ownership of Thai-incorporated financial institutions allowed up to 100% foreign ownership but only for a period of up to 10 years. Regulation was also relaxed to allow a proportion of foreign directors on boards of financial institutions of up to 50% (Chandler and Thong-ek, 2008).

The government promoted debt restructuring in both the financial and corporate sectors to help resolve the problem of non-performing loans held by the financial institutions. This involved new regulation as well as legal and tax reforms in an effort to improve the debt restructuring framework. The bankruptcy law was amended in 1998 and reformed in 1999, and the bankruptcy court was established in June 1999 (Polsiri and Wiwattanakantang, 2006).

Policies and guidelines were issued to improve corporate governance in financial institutions. In November 1997, the Bank of Thailand (BOT) tightened the requirements on the qualifications of bank directors (contained in the Commercial Banking Act of 1979), by additionally requiring that top executives of banks must have at least 5 years experience as senior management at established financial institutions, an appropriate business and work record and no record of imprisonment (Polsiri and Wiwattanakantang, 2006). In September 1999, the BOT issued rules limiting related lending and multiple directorships of senior bank executives (Bank of Thailand, 1999). The BOT prohibited banks from extending new loans to companies linked to the bank through joint directorship. It also ordered banks to reduce outstanding loans to connected

⁵ Only 15% of the companies in our sample (in 1995) have connections with finance companies only and no connections with banks; the remainder have connections with banks. This small proportion makes it difficult to reliably estimate the separate effect of finance companies over and above that of banks. See also Section 4.1.

companies or else have their senior executives surrender their company directorships if they held more than 1% of the company equity. Exempt from these rules were connections resulting from debt restructuring. The BOT also called on bank directors and senior executives to hold directorships in no more than three companies at any given time.

In sum, the East Asian Financial Crisis resulted in a substantial transformation of the Thai economic and institutional framework. Our analysis seeks to establish whether this transformation had a measurable effect on the decisions of banks (specifically, their connections with companies) and on the investment behaviour of non-financial companies. The next section describes our data.

3. Data

The sample comprises non-financial firms listed on the Stock Exchange of Thailand during 1995–2000. To test the impact of the financial crisis, we select a sample period (1995–2000) that straddles the crisis years 1997–1998, allowing 2 years before the crisis (1995–1996) and 2 years thereafter (1999–2000). In order to quantify connections based on ownership and board structure, we obtain lists of family business groups and lists of ownership structure of Thai firms, commercial banks and finance companies. We use ownership data of Thai firms constructed by Khanthavit et al. (2003) and ownership data of Thai commercial banks and finance companies constructed by Anuchitworawong et al. (2003). Both studies provide comprehensive ownership databases that trace the ultimate shareholders of Thai firms, commercial banks and finance companies during 1995–2000. In addition, lists of board of directors of Thai firms, commercial banks and finance companies are collected from the I-SIM CD-ROMs, the annual company reports and the SETSMART database of the Stock Exchange of Thailand. The financial data during 1994–2000 is collected from the Worldscope database, which compiles the company information of Thai firms from the Stock Exchange of Thailand. All financial data are winsorized at one and 99%.

The total firm-year observations that are available with the ownership data are 1992. Observations are excluded from the sample if the firm data are in the year of an initial public offering (IPO) (48 observations) or rehabilitation (118 observations) and if financial data of observations is missing (129 observations).⁶ The final firm-year observations include 1697 firm-year observations, which are 575 firm-year observations in the pre-crisis period (1995 and 1996), 591 firm-year observations during crisis (1997 and 1998) and 531 firm-year observations in the post-crisis period (1999 and 2000).

4. Evolution and determinants of bank connections pre- and post-crisis

4.1. Definition of connections

We use the term “bank connections” to refer to connections with commercial banks and finance companies (see Section 2.3 above). In this study, we focus on observable ownership and board connections to define and quantify variables of connections between firms and banks. We measure connections in four different

ways. The main definition uses ultimate bank and company ownership structure to identify connections between firms and banks in the context of family firms. Other definitions of bank connections are based on observable board connections between firms and banks in Thailand. We use a 10% ownership threshold to define connections. There are legal and institutional reasons to justify the choice of a 10% threshold to define a large shareholder in Thailand. Charumilind et al. (2006) use a 10% family stake as the threshold to define Thai firms as family connected, and explain how a 10% stake in Thai firms can provide the owner with control over the (liquidation of) the firm (see Charumilind et al., 2006, p. 195). Further, the largest shareholders of Thai financial institutions typically own 10% or more of the equity (Anuchitworawong et al., 2003; Table 3, p. 22).⁷ To the extent that bank connections with companies are established by the largest shareholders (in many cases, family owners), we would expect that lowering our ownership cut-off level below 10% will have little effect on the numbers of bank-company connections we observe. This is confirmed by our robustness checks reported at the end of this section below. Faccio et al. (2010) note that defining controlling shareholders at the 10% cut-off level is a “standard of control” (p. 92) that has been widely used in earlier studies (La Porta et al., 1999; Claessens et al., 2000; Charumilind et al., 2006; Boubakri et al., 2010).

Bank connections are developed in various ways. The most obvious and strongest type of connection is driven by ownership incentives and is formed through the structure of the family business group. In emerging markets, several family business groups own and control a bank or a finance company presumably as the groups' source of capital. Hence, firms in those family business groups are connected with the bank because they are controlled and managed by the same large family shareholders. The family-owned bank can obtain information about the (investments of) firms in the same group, which helps to reduce asymmetric information and agency problems. The controlling family aims to maximise family wealth in all businesses in the group motivated by high powered ownership incentives and an interest to sustain the family reputation and wealth.

This type of connection may precipitate looting problems if the large family shareholder, who is a firm/bank manager, has an interest in channelling bank capital and expropriate minority shareholders of the bank as predicted by agency theory. The family shareholder may expropriate minority shareholders of the bank by approving loans with excessively lax lending practices to his fully-owned firms, if the controlling shareholder's ownership stake in borrower companies exceeds the controlling shareholder's bank stake. In some cases, the large family shareholder may over-spend bank loans on empire building at the expense of minority shareholders at both firms and banks (La Porta et al., 2003).

Definition 1. A company is defined as bank-connected if an individual owning at least 10% or more of the company equity also holds 10% or more of the equity of a bank.

This definition focuses on ownership relations by tracing ultimate shareholders and takes both family ownership and business group structure into account.⁸ Family connections play a key role in accumulating wealth and expanding a business empire in emerging economies (Bunkanwanicha et al., forthcoming). Not only individual shareholders, but also their family members and extended (in-law) families, are often involved in developing and maintaining

⁶ In terms of numbers of companies (as opposed to firm-year observations), there are 17, 28 and 3 IPO firms in 1995, 1996 and 1997, respectively. There are no delisted firms before the crisis and 38 during 1998–2000. The rehabilitation board of the Stock Exchange of Thailand (SET) comprises stocks that are identified by the SET as undergoing restructuring because the issuing companies are experiencing financial or operating difficulties. Stocks are withdrawn from the rehabilitation board if the restructuring is successful. Some of the stocks in our rehabilitation subsample were subsequently delisted during our sample period.

⁷ We are grateful to Anuchitworawong et al. for providing us their data on ultimate ownership. Our analysis of connections is based on these data and the concept of ultimate (direct and indirect) ownership by families and in-laws.

⁸ Definition 1 captures not only ownership links through business groups, but also the links between companies and financial institutions through individual shareholders.

connections. We assume that there are no conflicts of interest between an individual shareholder and his or her extended family given the shared objectives within family business groups to maximise family wealth and sustain family reputation. In Definition 1 and the following definitions, an “individual shareholder’s” company and bank ownership is therefore the total ownership of the shareholder and his/her extended family.

Definition 2. A company is bank-connected if an individual shareholder owning at least 10% of company equity has a seat on the board of directors of a bank.

Not only family linkages, but also social relations, play a key role in forming connections between firms and banks. Such connections may be found in a network of wealthy families because trust and reputation of people in the same network substitute for weak contract enforcement in countries with a weak legal system. It is possible that the existence of board connections between firms of wealthy families is caused by long-term relationships and an exchange of benefits.

A bank may invite large shareholders of firms onto its board to strengthen its relationship with good customers and secure its market share. Conversely, major company shareholders who hold seats on bank boards may be able to secure favourable financing deals for their companies. Representation of major company shareholders on bank boards is likely to act as an important information channel between companies and banks.

The existence of a major company shareholder on the bank board may also be an indicator of cronyism. The large company shareholder may have secured the bank seat with a view to gaining preferential bank lending through bribery or collusion with bank directors.

Definition 3. A firm is connected if an individual who holds at least 10% of the equity of the bank holds a seat on the board of directors of the company.

To differentiate Definitions 2 and 3 from Definition 1, the firm must not belong to the bank’s large shareholder or his/her extended family.

Definition 4. A firm is connected if one of the directors on the company board (who is not related to any of the major company or bank shareholders) is also a director of a bank.

To differentiate this from Definition 3, the bank director must not be related directly or by marriage to any of the large shareholders of the company or of the bank (i.e. shareholders who hold 10% or more of the equity). Definition 4 is similar to the definition that is used in prior research in developed countries where banks have dispersed ownership and act as financial intermediaries (e.g., Gibson, 1995; Kroszner and Strahan, 2001).

In sum, a firm is bank-connected if

- (1) (1) a major shareholder of a bank (owning 10% or more of the bank shares) holds 10% or more of the company shares (CONN1 = 1),
- (2) a major shareholder of the firm is a director of a bank (CONN2 = 1),
- (3) a major shareholder of a bank is a director of a firm (CONN3 = 1), or
- (4) a board director of a bank (who is unrelated to the major company and bank shareholders) is also a director of the firm (CONN4 = 1).

It should be noted that firms are not just classified as connected or non-connected at a single point within the sample period; instead firm-year observations are re-classified in each sample year

on the basis of the data on ownership and board structure in that year.⁹

In addition to the separate connection measures above, we also use composites of these measures. Specifically, we define a broad measure of connections (CONN1–4): a company is bank-connected if any of the four definitions above identify it as connected (CONN1–4 = 1 IF CONN1 = 1 OR CONN2 = 1 OR CONN3 = 1 OR CONN4 = 1). We also define a measure of pure board connections (CONN2–4) coded one if CONN1 = 0 AND (CONN2 = 1 OR CONN3 = 1 OR CONN4 = 1), and zero otherwise. Note that CONN1–4 is not nested within CONN2–4 in that observations that have ownership connections (CONN1 = 1) are not considered purely board connected (therefore CONN2–4 is coded zero for these observations).

We examine the robustness of our connection results to varying the ownership cut-off level from 10% to either 5% or 25%. The numbers of connected companies do not change greatly. Specifically, by reducing the cut-off to 5% we identify an extra 3 firms with CONN1 connections in 1995 in addition to 58 connected firm-year observations identified at the 10% threshold. By raising the threshold to 25%, we lose only 6 of the 58 connected firms in 1995. Since we find that varying the threshold level has relatively little impact on differentiating connected from unconnected firms, we adopt the 10% definition for the sake of comparability with the results of earlier studies (e.g., Charumilind et al., 2006; Boubakri et al., 2010).

4.2. Evolution of bank connections

Table 2 shows the evolution of bank connections using the broad composite measure (CONN1–4). Our findings confirm that the presence of bank connections based on any of the four measures above was widespread before the crisis of 1997–1998. In the pre-crisis period, bank connections via ownership structure (CONN1) accounted for 22% of total firm-year observations. Bank connections are also formed through boards of directors. The presence of a firm’s large shareholder or his/her related families on a bank’s board of directors (CONN2) represented 19% of total firm-year observations. Connections defined as a bank’s large shareholder or his/her related families on a firm’s board of directors (CONN3) amounted to 23% of total firm-year observations, while the proportion of firms with bank directors on their boards (CONN4) equalled 54%.¹⁰ Based on the composite measure (CONN1–4 = 1) the results show that most Thai firms were connected with banks via ownership or board connections or both, accounting for 78% of total firm-year observations. More than half (56%) of the total firm-year observations show a board connection.

As can be further seen in Table 2, the crisis and the resulting ownership restructuring and structural changes in the banking and financial sector had a dramatic effect on the extent of connections between firms and banks. The prevalence of connections between firms and banks in the post-crisis period is substantially and statistically significantly (at the 1% level) lower than in the pre-crisis period. The percentage of CONN1 connected firms declined from 22% of total firm-year observations in the pre-crisis period to 15% in the post-crisis period. The proportion of CONN1 firms is statistically significantly different between the pre-crisis and post-crisis periods at the 1% level. Interestingly, the existence

⁹ We exclude the crisis period (1997 and 1998) because, during this time interval, various government actions and the ongoing process of bank closures and capital injections in Thai financial institutions, make it difficult to define the existence of bank connections.

¹⁰ The categories CONN1, CONN2, CONN3, and CONN4 are not mutually exclusive. Some firms in our sample are bank-connected through both ownership and board, or through several board links. Consequently, the numbers of observations coded one by the composite measures CONN1–4 and CONN2–4 are not simply the sum of the observations coded one by the individual measures CONN1, CONN2, CONN3, and CONN4.

Table 2

The presence of connections between firms and banks. This table shows the presence of connections between Thai non-financial companies and banks or finance companies in the pre-crisis period (1995 and 1996) and in the post-crisis period (1999 and 2000). The figures in parentheses show the percentages of total firm-year observations in the pre- and post-crisis periods that have a “bank connection” as measured by one of four alternative measures reflecting links through ownership or membership of the boards of directors. The term “bank connection” refers to a connection with one or more financial institution comprising both banks and finance companies. The total numbers of firm-year observations are 575 and 531 in the pre- and post-crisis periods, respectively. LS denotes a “large shareholder” owning together with his/her extended family 10% or more of shares. The connection measure CONN1 is based on *Definition 1* (in Section 4): it is a dummy variable coded one for a given company if 10% or more of the shares of the company are owned by an individual (or a member of his/her extended family) who also holds 10% or more of the shares of a bank or finance company; it is coded zero otherwise. CONN2 is based on *Definition 2* and coded one if a large shareholder of the company, or a member of his/her extended family, is a director of a bank or finance company; otherwise it is zero. CONN3 is based on *Definition 3* and coded one for a given company if one of the directors, or a member of the extended family of a director, is a large shareholder of a bank or finance company; it is zero otherwise. Finally, CONN4 is based on *Definition 4* and coded one if a director of the company is also on the board of a bank or finance company, and zero otherwise. A firm is connected if any of the four connection measures is one as captured by the composite measure CONN1–4: CONN1–4 = 1 if CONN1 = 1 OR CONN2 = 1 OR CONN3 = 1 OR CONN4 = 1. The pure board connection measure (CONN 2–4) is one if CONN1 = 0 AND (CONN2 = 1 OR CONN3 = 1 OR CONN4 = 1). We test the equality of 2% between two subsamples, assuming a binomial distribution, using the two-tailed Z-test. Under the null hypothesis that the two proportions are identical, Z has an approximately standard normal distribution.

Types of connections		Pre-crisis 1995–1996	Post-crisis 1999–2000
Connection types			
Connections through ownership CONN1	LS of firm is LS of bank	124 (22%)	77 (15%)***
Connections through boards of directors CONN2	LS of firm is on bank board of directors	107 (19%)	4 (1%)***
CONN3	Firm director is LS of bank	135 (23%)	90 (17%)***
CONN4	Firm director is on bank board	308 (54%)	163 (31%)***
Composite measures of connections CONN1–4	Broad measure of Connection (through ownership or board)	447 (78%)	270 (51%)***
CONN2–4	Pure Board Connection (conditional on no ownership connection)	323 (56%)	193 (36%)***
Total number of firm-year observations		575 (100%)	531 (100%)

** Indicates the statistical significance of the two-tailed Z-test at the 5% level.

* Indicates the statistical significance of the two-tailed Z-test at the 10% level.

*** Indicates the statistical significance of the two-tailed Z-test at the 1% level.

of large company shareholders on bank boards (CONN2) almost vanished, dropping from 19% of total firm-year observations in the pre-crisis period to 1% in the post-crisis period. The proportion of CONN2 firms is statistically significantly different between the pre-crisis and post-crisis periods at the 1% level. The result indicates a significant reduction of bank connections between family-owned banks and other family firms. This reflects the impact of reforms of bank governance.

In addition, the post-crisis results show that the restructuring in the banking and financial industry affected the frequencies of CONN3 and CONN4 type connections. The percentage of connected firms as defined by CONN3 decreased from 23% of total firm-year observations to 17% in the post-crisis period, and this difference in the proportions of CONN3 connected firms between the pre-crisis and post-crisis periods is significant at the 1% level. The proportion of CONN4 declined from 54% of total firm-year observations to 31% after the crisis, and this decline is statistically significant at the 1% level. The composite measure of connections (CONN1–4) shows that after the crisis, there is about an equal split between connected and non-connected firms, with the percentage of connected firms having dropped to 51%. Connections through boards (CONN2–4) fell to 36%.

The findings reflect the extensive restructuring and reforms of governance at the bank, corporate and economic level after the crisis (in part due to foreign pressure). The decrease in board connections is partly in response to reforms in the face of heightened concerns about the conflicts of interests caused by board linkages between companies and banks. For instance, after the crisis, the issues of bank board independence and the qualifications of bank directors became important issues in corporate governance and

regulation. In consequence, banks' directors have faced stricter rules from regulators with regard to holding directorships in other companies.

4.3. Characteristics of connected firms and determinants of bank connections

Table 3 shows descriptive statistics of the firm characteristics, specifically those characteristics used throughout our empirical analysis, for the three sample periods (pre-crisis, crisis, and post-crisis). Table 4 reports the correlation matrix. In order to investigate whether there are any systematic differences between firms with and without bank connections, the sample of firm-year observations is classified into two groups, those with and without bank connections, on the basis of the composite measure CONN1–4 (as outlined in the previous section). Table 5 shows the medians and means of financial variables for connected and unconnected firms in the pre-crisis, crisis and post-crisis periods. The statistical significance of the differences in the means and medians between connected and unconnected firm-year observations is tested using *t*-statistics and Mann–Whitney tests.

Our results suggest that connected firms are significantly larger than their unconnected counterparts based on both book and market measures of size. The market capitalisation of both types of companies dropped dramatically during the crisis but recovered in the post-crisis period. While there is no significant difference in leverage measured by total debt to total assets between connected and unconnected companies, connected firms do have significantly more long-term debt (as a fraction of total assets). This may suggest that bank connections help companies negotiate

Table 3
Summary statistics.

Variable	Mean	Median	Standard deviation	Minimum	Maximum
<i>Panel A: this table reports summary statistics of total sample firms, including 1697 firm-year observations between 1995 and 2000</i>					
Investment/capital	0.19	0.10	0.25	0.00	7.86
Cash flow/capital	0.16	0.16	0.58	−20.51	7.59
Lagged Tobin's Q	1.18	1.02	0.62	0.17	6.69
Lagged sales/capital	2.66	1.67	3.06	−0.58	53.47
Lagged cash stock/capital	0.36	0.10	0.72	0.00	27.92
<i>Panel B: this table reports summary statistics of 575 firm-year observations in the pre-crisis period (1995–1996)</i>					
Investment/capital	0.29	0.19	0.30	0.00	7.86
Cash flow/capital	0.28	0.21	0.56	−17.97	7.59
Lagged Tobin's Q	1.48	1.26	0.70	0.29	6.47
Lagged sales/capital	2.93	1.78	3.33	0.01	53.47
Lagged cash stock/capital	0.49	0.15	0.92	0.00	27.92
<i>Panel C: this table reports summary statistics of 591 firm-year observations during the crisis (1997–1998)</i>					
Investment/capital	0.16	0.08	0.23	0.00	5.79
Cash flow/capital	0.06	0.12	0.62	−20.51	6.07
Lagged Tobin's Q	1.08	0.96	0.52	0.25	4.76
Lagged sales/capital	2.56	1.67	2.94	0.01	27.09
Lagged cash stock/capital	0.31	0.09	0.59	0.00	13.53
<i>Panel D: this table reports summary statistics of 531 firm-year observations in the post-crisis period (1999–2000)</i>					
Investment/capital	0.11	0.06	0.18	0.00	2.96
Cash flow/capital	0.15	0.13	0.54	−4.04	7.34
Lagged Tobin's Q	0.99	0.89	0.49	0.17	6.69
Lagged sales/capital	2.48	1.57	2.87	0.00	33.03
Lagged cash stock/capital	0.28	0.08	0.55	0.00	26.97

Note: All financial data are winsorized at 1% and 99%. The minimum and maximum values of winsorized data are as follows: investment/capital (0.00, 1.53), cash flow/capital (−2.41, 2.63), lagged Tobin's Q (0.36, 4.11), lagged sales/capital (0.05, 17.89) and lagged cash stock/capital (0.00, 4.51).

Table 4
Pairwise correlations. This table reports pairwise correlation coefficients between variables for 1697 firm-year observations between 1995 and 2000. The figures in parentheses report p-value of each correlation coefficient.

	Investment/capital	Cash flow/capital	Lagged Tobin's Q	Lagged cash stock/capital	Lagged sales/capital
Investment/capital	1.0000				
Cash flow/capital	0.2917*** (0.0000)	1.0000			
Lagged Tobin's Q	0.3561*** (0.0000)	0.2905*** (0.0000)	1.0000		
Lagged cash stock/capital	0.3301*** (0.0000)	0.3356*** (0.0000)	0.2860*** (0.0000)	1.0000	
Lagged sales/capital	0.2909*** (0.0000)	0.2944*** (0.0000)	0.1619*** (0.0000)	0.4491*** (0.0000)	1.0000

*** Indicates significance at levels of 1%.

longer debt maturities. This result is consistent with the findings of Charumilind et al. (2006) that bank connections provide firms with preferential access to long-term loans.

There appears to be no statistically significant difference between connected and unconnected firm in cash stock (financial slack) relative to capital (fixed assets), nor in cash flow relative to fixed assets with the exception of the crisis period when connected firms had a lower cash flow ratio.¹¹ There also seems to be no statistically significant difference in investment expenditure relative to capital.¹² Finally, prior to and during the crisis, the market-to-book value of assets (measured at the beginning of the year), that is used to proxy Tobin's Q measure of the availability of investment opportunities, is not significantly different between the two groups. However, after the crisis connected firms appear to have significantly higher market-to-book values than unconnected firms.

Following the above univariate analysis of the associations between connections and a range of firm characteristics, we next examine the determinants of bank connections using Probit

analysis. In the US, Kroszner and Strahan (2001) investigate the determinants of bank connections, based on institutional characteristics, such as the existence of an active capital market and the importance of credit rating facilities, to measure firms' volatility and access to external funds. Elsas (2005) examines the determinants of bank connections in Germany and focuses on the features of Hausbank lending relationships. In Thailand, commercial banks rarely get involved in company management, and arguably perform poorly in monitoring their borrowers (Vichyanond, 2005). Using Thai firms, Charumilind et al. (2006) investigate the determinants of board connections between firms and banks in 1996 and report the importance of membership of family business groups.

Our sample in this part of the analysis is restricted to 2 years, the years immediately before and after the crisis. Our sample includes 310 and 265 firm observations in 1996 and 1999, respectively. We estimate a Probit model with the composite measure of connections CONN1–4 (coded one if a firm is connected and zero otherwise) as the dependent (binary) variable. We also estimate separate Probit models for CONN1 (coded one if a firm has an ownership connection with a bank), and for a composite measure CONN2–4 of the indicators of board connections CONN2, CONN3

¹¹ Both variables are measured at the beginning of the years.

¹² Capital is used as a synonym for fixed assets, also termed net property, plant and equipment.

Table 5

The characteristics of firms with and without bank connections. This table reports the means and medians of the financial characteristics of the firm-year observations in each of the three sample periods (pre-crisis, crisis and post-crisis). The figures are shown separately for connected and unconnected companies. Connected firm-year observations are identified using the composite connection measure CONN1–4 outlined in Section 4 and Table 2 above. 'During Crisis' connections are based on connections observed in 1996. Asterisks indicate the statistical significance of the difference between connected and non-connected firms; The unit of measurement of variables other than ratios is Million USD.

	Pre-crisis		During crisis		Post-crisis	
	Non-connected Median	Connected Median	Non-connected Median	Connected Median	Non-connected Median	Connected Median
<i>Panel A: the figures show the median values of the variables for each subgroup of firm-year observation. Mann–Whitney tests are used to assess the significance of the differences in medians between non-connected firms and connected firms</i>						
Investment model variables						
Investment/capital	0.22	0.19	0.09	0.08	0.06	0.05
Cash flow/capital	0.23	0.20	0.18	0.11*	0.12	0.14
Lagged Tobin's Q ratio	1.26	1.26	0.98	0.95	0.87	0.94***
Lagged sales/capital	1.72	1.78	1.89	1.61**	1.99	0.14
Lagged cash stock/capital	0.14	0.15	0.07	0.10	0.08	0.08
Other variables						
Ln(total assets)	7.38	7.94***	7.50	7.98***	7.41	7.99***
Total assets	63.90	112.11***	49.80	80.46***	42.53	75.45***
Market capitalisation	26.80	51.57***	8.53	12.21*	10.15	27.16***
Sales	46.00	64.21***	31.43	40.76*	33.58	45.10***
Long-term debt/total assets	0.10	0.14**	0.14	0.18*	0.11	0.18**
Total debt/total assets	0.42	0.43	0.52	0.47	0.39	0.38
Number of firm-year observations	128	447	126	465	261	270
	Mean	Mean	Mean	Mean	Mean	Mean
<i>Panel B: the figures show the mean values of the variables for each subgroup of firm-year observations. Student t-statistics are used to assess the significance of the differences in the means between non-connected firms and connected firms</i>						
Investment model variables						
Investment/capital	0.29	0.29	0.14	0.17	0.11	0.11
Cash flow/capital	0.29	0.27	0.18	0.02**	0.15	0.16
Lagged Tobin's Q ratio	1.43	1.49	1.13	1.06	0.93	1.03**
Lagged sales/capital	2.67	3.00	2.80	2.50	3.05	1.93***
Lagged cash stock/capital	0.40	0.52	0.29	0.32	0.29	0.27
Other variables						
Ln(total assets)	7.46	8.09***	7.60	8.13***	7.61	8.20***
Total assets	116.24	310.12***	104.57	254.51***	128.38	260.01***
Market capitalisation	83.14	223.00***	62.59	69.85	49.08	137.45***
Sales	66.21	145.31***	60.92	108.62***	73.04	126.82***
Long-term debt/total assets	0.14	0.19***	0.18	0.24***	0.19	0.25***
Total debt/total assets	0.41	0.41	0.47	0.46	0.39	0.38
Number of firm-year observations	128	447	126	465	261	270

* Significance level of at least 10% is reported.

** Significance level of at least 5% is reported.

*** Significance level of at least 1% is reported.

and CONN4. CONN2–4 is coded one if CONN2 = 1 OR CONN3 = 1 OR CONN4 = 1 AND CONN1 = 0. We examine the impact of institutional and financial characteristics of firms on the likelihood of having connections. Our independent variables are an indicator of business group membership of the company, a measure of financial distress, fixed assets (relative to total assets), firm size, and the market-to-book value of assets (acting as a proxy of Tobin's Q and investment opportunities). The coefficients reported in Table 6 are the marginal effects showing the increase in the probability of having bank connections due to a one unit rise in a given independent variable (evaluated at the means of continuous variables, or for discrete changes from zero to one for dummy variables).

The independent variables are motivated and defined as follows. Business group membership is a dummy variable coded one if the firm belongs to one of the top 60 family business groups in Thailand, and zero otherwise. The list of top 60 business groups and their large family shareholders is obtained from Charumilind et al. (2006). These groups are ranked according to total sales of group affiliates in Thailand in 1994.

The most obvious effect of business group membership on bank connections is where the group includes both banks and non-financial companies resulting in ownership links between companies and banks in the same group. Also, family business groups are well-known entities in the country and may have reputational

capital (McMillan and Woodruff, 1999). Firms in business groups may have lower default risks as a result of reputational concerns, and due to diversification and risk-sharing among member firms (Khanna and Yafeh, 2007). Banks may receive benefits from connections with firms in business groups in terms of gaining a larger lending market share. There is evidence that firms in business groups are granted preferential terms on bank loans (Charumilind et al., 2006). Thus, we expect that firms that belong to a family business group are more likely to have bank connections.

The financial distress indicator is a dummy variable coded one if the coverage ratio, the ratio of earnings before interest and tax to interest expenses, is below one in the current year, and zero otherwise. This definition is based on measures of financial distress used in Hoshi et al. (1990) and Andrade and Kaplan (1998). The likely effect of financial distress is to make connections more probable. Evidence from Japan suggests that bank directors are present on corporate boards of directors when companies face financial distress (Sheard, 1994). Evidence from Thailand shows that prior to the crisis, banks were likely to be bailed out by the government. As a result of implicit government guarantees, banks might be unconcerned about bad assets and willing to rescue firms (Charumilind et al., 2006). Also financially-distressed firms may seek bank connections (specifically through the presence of bank directors on the company boards) to secure debt finance and to certify company

Table 6

Determinants of bank connections. The table reports the results of a Probit model of the determinants of bank connections. The figures reported are the marginal effects of a one unit change from the mean of each independent variable (continuous variables) and the discrete change for dummy variables on the probability of having a bank connection. The dependent variable is one if the firm is connected with banks. The mean of the dependent variable is 0.67 using the composite connection measure (CONN1–4), 0.18 using the ownership connection (CONN 1) and 0.49 using the board connection (CONN 2–4). Business group is a binary variable that equals 1 if a firm belongs to the top 60 family business groups in the country. Financial distress is a dummy variable that equals 1 if a coverage ratio is less than 1 in the current year. Fixed asset ratio is the ratio of net fixed assets to total assets. Size is the natural logarithm of total assets. Tobin's Q is the ratio of market value to book value of total assets. Year 1999 is a dummy variable that equals 1 if an observation is in Year 1999. The White's standard errors are adjusted for heteroskedasticity. The model controls for industry effects and year effects. The figures in parentheses report *p*-value for two-tailed tests.

Pooled sample (96 and 99)	Composite connection (CONN 1–4)	Ownership connection (CONN 1)	Board connection (CONN 2–4)			
Panel A: determinants of bank connections						
Business group dummy	0.2694*** (0.000)	0.2589*** (0.000)	−0.0718 (0.228)			
Financial distress dummy	0.1888** (0.022)	0.0368 (0.446)	0.0924 (0.195)			
Fixed asset ratio	−0.0161 (0.902)	0.1237 (0.142)	−0.1826 (0.173)			
Size	0.0589** (0.015)	−0.0045 (0.793)	0.0368 (0.143)			
Tobin's Q	−0.0547 (0.253)	0.0059 (0.857)	−0.0607 (0.239)			
Year 1999 dummy	−0.2074 (0.446)	0.0633 (0.761)	−0.5541** (0.037)			
Business group × Year 1999	−0.1519* (0.082)	−0.0455 (0.455)	0.0188 (0.831)			
Financial distress × Year 1999	−0.3153*** (0.005)	−0.0391 (0.521)	−0.1832* (0.053)			
Fixed asset ratio × Year 1999	0.2384 (0.173)	0.0129 (0.915)	0.2889 (0.124)			
Size × Year 1999	−0.0148 (0.656)	−0.0133 (0.572)	0.0331 (0.361)			
Tobin's Q × Year 1999	0.0790 (0.284)	0.0222 (0.699)	0.0672 (0.423)			
Industry dummy	Yes	Yes	Yes			
Number of observations	575	575	575			
Prob. > χ^2	0.000	0.000	0.001			
Pseudo R^2	0.1574	0.1559	0.0598			
Predicted	Composite connection (CONN 1–4)					
	1996	1999				
	Actual	Actual				
	Non-connected	Connected	Total observations	Non-connected	Connected	Total observations
Panel B: frequencies of actual and predicted outcomes of the Probit specification estimated in Panel A using the composite connection measure (CONN 1–4). The predicted outcomes are defined by a probability level of 50%. The sample comprises 310 and 265 firm-year observations in 1996 and 1999, respectively						
Non-Connected	38	48	86	112	113	225
Connected	27	197	224	10	30	40
Total observations	65	245	310	122	143	265
% correct predictions		76%			54%	

Note: The naïve model correctly classifies 79% and 54% in 1996 and 1999, respectively.

* The statistical significance at level of 10% is reported.

** The statistical significance at level of 5% is reported.

*** The statistical significance at level of 1% is reported.

solvency and reputation to other stakeholders. Before the crisis, there were no concrete and practical procedures in Thailand to renegotiate or restructure the debt of troubled companies (Wong et al., 2006). Renegotiations in court were time-consuming, and foreclosures could take up to 8 years. As a result, firms rarely went bankrupt in Thailand before the crisis and banks had an incentive to rescue distressed firms to avoid losses in the hope of future repayments (Perotti, 1993). Therefore, we expect that before the crisis financially distressed firms were more likely to have bank connections.

The financial crisis had a dramatic impact on banks due to the large amounts of non-performing loans (NPLs) and bank closures. The crisis made banks more cautious in their lending and more concerned about their income and NPLs (Rahman et al., 2004). In addition, the reform of the Thai bankruptcy law in the wake of the crisis means that banks are now allowed to file insolvent firms for liquidation or restructuring (Wong et al., 2006; Vichyanond, 2005). Furthermore, the amended foreclosure law gives banks incentives to file bankruptcy petitions to try and obtain salvage funds from

financially-distressed firms if they fear the recovery rate from restructuring may be too low. After the crisis, and following reforms in its wake, the role of creditors in dealing with insolvent firms has changed and turned into an arms-length approach.¹³ Also stricter rules regarding bank directors' qualifications, bank board independence and directors' liability, announced after the crisis, are likely to discourage bank directors from being on the boards of financially

¹³ For example, the controlling family shareholder of the Thai Petrochemical Industry (TPI) refused to service the company's debts and restructure his firm after the financial crisis, but the improved creditor's rights given by the amended bankruptcy law allowed the TPI's 148 creditors to be successful in filing a petition for the company's restructuring and in seizing control over the firm from the former family shareholder. In addition, a bank-connected firm, Alphatec Electronics Public Company (ATEC), became insolvent at the end of 1997 because it was unable to repay its loan and its controlling family shareholder was found to transfer ATEC's capital to his private companies without the approval of ATEC's board. Connected banks seemed to overlook the fraudulent transfers and financial problem of ATEC. Nevertheless, ATEC was the first insolvent firm whose creditors filed a petition for restructuring under the amended bankruptcy law.

distressed companies. Directors of listed companies may be personally **penalised** if the company fails to disclose relevant information to the public. As insolvent firms may be tempted to withhold bad news, bank directors (and other individuals) are likely to be reluctant to sit on the boards of financially-distressed firms. Consequently, we expect that after the crisis financial distress reduces the likelihood that a company has bank connections.

The ratio of fixed assets to total assets measures tangibility of the company assets. Evidence of bank lending practices in Thailand shows that banks commonly require tangible assets as collateral (Siamwalla, 2005; Vichyanond, 2005; Menkhoff et al., 2006). As tangible assets are relatively easy to collateralise (Kroszner and Strahan, 2001), companies with more tangible assets are likely to rely more on debt finance, and may therefore be more likely to seek bank connections.

Size is measured as the natural logarithm of total assets. Larger firms tend to be less risky and are likely to have a lower probability of financial distress and lower expected bankruptcy costs (Kroszner and Strahan, 2001; Charumilind et al., 2006). Thus, banks may cultivate relations and seek connections with larger firms to secure their large-scale, low risk custom.

We include the ratio of market value to book value of total assets to proxy Tobin's Q and the availability of investment opportunities. The market value of total assets is calculated as the market **capitalisation** of equity plus the book value of total assets minus the book value of shareholders' equity. All else being equal, firms with higher investment opportunities rely more on external funds. In countries such as Thailand where bank lending is a major source of corporate financing, those firms are likely to seek bank connections to secure a committed source of external funds in the form of related bank lending. In addition, firms with high investment opportunities tend to face higher costs of information asymmetry (Barclay and Smith, 1995), and the economic value of bank connections in terms of reducing market failures is likely to be higher. Finally, the Probit models also include industry and year dummies to control for (fixed) industry and year effects.

The results of our Probit analysis are shown in Table 6. Based on the broad composite measure of connections (CONN1–4), the likelihood of having bank connections is higher if the company is part of one of the top 60 family business groups. This business-group effect is substantially larger before the crisis (shown by the marginal effect of 0.27 on the uninteracted business group dummy) than after the crisis. The total effect of business group membership after the crisis is measured by the sum of the marginal effects of the uninteracted dummy (0.27) plus the marginal effect of the interacted term: business group times the Year 1999 dummy. The latter marginal effect is in fact negative (**−0.15**) suggesting that the impact of the crisis was to reduce the business group effect from 0.27 to just 0.12. The second and third Probit models use alternative connection measures focusing on connections through ownership (CONN1) and board membership (CONN2–4) separately. The results suggest that business group membership affects connections through ownership links (as the marginal effect of the business group indicator is positive and significant in the CONN1 model) but not through joint board membership (as the marginal effect of the business group indicator is not significantly different from zero in the CONN2–4 model). The findings suggest that the restructuring of the financial sectors, including the reduction of family ownership of banks, dramatically reduced the incidence of connections between family group companies and banks. This may have been motivated in part by banks fearing exploitation due to **tunnelling** and looting by firms in family business groups, activities that are more likely in times of crisis. Also as outlined above, tighter rules on bank governance, including rules on board independence and directors' qualification, also virtually eliminated connections through company owners sitting on bank boards

(CONN2) for group and non-group companies alike. Finally, family business groups may have had better access to alternative sources of external funds and become less dependent on bank financing given the increased activity in the primary equity and bond markets in 1999 (as shown in Table A2).

The effect of financial distress on bank connections, which was positive before the crisis with a marginal effect of 0.19, was not only dampened but in fact turned negative after the crisis with the total post-crisis effect given by the sum of the marginal effects of the uninteracted financial distress variable and the corresponding interaction term, Financial distress times Year 1999 (0.19 plus **−0.32**). This is in line with our predictions outlined above based on the likely impact of the reforms and restructuring of the financial sector. After the financial crisis, banks take an arms' length approach and discontinue connections with financially-distressed firms.

Firm size significantly increases the likelihood of bank connections both before and after the crisis. The impact of the crisis on the size effect, as measured by the marginal effect of the interaction term (Size times Year 1999) is not significantly different from zero. A one percentage increase in size (the natural logarithm of total assets) increases the probability of bank connections by **0.06%**. This result is in line with our expectations (outlined above).

In conclusion, business group membership, financial distress and size significantly affect the likelihood of companies having connections with banks or finance companies. The crisis dramatically changed the magnitude of the business group effect and even reversed the direction of financial distress effect. These findings are indicative of a fundamental transformation of the Thai corporate and financial sectors in the wake of the crisis. The relationship between the corporate and financial sectors appears to have changed from a connection-based (arguably crony-style) system to one **characterised** by arms' length relations.

5. Corporate investment pre- and post-crisis

5.1. Hypotheses

As we have seen, the crisis caused tremendous turmoil and restructuring in the Thai financial sector. This section examines the impact of these events on the investment behaviour of Thai non-financial companies. In perfect capital markets, companies determine whether or not to invest based on the availability of profitable investment opportunities and without concern over the financing of their investment. However, if companies face financing constraint, the feasibility of investment may depend on the availability of internal financing. Following the seminal work of Fazzari et al. (1988), a large body of literature has studied the apparent "excess" sensitivity of corporate investment to internally generated cash flows of samples of companies that are thought to be financially constrained.

Here, we examine the sensitivity of investment to internal cash flows of connected and unconnected Thai companies before and after the Asian crisis. Connections with banks may reduce the asymmetric-information costs of external financing and provide firms easier and cheaper access to (bank) finance (e.g., Hoshi et al., 1990; La Porta et al., 2003; Charumilind et al., 2006). If bank-connected firms do have easier access to bank loans, we expect their investment to be less sensitive to internal cash flow.

Hypothesis H₁ (1). The cash flow sensitivity of investment is lower for firms with bank connections than for others.

As a result of the restructuring in the Thai financial industry (as outlined above), bank connections became far less pervasive among Thai companies. One reason for this is the erosion of family-ownership of financial institutions during the crisis (Dixon,

Table 7

Investment–cash flow sensitivity: Impact of bank connections. This table reports the results of the pooled OLS regression in the pre-crisis and post-crisis periods. The dependent variable is the investment scaled by capital at the beginning of the year. Cash flow is net income plus depreciation and depletion during the year. Capital is property, plant and equipment at the beginning of the period. Proxy of lagged Tobin's Q is the ratio of market value of assets to book value of assets at the beginning of the period. Lagged cash stock is cash on hand and at banks plus short-term investment at the beginning of the year. Lagged sales is total sales at the beginning of the period. Connection is a dummy variable that equals 1 if a firm is connected to bank(s) through ownership or board membership to bank(s), and zero otherwise. That is, connections are broadly measured by CONN1–4. The White's standard errors are adjusted for heteroskedasticity. The regression controls for industry effects and year effects. The figures in parentheses report *p*-value for two-tailed tests.

Dependent variable: investment/capital	Pre-crisis 95–1996		Post-crisis 1999–2000	
	(1)	(2)	(3)	(4)
Constant	0.017 (0.738)	–0.067 (0.234)	–0.007 (0.893)	–0.017 (0.695)
Cash flow/capital	0.465*** (0.000)	0.319*** (0.000)	0.076*** (0.000)	0.076*** (0.000)
Lagged Tobin's Q	–0.015 (0.495)	0.035* (0.063)	0.066 (0.126)	0.074*** (0.001)
Lagged sales/capital	–0.005 (0.667)	0.010* (0.056)	0.008 (0.230)	0.011** (0.025)
Lagged cash stock/capital	–0.034 (0.263)	0.027 (0.152)	0.042 (0.517)	0.024 (0.510)
Connection × (cash flow/capital)	–0.358*** (0.000)	–0.198** (0.023)	–0.005 (0.913)	0.001 (0.983)
Connection × lagged Tobin's Q	0.069** (0.025)		0.016 (0.749)	
Connection × (lagged sales/capital)	0.016 (0.192)		0.008 (0.374)	
Connection × (lagged cash stock/capital)	0.067* (0.071)		–0.040 (0.564)	
Connection dummy	–0.082 (0.139)	0.041 (0.198)	–0.020 (0.699)	0.003 (0.856)
Year dummy	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes
Observations	575	575	531	531
Adjusted R ²	0.238	0.231	0.276	0.276

* The statistical significance at level of 10% is reported.

** The statistical significance at level of 5% is reported.

*** The statistical significance at level of 1% is reported.

2004). A range of reforms targeted at reducing “cronyism” may be expected to have created a level playing field and reduced both the prevalence and the value of connections. We expect that after the crisis access to bank financing is less dependent on bank connections than before the crisis. We examine the difference in the investment–cash flow sensitivity between connected and unconnected firms and expect this difference to be greater before the crisis than after.

Hypothesis H₁ (2). The difference in the investment–cash flow sensitivity between connected and unconnected firms is higher in the pre-crisis period than after the crisis.

To examine whether internal cash flow plays a significant role in determining firms' investment, we estimate Eq. (1):

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha_{i,t} + \beta_1 \frac{CF_{i,t}}{K_{i,t-1}} + \beta_2 Q_{i,t-1} + \beta_3 \frac{Sales_{i,t-1}}{K_{i,t-1}} + \beta_4 \frac{CSHST_{i,t-1}}{K_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

where $I_{i,t}$ is investment spending or capital expenditure during the year, $K_{i,t-1}$ is the capital stock (i.e., fixed assets) at the beginning of the year, $CF_{i,t}$ is cash flow or net income plus depreciation and depletion during the year, $Q_{i,t-1}$ is a proxy of lagged Tobin's q ratio (measured by the ratio of market value of total assets to book value of total assets) at the beginning of the year, $Sales_{i,t-1}$ is sales in the previous year, and $CSHST_{i,t-1}$ is cash stock (or cash on hand and at banks plus short-term investments) at the beginning of the year.¹⁴

¹⁴ Capital stock is measured by fixed assets, also termed net property, plant and equipment, at the beginning of the year. The market value of total assets is measured by the market capitalisation of company equity, plus the book value of debt (defined as the book value of total assets minus shareholders' equity).

We expect a positive sign of the coefficient of $Q_{i,t-1}$, capturing the impact of investment opportunities on firms' investment spending. Following Fazzari et al., the variables $Sales_{i,t-1}$ is included to control for the impact of the so-called sales accelerator: according to the accelerator hypothesis, investment responds positively to increasing levels of sales. As in Fazzari et al., we also include $CSHST_{i,t-1}$, a stock measure of liquidity (in addition to cash flow, i.e., the flow of liquidity), to control for the effect of this alternative source of internal liquidity on firms' investment; we expect β_4 to be positive. We use Ordinary Least Square (OLS) on pooled cross-section and time-series data controlling for year and industry effects by including dummies.¹⁵ We examine the robustness of our OLS results and discuss the use of this method in Section 5.3.

The main variable of interest is cash flow, and the coefficient of cash flow, β_1 , is expected to be positive and significant capturing the positive impact of internal liquidity on investment. To test Hypothesis (1) whether bank connections reduce cash flow sensitivity, we extend Eq. (1) by interacting the explanatory variables with the dummy indicator of connections. The hypothesis predicts that the marginal effect of cash flow (that is the cash flow variable interacted with the connections indicator) is positive and significant. We measure bank connections of companies using the composite connection measure CONN1–4 (described in the previous section): the dummy variable is coded one if a company is connected based on any of the four definitions outlined in the previous section, and zero otherwise.

¹⁵ The Stock Exchange of Thailand classifies non-financial firms into eight industries, which are (1) Agribusiness and Food Industry, (2) Consumer Products, (3) Industrials, (4) Property and Construction, (5) Resources, (6) Services, (7) Technology and (8) Others.

Table 8

Investment–cash flow sensitivity of 1996 connected firms in post-crisis. This table reports the results of the pooled OLS regression in the post-crisis period. The dependent variable is the investment scaled by capital at the beginning of the year. Cash flow is net income plus depreciation and depletion during the year. Capital is property, plant and equipment at the beginning of the period. Proxy of lagged Tobin's Q is the ratio of market value of assets to book value of assets at the beginning of the period. Lagged cash stock is cash on hand and at banks plus short-term investment at the beginning of the year. Lagged sales is total sales at the beginning of the period. Connection 96 is a dummy variable that equals 1 if a firm was connected to bank(s) in 1996, and zero otherwise. Connections are either through ownership or board membership, and are measured using the broad definition CONN1–4. Connection Lost is a dummy variable that equals 1 if a firm has lost bank connections after the restructuring of the Thai banking and financial sector. Year 2000 is a dummy variable that equals 1 if an observation is in 2000. The White's standard errors are adjusted for heteroskedasticity. The regression controls for industry effects and year effects. The figures in parentheses report *p*-value for two-tailed tests.

Dependent variable: investment/capital	Post-Crisis 99–00		
	(1)	(2)	(3)
Constant	−0.0076 (0.899)	−0.0338 (0.478)	−0.0133 (0.833)
Cash flow/capital	0.1195** (0.019)	0.1380*** (0.002)	0.0978* (0.085)
Lagged Tobin's Q	0.0317 (0.471)	0.0741*** (0.002)	0.0455 (0.290)
Lagged sales/capital	0.0006 (0.941)	0.0099** (0.029)	−0.0011 (0.902)
Lagged cash stock/capital	0.1676 (0.289)	0.0268 (0.469)	0.1990 (0.261)
Connection 96 × (cash flow/capital)	−0.0641 (0.259)	−0.0787 (0.118)	−0.0506 (0.480)
Connection 96 × lagged Tobin's Q	0.0614 (0.211)		0.0408 (0.436)
Connection 96 × (lagged sales/capital)	0.0148 (0.117)		0.0180 (0.108)
Connection 96 × (lagged cash stock/capital)	−0.1759 (0.269)		−0.1846 (0.302)
Connection 96 dummy	−0.0790* (0.096)	−0.0193 (0.393)	−0.0647 (0.203)
Connection 96 × Connection Lost × (cash flow/capital)			0.0229 (0.659)
Connection 96 × Connection Lost × lagged Tobin's Q			0.0218 (0.592)
Connection 96 × Connection Lost × (lagged sales/capital)			−0.0023 (0.787)
Connection 96 × Connection Lost × (lagged cash stock/capital)			−0.0512* (0.070)
Connection 96 × Connection Lost dummy			−0.0035 (0.918)
Year 2000 dummy	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes
Observations	511	511	508
Adjusted R ²	0.2924	0.2630	0.2872

* The statistical significance at level of 10% is reported.

** The statistical significance at level of 5% is reported.

*** The statistical significance at level of 1% is reported.

5.2. Regression analysis

The results of the regression analysis examining the determinants of the investment decisions of Thai companies and assessing the cash flow sensitivity in the pre-crisis (1995 and 1996) and post-crisis years (1999 and 2000) are presented in Table 7.¹⁶ As expected, the cash flow coefficient is positive and significant, and this is true in both the pre- and post-crisis period. However, the coefficient of the cash flow variable, while still significant, is much smaller than in the pre-crisis period having dropped from pre-crisis values of 0.47 and 0.32 to a mere 0.08 after the crisis. Moreover, in the pre-crisis period, the marginal effect of cash flow for connected companies (as measured by the coefficient on the interaction term of

Connection times Cash flow), is statistically significant and negative. Thus, before the crisis, we cannot reject Hypothesis (1) that connected firms have lower cash-flow sensitivity of investment than other companies. However, after the crisis, the interaction term of Connection times Cash flow is no longer statistically significant. Based on these results we cannot reject Hypothesis (2) that the crisis reduced the difference between connected and unconnected firms in terms of the cash flow sensitivity of their investment.

In the analysis just presented, sample companies were sorted on the basis of the composite connections measure (CONN1–4) as measured in a given sample year. That is, firm-year observations were sorted into connected and unconnected in the pre-crisis sample period on the basis of the connections measure observed for years 1995 and 1996. They were then re-sorted post-crisis on the basis of connections observed in 1999 and 2000. The difference in the numbers of connected companies between the two periods is almost entirely due to companies losing connections (primarily due to ownership changes of financial institutions) during the crisis; the number of companies that newly acquire connections in the post-crisis period is very small. To examine what happens post-crisis to companies that had connections before the crisis, and to test directly the impact of losing connections during the

¹⁶ Descriptive statistics of the variables used in estimating Eq. (1) are shown in Table 3 and discussed in Section 4.3. Table 4 above shows pairwise correlation coefficients between variables in the OLS specification (1) for the full sample (1697 firm-year observations) between 1995 and 2000. As shown in the first column of results, the investment measure, the dependent variable in Eq. (1), is significantly correlated with all the independent variables, indicating the impact of financial factors on firms' investment behaviour. At the same time, the correlations among the independent variables, while statistically significant, are all below 0.45, so we can conclude that multicollinearity is not a problem in this specification.

crisis, we re-estimate the post-crisis regression model using two interaction terms instead of the connection dummy used before. The first dummy, *Connection* 96, measures connections (based on the composite measure *CONN1–4*) as evaluated on the basis of 1996 data. The second (*Connection Lost*) measures whether a company connected in 1996 had lost its connection as of 1999: the dummy is coded one for companies connected in 1996 and unconnected based on 1999 data, and zero otherwise.

The results of this analysis shown in Table 8 confirm our earlier findings: interacting the cash flow variable with either of the two interaction terms (*Connection* 96 interacted with the cash flow variable, and *Connection Lost* times the cash flow measure) generates no significant marginal cash flow effects on investment over and above the impact of un-interacted cash flow. That is, in the post-crisis period, it no longer matters to the cash-flow sensitivity of investment whether a company has connections (based on

pre-crisis connections data) or whether it lost these connections during the crisis.

5.3. Extensions and robustness tests

In this section we extend our analysis in various ways in order to investigate the precise nature and robustness of our results on the impact of connections on *investment–cash* flow sensitivity. First, we examine whether it is the connections through ownership or those through board membership, or both, that drive our results. The model reported in Table 9 replaces the broad connection measure (*CONN1–4*) used above with separate measures for ownership connections (*CONN1*) and pure board connections (*CONN2–4*). See Section 4.1 for definitions of the measures. The effects of each of the two separate measures are qualitatively similar to those of the broad connection measure *CONN1–4*. The marginal effects of *connections* (as measured by *Connection* interacted *Cash flow*) are statistically significant and negative pre-crisis but insignificant post-crisis for both ownership-connected firms (*CONN1* interacted with *Cash flow*) and board-connected firms (*CONN2–4* interacted with *Cash flow*). The ownership connection effect is however significantly stronger with the *CONN1*-based interaction term having a coefficient (*–0.504*) that is significantly larger in absolute terms than that for board connections measured by *CONN2–4* (*–0.309*). In conclusion, both ownership connections and board connections reduce *investment–cash* flow sensitivity, but the former type is more effective.

Next, we explore ownership connections further. Our earlier analysis of the determinants of connections in Section 4 (Table 6) found a highly significant association between ownership connections (*CONN1*) and business group membership. Now we investigate whether business group membership is in fact driving our

Table 9

Investment–cash flow sensitivity: ownership and board connections. This table reports the results of the pooled OLS regression in the pre-crisis and post-crisis periods. The dependent variable is the investment scaled by capital at the beginning of the year. Cash flow is net income plus depreciation and depletion during the year. Capital is property, plant and equipment at the beginning of the period. Proxy of lagged Tobin's Q is the ratio of market value of assets to book value of assets at the beginning of the period. Lagged cash stock is cash on hand and at banks plus short-term investment at the beginning of the year. Lagged sales is total sales at the beginning of the period. Connections are proxied using two separate measures. The ownership connection measure (*CONN1*) is one if a firm has an ownership connection with a bank, and zero otherwise. The board connection dummy measures pure board connections (without any ownership connections) and is defined as *CONN 2–4* = 0 if *CONN1* = 1 AND (*CONN2* = 1 OR *CONN3* = 1 OR *CONN4* = 1), and zero otherwise. The White's standard errors are adjusted for heteroskedasticity. The regression controls for industry effects and year effects. The figures in parentheses report *p*-value for two-tailed tests.

Dependent variable: investment/capital	Pre-crisis 95–96	Post-crisis 99–00
Constant	0.028 (0.590)	–0.003 (0.953)
Cash flow/capital	0.467*** (0.000)	0.077*** (0.000)
Lagged Tobin's Q	–0.016 (0.479)	0.064 (0.140)
Lagged sales/capital	–0.005 (0.659)	0.008 (0.224)
Lagged cash stock/capital	–0.034 (0.270)	0.042 (0.523)
<i>CONN1</i> × (cash flow/capital)	–0.504*** (0.000)	0.041 (0.402)
<i>CONN1</i> × lagged Tobin's Q	0.086** (0.033)	–0.033 (0.620)
<i>CONN1</i> × (lagged sales/capital)	0.030* (0.075)	0.013 (0.287)
<i>CONN1</i> × (lagged cash stock/capital)	0.025 (0.540)	0.159 (0.134)
<i>CONN1</i> dummy	–0.110 (0.131)	–0.016 (0.811)
<i>CONN2–4</i> × (cash flow/capital)	–0.309*** (0.001)	–0.029 (0.651)
<i>CONN2–4</i> × lagged Tobin's Q	0.061* (0.084)	0.043 (0.431)
<i>CONN2–4</i> × (lagged sales/capital)	0.009 (0.466)	0.009 (0.391)
<i>CONN2–4</i> × (lagged cash stock/capital)	0.076 (0.051)	–0.059 (0.399)
<i>CONN2–4</i> dummy	–0.064 (0.289)	–0.041 (0.439)
Year dummy	Yes	Yes
Industry dummy	Yes	Yes
Observations	575	531
Adjusted R ²	0.256	0.2853

* The statistical significance at level of 10% is reported.

** The statistical significance at level of 5% is reported.

*** The statistical significance at level of 1% is reported.

Table 10

Robustness check: the impact of business group on investment–cash flow sensitivity. This table reports the results of the pooled OLS regression in the pre-crisis and post-crisis periods. The dependent variable is the investment scaled by capital at the beginning of the year. Cash flow is net income plus depreciation and depletion during the year. Capital is property, plant and equipment at the beginning of the period. Proxy of lagged Tobin's Q is the ratio of market value of assets to book value of assets at the beginning of the period. Lagged cash stock is cash on hand and at banks plus short-term investment at the beginning of the year. Lagged sales is total sales at the beginning of the period. Business group is a binary variable that equals 1 if a firm belongs to the top 60 family business groups in the country, and zero otherwise. The White's standard errors are adjusted for heteroskedasticity. The regression controls for industry effects and year effects. The figures in parentheses report *p*-value for two-tailed tests.

Dependent variable: investment/capital	Pre-crisis 95–96	Post-crisis 99–00
Constant	–0.015 (0.764)	–0.027 (0.561)
Cash flow/capital	0.143** (0.010)	0.103*** (0.003)
Lagged Tobin's Q	0.033* (0.083)	0.077*** (0.001)
Lagged sales/capital	0.010* (0.062)	0.011** (0.020)
Lagged cash stock/capital	0.030 (0.112)	0.027 (0.459)
Business group dummy × (cash flow/capital)	–0.011 (0.876)	–0.046 (0.263)
Business group dummy	0.023 (0.399)	–0.004 (0.822)
Year dummy	Yes	Yes
Industry dummy	Yes	Yes
Observations	575	531
Adjusted R ²	0.2198	0.2813

* The statistical significance at level of 10% is reported.

** The statistical significance at level of 5% is reported.

*** The statistical significance at level of 1% is reported.

Table 11

Robustness check: the fixed effects regression. This table reports the results of the fixed effects regression in the pre-crisis and post-crisis periods. The dependent variable is the investment scaled by capital at the beginning of the year. Cash flow is net income plus depreciation and depletion during the year. Capital is property, plant and equipment at the beginning of the period. Proxy of lagged Tobin's Q is the ratio of market value of assets to book value of assets at the beginning of the period. Lagged cash stock is cash on hand and at banks plus short-term investment at the beginning of the year. Lagged sales is total sales at the beginning of the period. Connection is a dummy variable based on the broad definition CONN1–4, and coded 1 if a firm is connected to bank(s) through either ownership or board connections, and zero otherwise. The model includes an interaction term between the connection dummy and cash flow. The figures in parentheses report *p*-value for two-tailed tests.

Dependent variable: investment/capital	Fixed effect	
	Year 1994–1996	Year 1999–2001
Constant	0.096 (0.194)	0.002 (0.951)
Cash flow/capital	0.404*** (0.000)	0.007 (0.698)
Lagged Tobin's Q	0.000 (0.999)	0.015 (0.368)
Lagged sales/capital	0.013 (0.233)	0.033*** (0.000)
Lagged cash stock/capital	−0.038 (0.245)	−0.026* (0.075)
Connection × (cash flow/capital)	−0.304*** (0.003)	−0.019 (0.503)
Connection dummy	0.153** (0.048)	0.061** (0.046)
Observations	683	788
R ² within	0.0806	0.1052
R ² between	0.1232	0.1060
R ² overall	0.1056	0.1307

* The statistical significance at level of 10% is reported.

** The statistical significance at level of 5% is reported.

*** The statistical significance at level of 1% is reported.

results on the effect of ownership connections on **investment–cash** flow sensitivity. We re-estimate the investment equation similar to the one presented in Table 7, but using the business group indicator instead of any connection measure(s). Our results in Table 10 show that the interaction term of business group and cash flow is not statistically significant either pre- or post-crisis. Therefore, it appears that it is in fact ownership (and board) connections that drive our results, not merely business group membership. Recall that our definition of ownership connections (CONN1) captures how firms are connected to financial institutions, not only through the structure of business group, but also via individual shareholders. It appears that it is these additional links that go beyond mere membership in a business group that caused connections to reduce **investment–cash** flow sensitivity before the crisis.

So far our analysis has employed pooled OLS controlling for year and industry effects. The year and industry controls deal with any fixed effects that affect entire industries or arise in a given year. Now we address the issue of firm-specific fixed effects that may be due to omitted firm-specific variables. We re-estimate a parsimonious investment equation similar to the model in Table 7 controlling for firm-specific fixed effects. The fixed-effects estimation involves calculating the deviation of variables from the firm-specific mean, and hence requires lagged observations. To allow for the lags while keeping 2 year in each of the pre- and post-crisis periods, we extend our sample period by 2 years (for the financial and accounting variables). The pre-crisis sample now starts in 1994 and the post-crisis sample ends in 2001. The measure of connections is based on the broad definition CONN1–4.¹⁷ The results in Table 11 confirm the robustness of our earlier results: before the

crisis, cash flow and the interaction term of connections and cash flow are significant showing that connections reduce much of the **investment–cash** flow sensitivity, but after the crisis the connection effect disappears. In fact, in this model we find no significant **investment–cash** flow sensitivity after the crisis: the cash-flow coefficient is much smaller than in the OLS regression in Table 7 and statistically insignificant.

Finally, we allow for the dynamic nature of the investment equation by including the lagged dependent variable. To account for the endogeneity of the lagged dependent variable, we estimate the investment equation using the Generalised Method of Moments, GMM, following Arellano and Bond (1991). To maximise the numbers of available time-series observations, we use the extended sample period 1994–2001 for the accounting and financial variables and pool the pre- and post-crisis samples. As before, connections are measured broadly using CONN1–4. The results shown in Table 12 corroborate our earlier findings.

Before the crisis we find significant **investment–cash** flow sensitivity that is largely offset by connections (based on the coefficients of cash flow and of connections interacted with cash flow). However, after the crisis, **investment–cash** flow sensitivity almost disappears (comparing the coefficients of cash flow and of the interaction of the post-crisis dummy with cash flow). And (most of) the effect of connections also disappears after the crisis. The total effect of connections on cash flow after the crisis is small and statistically insignificant. It is measured here by the sum of the coefficient of connections interacted with cash flow plus the coefficient of the post-crisis dummy interacted with connections and cash flow.

Table 12

Robustness check: GMM estimation of the dynamic model. This table reports the results of the GMM regression. The dependent variable is the investment scaled by capital at the beginning of the year. The model includes the lagged dependent variable as an explanatory variable. Cash flow is net income plus depreciation and depletion during the year. Capital is property, plant and equipment at the beginning of the period. Proxy of lagged Tobin's Q is the ratio of market value of assets to book value of assets at the beginning of the period. Lagged cash stock is cash on hand and at banks plus short-term investment at the beginning of the year. Lagged sales is total sales at the beginning of the period. Connection is a dummy variable based on the broad definition CONN1–4, and coded 1 if a firm is connected to bank(s) through either ownership or board connections, and zero otherwise. Post-crisis is a dummy variable that equals 1 if an observation is in 1997–2001, and zero otherwise.

Dependent variable: investment/capital	Pooled sample
Constant	−0.0059 (0.393)
Lagged (investment/capital)	0.2369*** (0.000)
Cash flow/capital	0.3317*** (0.002)
Lagged Tobin's Q	0.0166 (0.432)
Lagged sales/capital	0.0572*** (0.000)
Lagged cash stock/capital	0.0397 (0.266)
Connection × (cash flow/capital)	−0.2258** (0.039)
Connection dummy	0.0247 (0.286)
Post-crisis × (cash flow/capital)	−0.3079*** (0.003)
Post-crisis dummy	−0.0073 (0.808)
Connection × post-crisis × (cash flow/capital)	0.2067* (0.064)
Observations	1339
Wald (χ^2)	112.48
Sargan (χ^2)	37.11

* The statistical significance at level of 10% is reported.

** The statistical significance at level of 5% is reported.

*** The statistical significance at level of 1% is reported.

¹⁷ Firm-year observations are categorised into connected and unconnected based on the firm's values of the broad connections measure CONN1–4 in 1995 (for the pre-crisis period) and 1999 (for the post-crisis period).

Fixed-effects and GMM estimations are usually applied to panel data over sample periods much longer than ours. In our panel with many cross-sectional observations but relatively few time periods, these methods are likely to produce inefficient estimates. To maximise our number of time periods in the GMM estimation we pool the extended pre- and post-crisis periods (1994–2001). One limitation of pooling the two sub-periods is the presence of a structural break between the pre- and post-crisis periods: a Chow tests rejects the equality of the pre- and post-crisis parameters. Interacting (some of) the explanatory variables with a post-crisis dummy in the GMM model is intended to address this. Our robustness checks using the fixed-effects and GMM methods produce results that broadly confirm our pooled OLS results. Since each of these methods has strengths as well as weaknesses in the context of our sample, the main part of our analysis in Section 5.2 above uses the method that is most widely used and easy to interpret, viz. pooled OLS.

In conclusion, we report robust results showing that before the 1996–1997 crisis bank connections in Thailand reduced the otherwise significant investment–cash flow sensitivity, but after the crisis the connections effect disappears and the investment–cash flow sensitivity of both connected and unconnected firms is much reduced (or completely vanishes).

One possible interpretation of these results is that pre-crisis, connections facilitated firms' investment and reduced financial constraints faced by companies consistent with the findings of Hoshi et al. (1991) and Shen and Wang (2005). However, after the crisis, bank connections lost their value as connected companies no longer had significantly lower cash flow sensitivity of investment than other companies. The restructuring and reforms in the Thai economy, specifically in the banking and financial sector, during the financial crisis appear to have diminished the role of bank connections in allocating bank financing, e.g. by reducing the number of family-owned financial institutions. In addition, alternative sources of external finance have played a greater role after the crisis, as shown by the increased funds raised in the equity and bond markets (see Table A2 and Fig. 1 in Appendix A). Thus, the crisis and the restructuring and reforms in its wake, transformed both banks (in terms of ownership, governance and lending practices), and capital markets resulting in more efficient corporate investment decisions and eliminating the need for bank connections to achieve efficient investment.

6. Conclusions

This paper finds that connections between firms and banks were commonly found in Thailand before the East Asian Financial Crisis in 1997–1998 mainly because of family ownership of banks and finance companies and through board connections between companies and financial institutions. However, the restructuring of the banking and financial industry during the crisis significantly affected bank connections through the restructuring of the ownership and the reform of the governance of financial institutions. We report a significant drop in the number and percentage of bank connected companies from the pre- to the post-crisis period. We measure connections in four different ways focusing on both ownership and board links. We highlight a particularly dramatic effect of the crisis and the resulting financial-sector restructuring of the financial sector: the virtual disappearance of corporate shareholders on bank boards.

We examine the determinants of connections and find that the likelihood of having ownership connections with banks is greater for companies that are part of a business group but the business group effect on connections is substantially reduced after the crisis. Financial distress of a firm increased the likelihood of bank

connections before the crisis, but after the crisis distressed firms become less likely to be connected with banks because in response to bankruptcy reforms banks now take an arms-length approach when dealing with distressed firms.

Focusing on corporate investment decisions we find that capital expenditure is sensitive to internal cash flows both before and after the crisis. However, after the crisis the cash flow sensitivity is reduced to less than one sixth of the pre-crisis coefficient. The cash flow sensitivity is lower for connected than non-connected firms in the pre-crisis period, but connections no longer affect the cash flow sensitivity after the crisis. These results are qualitatively robust to variations in the estimation method. Both ownership and board connections (when measured separately) have a similar effect, but the former is stronger. The ownership effect appears to be driven by links among individual shareholders not through business group membership of companies.

Overall, our results suggest that the financial sector restructuring in Thailand in the wake of the crisis has had a dramatic impact on the corporate sector and specifically on corporate investment decisions. Before the crisis, families owned the vast majority of financial institutions that were influential in allocating bank capital to Thai firms providing connected firms with preferential access to bank loans. After the crisis, following restructuring and reforms of the financial sector, family control of financial institutions is rare, and the capital markets have become an alternative source of external funds to finance corporate investment. As a result, bank connections no longer affect corporate investment decisions. The fact that corporate investment is less sensitive to cash flow for all companies after the crisis suggests that investment decision have become more efficient. Cash-flow sensitive investment perpetuates shocks (to cash flow) from one period to the next (through lower investment). Our finding that the investment–cash flow sensitivity is significantly lower after the crisis also suggests that the Thai corporate sector is less prone to protracted downturns than before the crisis.

The events during the Thai crisis exemplify the effects of crises in facilitating fundamental change both by reducing resistance to regulatory change and through market processes. Our results show that these mechanisms led to a dramatic reduction in the prevalence of connections. This suggests that policy makers should treat crises as windows of regulatory opportunity.

Our paper also highlights the central role played by the financial sector, and illustrates how financial-sector restructuring and reform can substantially impact the corporate sector. Our study documents that the changes in the Thai financial sector filtered through to the corporate sector in terms of measurable changes in real investment behaviour. Consistent with our findings, another study reports an increase in the cost of equity faced by Thai family

Source of corporate financing in Thailand 1995–2000

Fig. 1. Sources of corporate financing in Thailand 1995–2000.

Table A1

Thailand economic indicators. Source: Bank of Thailand.

	1995	1996	1997	1998	1999	2000
<i>Gross domestic product</i>						
GDP at constant 1988 price (billions of USD)	118.0	122.9	97.9	66.5	75.9	74.9
(% change)	10%	4%	–20%	–32%	14%	1%
GDP at constant 1988 price (billions of Baht)	2941.7	3115.3	3072.6	2749.6	2871.9	3008.4
(% change)	9%	6%	–1%	–11%	4%	5%
<i>Exchange rate</i>						
Baht: US\$ (reference rate) average (Baht: 1 USD)	24.92	25.34	31.37	41.37	37.84	40.16

Table A2

Sources of corporate financing 1995–2000. Sources: Bank of Thailand; Securities and Exchange Commission of Thailand and the Thai Bond Dealing Centre.

Unit	Billion USD					
Year	1995	1996	1997	1998	1999	2000
Net new bank loans*	18	18	38	–10	–3	–16
Net new finance–company loans**	8	6	–18	–1	–6	–1
Equity issues***	3	3	1	3	7	2
Corporate bond issues***	3	5	1	1	8	4

* Net new bank loans are defined as the changes relative to the previous year in the amounts of commercial banks' outstanding loans to businesses.

** Net new finance–company loans are defined as the changes relative to the previous year in the amounts of outstanding loans and receivables of finance companies to businesses.

*** Equity and corporate bond issues are proceeds of equity and debt securities offerings, respectively.

companies after the crisis (Boubakri et al., 2010).¹⁸ Our study may serve as a reminder to policy makers that financial-sector crises and reforms can have substantial, measurable effects on the real economy.

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Appendix A

See Tables A1 and A2.

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¹⁸ Our results suggest an interpretation of the findings of Boubakri et al. unlike that of the authors: they argue that outside investors only became aware of the entrenchment costs of family ownership after the crisis. Our findings suggest that before the crisis the entrenchment costs of family ownership were offset by the benefits from the availability of cheap debt through family banks. However, after the crisis when family links were severed from the banks, the costs offset the benefits thus increasing the cost of equity.

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