

# Bank Relationships and Their Effects on Firm Performance around the Asian Financial Crisis: Evidence from Taiwan

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*We evaluate the impact of bank relationships on firm performance for a sample of Taiwanese firms around the 1997 Asian financial crisis. We find a negative relation between the number of domestic-bank relationships and firm performance, but a positive relation between the number of foreign-bank relationships and firm performance. Firms explored new relationships with domestic banks and reduced their reliance on foreign banks during the crisis. Lending bank reputation and bank loan ratios are important factors explaining firm performance. Factors that affect banking relationships include borrowing firms' profitability, age, size, and leverage, and the primary lending bank's characteristics.*

Although worldwide financial deregulation and disintermediation have created a new environment for commercial banking, bank financing remains important in emerging markets. Yet, very few studies examine the effect of bank relationships on firm performance in developing countries.

We try to fill this gap by examining bank relationships in one emerging market in Asia. We differentiate the impacts of foreign- and domestic-bank relationships on firm performance, and investigate whether the relation between bank relationships and firm performance changed during a particular financial crisis.

As Claessens, Djankov, and Lang (1998) report, firm financial structures and legal systems in East Asia are very different from those in developed countries. A study on the choices of single- or multiple-bank relationships and the number of bank relationships in Asian markets is warranted.

Studies analyzing the impact of foreign bank entities use mainly bank-level data (Berger, Klapper, and Udell, 2001, Claessens, Demirguc-Kunt, and Huizinga, 2001, and Clarke, Cull, Peria, and Sanchez, 2001). These studies examine the effect of a foreign bank entity on the host country's economy and banking system, and the availability of credit to small businesses. We use firm-level data to analyze the impact of foreign-bank relationships from a different perspective. We also examine whether the impact of foreign-bank relationships on local firm performance changed during the 1997 Asian financial crisis.

We analyze a sample of Taiwanese firms for changes in lending relationships. We find a significant shift in firms' number of bank relationships during the Asian financial crisis. The number of foreign-bank relationships declined, while the number of domestic-bank relationships rose. The bank loans-to-total loan ratio dropped during the crisis, as the proportion of domestic (foreign) bank loans rose (dropped). This finding indicates that firms are more closely related to domestic banks in a time of financial difficulty. Foreign-bank and domestic-bank relationships have different effects on firm performance. Firm performance improves as the number of foreign-bank relationships increases, but worsens as the number of domestic-bank relationships increases.

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There is no significant association between the choices of single- or multiple-bank relationships and firm performance, but we find a negative association between firm performance and the percentage of bank loans. Bank reputation exhibits a significant and positive relationship with firm performance, implying that high-quality banks play an effective certification and monitoring role.

The paper is organized as follows. Section I reviews the literature on banking relationships. Section II delineates the difference between domestic- and foreign-bank relationships. Section III describes the model specifications, the variables, and the hypotheses. Section IV describes the data and analyzes empirical results. Section V concludes the paper and discusses the policy implications of our findings.

## I. Literature Review

We divide our review into theoretical and empirical work.

### A. Firm Value and Banking Relationships

Bank loans can enhance firm performance for several reasons. Fama (1985) argues that bank loans avoid the high information costs incurred in public debt offerings. Yosha (1995) suggests that private debt reduces the risk that information will be revealed to rival firms, and thus keeps disclosure cost low. Reductions in these costs should improve firm performance.

Another advantage of bank loans is their ability to serve a monitoring purpose. The more credit offered by a bank, the greater the degree of monitoring of the borrower. Bank monitoring can mitigate the asset substitution and underinvestment problems, and thereby increase firm value.

Bank loans also allow firms to establish a good reputation, which can reduce a firm's cost of capital or increase the availability of credit. Banks with a more prominent reputation are expected to play a more effective certification role. Sharpe (1990) suggests that bank reputation can reduce the inefficient allocation of capital. Unlike public debt, bank loans provide borrowers with valuable flexibility in loan renegotiation.

Although theories suggest bank loans have a positive impact on firm performance, whether single- or multiple-bank relationships are more desirable remains an open question. The impact of the number of bank relationships depends on firm characteristics. A single-bank relationship has the benefits of: reducing information costs (Diamond, 1984); reducing borrowing costs; and avoiding the broadcast of private information (Padilla and Pagano, 1997). Diamond argues that a single bank is enough to resolve the problem of information asymmetries. Multiple-bank relationships can serve the same function, but at higher costs. In fact, there is less of a free rider problem in the case of a single creditor. A single creditor has a stronger incentive to monitor its borrowers and thus can exert a positive impact on the firm's performance.

In a competitive market, transmission of proprietary information to competitors may be fatal. There is much less likelihood that confidential information will be leaked if a firm borrows from one bank rather than several banks (von Rheinbaben and Ruckes, 1998). All these merits of a relationship with a single bank suggest a negative relationship between the number of banking relationships and firm performance.

At the same time, multiple-bank relationships may enhance firm performance for several reasons. First, as Rajan (1992) and von Thadden (1998) claim, a single bank may take advantage

of its monopoly power over information about a borrowing firm. The information lock-in problem and resulting hold-up costs may adversely affect a firm's value. Multiple-bank relationships can eliminate such problems.

Second, multiple-bank relationships can diversify liquidity risk. Detragiache, Garella, and Guiso (2000) show that multiple-bank relationships can reduce the risk of premature liquidation. Bolton and Scharfstein (1990) classify default into two types: strategic default, and liquidity default. Strategic default occurs when managers try to divert cash to themselves. Liquidity default occurs when a firm fails to fulfill its debt obligation. Bolton and Scharfstein (1996) note that multiple-bank relationships can reduce the likelihood of strategic default, as borrowing firms will have to negotiate with multiple creditors.

## B. Empirical Evidence

Many authors examine the market response to bank loan announcements (James, 1987; Lummer and McConnell, 1989; Slovin, Johnson, and Glascock, 1992; and Best and Zhang, 1993). In general, these studies find a positive price response when a loan or line of credit is announced, and imply that bank loans have a positive impact on firm performance. Kang and Stulz (2000), however, find that Japanese firms with higher percentages of bank loans performed more poorly than firms without bank loans during 1990-1993, when Japanese banks experienced a shock due to a collapse in the stock market.

Most empirical studies find evidence in favor of a single-bank relationship. Petersen and Rajan (1994) find that multiple lending relationships result in higher borrowing costs and reduced availability of credit. Angelini, Di Salvo, and Ferri (1998) report a negative effect of the number of banking relationships for a sample of Italian firms. Foglia, Laviola, and Reedtz (1998) find a strong association between multiple-bank relationships and firm risk. Cole (1998) and Harhoff and Korting (1998) find that multiple-bank firms actually have less access to credit than single-bank firms.

Machauer and Weber (2000) show that a higher number of bank relationships is associated with lower levels of collateralization, implying a negative relationship between bank negotiation power and competition among banks. Degryse and Ongena (2001) find that Norwegian firms with a single-bank relationship are substantially more profitable.

Weinstein and Yafeh (1998) find that main-bank clients in Japan are less profitable and grow more slowly than their industry peers. This result provides some evidence of the negative impact of monopoly power over borrower information in a close banking relationship. Billett, Flannery, and Garfinkel (1995) provide evidence on the importance of bank reputation. They show that lenders with higher credit ratings are associated with higher abnormal borrower returns.

## II. Domestic vs. Foreign Bank Relationships

Foreign- and domestic-bank relationships should be different in several respects. Foreign banks do not rely on local deposits and can raise equity capital internationally. Due to diversification and the resulting lower cost of capital, foreign banks might provide a price advantage to borrowers in host countries by charging lower interest rates than domestic banks. Borrowing from foreign banks also allows firms to diversify their funding sources and establish a reputation in international markets.

Even in the absence of a comparative cost advantage, foreign banks may price products

below domestic competitors in order to capture market share. According to Greenwich Associates (1988), competitive loan pricing is the main reason US corporations use foreign banks.

Differences in regulatory requirements may also reduce costs for foreign banks. As Claessens et al. (2001) suggest, foreign banks in developing countries may have higher interest margins, as they are exempt from credit allocation regulation and other restrictions. A bank cost advantage is likely to reduce a borrower's interest costs and improve its operating performance.

The impacts of a foreign-bank relationship are not all positive. Foreign lending may be more sensitive to an economic shock in the host country. Domestic borrowers may be affected by cyclical conditions in bank home countries. During crises, foreign banks may curtail their credit supply to a host country, exacerbating local economic problems. For example, during the 1990s, when the economic bubble burst in Japan, Japanese bank subsidiaries reduced their lending in US commercial real estate markets, which adversely affected real economic activity in the US (Peek and Rosengren, 2000).

A fundamental difference between foreign- and domestic-bank relationships is that most foreign-bank lending is transactional rather than relationship lending. The distinctive feature of relationship loans is repeated borrower-lender interactions. Repeated interactions allow the creditor to accumulate information about borrowers and enhance monitoring, and thus may improve firm performance. Transaction loans provide only limited monitoring and information benefits (Boot and Thakor, 2000).

Focarelli and Pozzolo (2000) show that banks with an international presence tend to be large, and large banks are less likely to provide relationship lending. Domestic banks place more value on long-term customer relationships, and a close relationship leads to greater availability of credit in general. Domestic banks may even continue to supply credit to firms during times of distress, following government guidance.

Foreign banks do not play as much of a monitoring role as local banks do. This has an important implication for the influence of domestic- and foreign-bank relationships on firm performance.

There is evidence that the nationality of lending banks does matter. Billett et al. (1995) find that loans to US corporations by foreign lenders result in significant increases in the value of the borrower's equity. Similarly, Byers, Fraser, and Shockley (1998) show that market responses to bank loan announcement are related to lender identity. Company announcements of bank loans by foreign banks in particular lead to positive market responses.

### III. Model Specification, Variables, and Hypotheses

We assess the impact of bank relationships on firm performance through pairwise analysis and simultaneous equation estimations. The pairwise analysis compares the performance of subsamples classified by the value of various bank relationship variables. The simultaneous equation models take account of a possible reverse causality from firm performance to bank relationships. We estimate six simultaneous equation specifications. In each specification, we estimate a performance equation jointly with a bank relationship equation.

#### A. Performance Equations

We measure firm performance by return on assets (ROA). We use ROA because it has the advantage of being independent of the firm's liability structure (see Mehran, 1995). All our sample firms are leveraged, with an average debt-to-asset ratio of 40%. We believe ROA is a better performance measure for our sample than return on equity (ROE), which is more

suitable to measure performance for all-equity firms.

As our proxies for bank relationships we use six variables: a dummy variable (MULTIPLE) that equals one for firms with multiple-bank relationships, and zero otherwise; the number of banking relationships (NUM); the number of foreign-bank relationships (FNUM); the number of domestic-bank relationships (DNUM); the percentage of bank loans to total loans (BLR); and the reputation of the lending bank (REP), a proxy for bank quality. To take account of skewed distributions, we take natural logarithms for the bank relationship variables as follows: number of total bank relationships (LNUM), number of foreign-bank relationships (LFNUM), number of domestic-bank relationships (LDNUM), and bank reputation (LREP).

The number of bank relationships is a good complementary measure for the simple dichotomy of single- and multiple-bank relationships. The numbers can proxy for competition among banks, which presumably influences loan terms. Loan terms in turn affect firms' cost of funding and their operating performance.

In each performance equation, one of the above six bank relationship variables is included as an explanatory variable. We include as explanatory variables borrowing firm age (AGE), size (SIZE), growth opportunities (DEP), leverage (LEVERAGE), lending-bank membership on the borrower's board of directors (BOARD), and CEO power (CEO). These variables have been found important in explaining firm performance in other research.

The performance equation is specified as:

$$\text{ROA} = a_0 + a_1(\text{Banking Relationship Variable}) + a_2 \text{AGE} + a_3 \text{SIZE} + a_4 \text{DEP} + a_5 \text{LEVERAGE} + a_6 \text{BOARD} + a_7 \text{CEO} \quad (1)$$

There is no unambiguous prediction of the impact of numbers of bank relationships on firm performance. There would be a negative relation between firm performance and numbers of bank relationships if more bank relationships reduce the efficiency of bank monitoring, cause a more severe information leakage problem, and increase costs of coordinating with lending banks. There would be a positive relation, on the other hand, if more bank relationships reduce the premature liquidation of profitable investments, solve the information hold-up problem, and result in lower borrowing costs and less stringent loan terms.

Foreign banks provide mainly transaction lending and offer limited information and monitoring benefits. As a result, reduced monitoring benefits may not be an issue with more foreign-bank relationships. If foreign banks do offer price advantages and geographic diversification to borrowing firms, firm performance would improve with more foreign-bank relationships. The benefit would be reduced during a crisis if foreign-bank lending is sensitive to a host country's economy, and lending is curtailed.

The bank loan ratio (BLR) is our proxy for firms' dependence on banks. The overall impact of the BLR depends on the trade-off between the benefits and the costs of bank relationships.

A high-quality bank should be able to monitor borrowing firms more effectively, which would lead to better firm performance. Therefore, we expect a positive relation between the bank reputation variable (REP) and performance.

We develop an index of reputation for lending banks from a list of the top 1,000 banks published by *The Banker*. Initially, REP is a weighted average ranking of the lending banks, where the weight is the ratio of a particular bank's loan to the firm's total bank loans. For banks not included in *The Banker* top 1,000 list, we assign a rank of 1,001 to the bank with the highest net worth, 1,002 to the bank with the second-highest net worth, and so on. The lowest ranking in our sample is 1,008. For easier interpretation, we specify reputation by

deducting REP from 1,008. In this way, a higher number indicates a higher ranking.<sup>1</sup>

Firm age (AGE) is our proxy for flexibility and management efficiency. Older firms are more likely to have a rigid administrative process and more bureaucracy. Investment opportunities may be limited for firms in the later stages of their life cycles. We expect a negative relation between AGE and performance, where AGE equals the natural log of the number of years since the firm was founded.

Large firms may have more market power and better access to capital, which should lead to higher profits. As the same time, size and performance may be negatively related because of diseconomies of scale or exacerbated agency problems. These factors together make the net impact of firm size on firm performance ambiguous. We measure firm size by the natural log of total assets (SIZE).

Growth opportunities enhance firm performance. We follow Krishnaswami, Spindt, and Subramaniam (1999) by using the ratio of depreciation expenses to sales (DEP) as a proxy for growth opportunities. The more tangible assets, the higher the depreciation ratio, and the lower the growth opportunity. We expect a negative relationship between ROA and DEP.

The impact of leverage on firm performance cannot be determined. The agency theory of free cash flow postulates that leverage can deter suboptimal investments and retard managers' consumption of perquisites. Any reduction in non-value-maximizing activities most likely enhances firm performance. High financial risk, however, may make it hard for a firm to raise the funds necessary to pursue profitable investments, and thus reduces profitability. We measure leverage (LEVERAGE) by the ratio of long-term debt to total assets.

If a lending bank is represented on the board of the borrowing firm, we expect bank monitoring to be more effective. We use BOARD as a dummy variable with a value of one if any lending bank officer is on the board, and zero otherwise. We expect BOARD to have a positive impact on firm performance.

Corporate governance mechanisms in Asian countries may not be as effective as those in developed countries, and the power of the chief executive officer may affect firm performance. The dummy variable (CEO) equals one if the chief executive officer has the dual position of chairman of the board, and zero otherwise. We expect more severe agency problems when a chief executive officer is also the board chair, which would have a negative impact on firm value.

## B. Banking Relationship Equations

We examine the relation between the choices of single- or multiple-bank relationships and firm performance following the method used by Degryse and Ongena (2001). In the first stage, we use ordinary least squares regression to relate firm performance to a set of exogenous variables, and a probit analysis that regresses the bank relationship dummy, MULTIPLE, on the same set of exogenous variables. We retrieve the fitted values in the first-stage regressions and then use these fitted values as the endogenous variables in a two-equation model. For the other five bank relationship variables (LNUM, LFNUM, LDNUM, BLR, and LREP), we use the standard two-stage least squares estimation.

When MULTIPLE, LNUM, LFNUM, or LDNUM is the dependent variable in the bank relationships equation, we include as explanatory variables ROA, AGE, SIZE, multinational corporation (MNC), LEVERAGE, BOARD, family group (FAMILY), industrial group (GROUP), public debt (PUBLIC), interest coverage ratio (ICR), the largest lending bank's loan loss provision (LBLEV), debt-to-equity ratio (LBLEV), and return on equity (LBROE):

<sup>1</sup>For example, if a firm borrows an equal amount of funds from two banks with *Banker* rankings of 340 and 400, REP equals 370 [ $0.5(340) + 0.5(400)$ ] initially. The final value of REP is 638 ( $1,008 - 370$ ).

$$\begin{aligned} \text{Bank Relationship Variable} = & b_0 + b_1 \text{ROA} + b_2 \text{AGE} + b_3 \text{SIZE} + b_4 \text{MNC} + b_5 \text{LEVERAGE} \\ & + b_6 \text{BOARD} + b_7 \text{FAMILY} + b_8 \text{GROUP} + \\ & b_9 \text{PUBLIC} + b_{10} \text{ICR} + b_{11} \text{LBLLP} + b_{12} \text{LBLEV} + \\ & b_{13} \text{LBROE} \end{aligned} \quad (2)$$

The last three variables of the largest lending bank's characteristics are not included when the bank relationship variable is BLR or LREP.

Detragiache et al. (2000) suggest firm profitability is negatively related to the probability of multiple-bank relationships, but positively related to the number of bank relationships. Assuming the pecking order theory of capital structure holds, more profitable firms will rely more on internal funds, reduce bank loans, and borrow from fewer banks. As a result, profitability can be related to the number of bank relationships in either direction. We expect a negative relation between firm profitability and bank reputation, since the certification role that a better-quality bank plays is more important to non-profitable firms than profitable firms.

The relationship between firm age and the number of bank relationships is ambiguous. Although the adverse selection argument predicts a negative relation, the fact that it takes time to establish relationships with multiple banks implies a positive relation.

Firm age is negatively correlated with information and monitoring costs. Therefore, firms with a longer history rely more on public debt and less on private debt including bank loans. Long-established firms usually have a better reputation, and thus rely less on the certification role of well-known banks. A negative relation between firm age and bank reputation is expected.

We expect firm size to be positively related to all the bank variables except for the bank loan ratios. Large firms are more likely to borrow from high-quality banks, and have relationships with more banks to diversify credit risk. According to the monitoring and information cost argument, however, larger firms may rely less on bank loans. As firms grow larger, they can produce information required for public securities offerings more efficiently, and thus rely less on private debt.

A multinational corporation is likely to have more foreign-bank relationships than a domestic firm does for diversification purposes. We define MNC as a dummy variable that is equal to one for multinational corporations, and zero for domestic firms. The MNC definition is based on a list of firms with foreign direct investments compiled by the Ministry of Economic Affairs in Taiwan. We expect MNC to be positively related to all the bank relationship variables.

Financial leverage can be positively or negatively related to the number of bank relationships and bank reputation. Detragiache et al. (2000) predict highly leveraged firms to have more banking relationships because of more severe adverse selection problems. But, they find a significant and negative relation between leverage and the number of bank relationships, perhaps because it is difficult for firms with high financial risks to explore new bank relationships. Johnson (1997) suggests that because high-leverage firms have high credit risk, the monitoring role of a bank becomes more important. As a result, a more highly leveraged firm will borrow from more prominent banks, although a high-quality bank may be reluctant to lend to firms with high credit risk.

Bank representation on a board also is likely to ensure credit availability, so we expect a positive relationship between BOARD and bank loan ratio. As bank representation on boards tends to result in more intensive monitoring, there may be less of a need for certification by more prominent banks, and we would expect a negative relationship between BOARD and REP.

Fund transfer among members of a family or an industrial group is likely to reduce both a firm's reliance on bank borrowing and the optimal number of bank relationships. To take this into account, we include two dummy variables, FAMILY and GROUP. FAMILY is equal to

one if a family group controls the firm, and zero otherwise. A firm is controlled by a family group if more than one-third of directors are close relatives. GROUP is equal to one if a firm belongs to an industrial group, and zero otherwise.

The variables FAMILY and GROUP are expected to be negatively related to the numbers of bank relationships and bank loan ratio. Family group and industry group confer reputational capital, which can reduce the need for a firm to borrow from a prominent bank, implying a negative relationship between group affiliations and bank reputation.

The ability to raise funds in the capital market affects a firm's relationship with banks. To test this effect, we construct a dummy variable (PUBLIC) with a value of one when the firm has public debt, and zero otherwise. We expect a negative relationship between PUBLIC and bank loan ratio as well as number of bank relationships, assuming that public debt is a substitute for bank financing. Firms with access to capital markets tend to have less severe asymmetric information problems and rely less on the reputation of lending banks. A negative relationship between REP and PUBLIC is expected.

Higher liquidity indicates less probability of financial distress and a less severe adverse selection problem. More liquid firms may rely on fewer lending banks and have fewer bank loans. Firms with lower liquidity risk will find it easier to borrow from well-known banks. We measure liquidity by the interest coverage ratio (ICR).

To control for the possible impact of the primary bank's risk characteristics (following Berger et al., 2001), we include three primary bank variables in the bank relationship equations when MULTIPLE, LNUM, LFNUM, or LDNUM is the dependent variable. The three variables are the largest lending bank's loan loss provision (LBLLP), debt-to-equity ratio (LBLEV), and return on equity (LBROE). As LBLLP and LBLEV increase (and LBROE declines), there is less chance of financial distress for the largest lending bank. If the multiple-bank bank distress hypothesis holds, MULTIPLE, LNUM, LFNUM, and LDNUM should be positively related to LBLLP and LBLEV, but negatively related to LBROE.<sup>2</sup>

## IV. Data and Empirical Results

The initial sample consists of all firms traded on the Taiwan Stock Exchange. Financial corporations and firms with missing data are eliminated. The final sample comprises 178 firms in 19 industries.

Data on bank relationships and balance sheet data are obtained from the *Taiwan Economic Journal (TEJ)* database. Since *TEJ* provides detailed loan information starting in 1994, our sample period starts in 1994 and goes through 1998.

To test whether the nature of the bank relationship-firm performance link changes during the 1997 Asian financial crisis, the sample is divided into two subsamples: 1994-1996 and 1997-1998. There are 534 firm-year observations in the first subperiod and 356 in the second subperiod. Since the time period is relatively short, we use pooling data for each subperiod without using year dummies and lagged variables.

### A. Summary Statistics

The first three columns in Table I show summary statistics of the bank relationship variables

<sup>2</sup>Berger et al. (2001) use the proportion of loans over 60 days past due to proxy for banks' chance of delinquency. Information on non-performing loans is not available to us, so we use the loan loss provision ratio, defined as loan loss provision divided by total loans, as a proxy for bank financial distress.



**Table I. Summary Statistics**

This table shows the summary statistics of the bank relationship variables and related firm characteristics. N is the number of observations. ROA is return on assets. NUM is the number of bank relationships, i.e., the number of banks from which a firm borrows. FNUM and DNUM are the number of relationships with foreign banks and domestic banks, respectively. BLR is the ratio of bank loans to total loans. MULTIPLE equals one for firms with multiple bank relationships, and zero otherwise. FOREIGN equals one for firms with foreign bank relationships, and zero otherwise. REP is a proxy for bank quality. It equals 1,008 minus the weighted average of the lending banks' ranking in *The Banker* magazine's top 1,000 list. A higher value of REP indicates better quality. AGE is the number of years since the firm was founded. ASSET is the firm's total assets in thousands of dollars (NT dollars). DEP is the ratio of depreciation expense to total sales, a proxy for growth opportunities. MNC equals one for multinational corporations based on a list prepared by the Ministry of Economic Affairs, and zero otherwise. LEVERAGE is the debt-to-total assets ratio. BOARD equals one if lending banks are represented on the board of directors, and zero otherwise. CEO equals one if the chief executive officer is also the chairman of the board, and zero otherwise. FAMILY equals one for firms controlled by a family group, and zero otherwise. GROUP equals one if the firm belongs to an industrial group, and zero otherwise. PUBLIC equals one for firms with issued public debt, and zero otherwise. ICR is the interest coverage ratio. The last column reports the t-statistics (z-statistics) of differences between means (medians) of the variables between the pre-crisis (1994-1996) and the crisis period (1997-1998).

Variable	1994-1996 (N = 534)			1997-1998 (N = 356)			t-Statistic	Z-Statistic
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.		
ROA (%)	5.58	5.26	5.89	3.28	3.91	8.71	-4.347***	-0.637***
NUM	9.47	8	7.37	9.69	8	7.65	0.424	0.156
FNUM	2.98	1	4.15	2.14	1	3.48	-3.271***	-2.905***
DNUM	6.49	5	4.85	7.55	6	5.98	2.786***	1.415
BLR (%)	34.00	34.10	19.00	31.80	30.10	20.00	-1.861*	-1.370
MULTIPLE	0.94	1	0.238	0.92	1	0.265	-0.914**	-0.935
FOREIGN	0.63	1	0.483	0.537	1	0.499	-1.163	-2.735***
REP	743	735	102.48	733	739	108.11	-0.313	0.274
AGE	26.76	27	9.59	29.26	29	9.57	3.812***	3.379***
ASSET	12,445,931	6,047,712	19,760,752	17,621,264	8,633,233	26,652,434	3.134***	4.513***
DEP (%)	18.75	17.10	11.76	19.66	17.50	14.11	1.008	0.410
MNC	0.746	1	0.436	0.746	1	0.436	-	-
LVRG. (%)	41.20	40.65	13.57	41.96	41.86	14.76	0.776	1.231
BOARD	0.072	0	0.258	0.051	0	0.220	-1.280	-1.239
CEO	0.181	0	0.385	0.181	0	0.385	-	-
FAMILY	0.527	1	0.499	0.534	1	0.450	1.923	0.192
GROUP	0.718	1	0.451	0.718	1	0.451	-	-
PUBLIC	0.286	0	0.452	0.438	1	0.497	4.707***	4.639***
ICR	9.252	3.92	2.83	9.06	2.75	3.49	-0.086	-3.178***

\*\*\*Significant at the 0.01 level.

\*\*Significant at the 0.05 level.

\*Significant at the 0.10 level.

and related firm characteristics for the first subperiod (1994-1996). There is a wide variation in the number of relationships (NUM) for Taiwanese firms. On average, our sample firms borrow from 9.47 banks; the median is 8.00, and the number ranges between 1 and 42. In this pre-crisis period, 94% of the observations show multiple-bank relationships, and 63% are with foreign banks. Compared to US firms, Taiwanese firms have more bank relationships.<sup>3</sup>

<sup>3</sup>According to Detragiache et al. (2000), the median number of bank relationships in the US is 2.00.

Firms establish relationships with fewer foreign banks than domestic banks. The average FNUM and DNUM are 2.98 and 6.49, and the medians are 1.00 and 5.00, respectively. The average bank loan ratio is 34%; domestic (foreign) bank loans represent 81% (19%) of total bank loans. The average value of REP is 743. On average, the sample firms have a 41.2% debt-to-asset ratio; about 53% of the sample firms are controlled by a family group; and 28.6% of them issue public debt.

The next three columns in Table I report the summary statistics for the crisis period. We examine whether the values of key variables differ significantly from those in the pre-crisis period using a simple t-test and a median test. Statistical results are shown in the last column.

Firm performance appears to have been impaired during the financial crisis. The average ROA declines from 5.58% to 3.28%, and the median from 5.26% to 3.91%. Both changes are significant at the 1% level.

While there is no major change in the average total number of bank relationships (9.47 versus 9.69), the numbers of foreign-bank relationships and domestic-bank relationships reveal significant changes. The average number of relationships with foreign banks declines from 2.98 to 2.14, while the average number of domestic bank relationships rises from 6.49 to 7.55. This indicates that during the crisis period, firms explored new relationships with domestic banks and reduced their dependence on foreign banks.

Domestic banks might be under more pressure to provide credit to local firm borrowers than foreign banks. The opportunity cost of losing a customer relationship is much higher for domestic banks than foreign banks. Therefore, domestic banks are more willing to extend credit to local firms during distress periods.

The decline in number of foreign-bank relationships may also relate to the type of foreign-bank lending. For example, firms with a lot of debt denominated in foreign currency will curtail their foreign-bank lending with depreciation of the domestic currency. We do not have detailed information about currency denomination of foreign-bank loans, but an MNC would be more likely to have foreign currency-denominated debt. Average FNUM for multinational corporations is 3.5 and 2.4 in pre-crisis and crisis periods, respectively, compared to the average FNUM for domestic firms of 1.3 and 0.94. While both MNCs and domestic firms are seen to reduce their number of foreign-bank relationships, the reduction for MNCs is higher. This is indirect evidence to support the conjecture that depreciation of a domestic currency to some extent diminishes reliance on foreign banks during the crisis period.

There is a slight decline in the average percentage of bank loans (BLR), as the change in median (from 34.1% to 30.1%) is insignificant, but the change in mean (from 34.0% to 31.8%) is significant at the 10% level. Decomposing total bank loans into domestic-and foreign-bank loan ratios, we find the mean percentage of domestic-bank loans increases from 81.0% to 84.8%, while the median increases from 94.0% to 98.0%. On the other hand, the mean percentage of foreign-bank loans is reduced from 19.0% to 15.2%, and the median drops from 6.0% to 2.0%. These changes are all significant at the 5% level.

These results further illustrate that firms' relationships with domestic banks are strengthened, but foreign banks reduce their credit to domestic firms during this crisis period. No significant change takes place in bank reputation during the financial crisis.

A significantly higher percentage of firms issue public debt during the crisis period. With the reduction in bank credit during the crisis period, firms seem to have relied more on public debt and to have seen higher financing costs. As expected, the interest coverage ratio declined during the crisis period.

## B. Pairwise Analyses

We divide the full sample into two groups using the mean or median value of bank

relationship variables as the benchmark. We then compare the average performance of firms with high values and low values of bank relationship variables. Table II reports the results.

During the pre-crisis period, firms with more bank relationships (NUM) have lower returns. For firms with NUM below the sample mean, the average return is 5.64%. Firms with NUM higher than the sample mean have an average return of 5.49% (the difference is statistically insignificant). A similar result applies when median NUM is the classification criterion.

When we decompose the number of total bank relationships into foreign- and domestic-bank relationships, firms with more foreign-bank relationships perform better. Firms with an above-the-mean FNUM have an average return of 6.66%, compared to 4.95% for firms with FNUM lower than the mean. This difference is significant at the 1% level, indicating that multiple foreign-bank relationships provide net benefits.

Firms with fewer domestic-bank relationships, on the other hand, show higher returns than firms with more domestic-bank relationships. Average ROA for firms with DNUM lower than the mean is 6.32%, compared to 4.48% for firms with DNUM above the mean. Similar figures are obtained when median DNUM is the classification criterion (6.61% vs. 4.50%), and both differences are significant at the 1% level.

The weak association between number of total bank relationships and firm performance seems to be driven by the offsetting effects of foreign- and domestic-bank relationships. The finding for domestic-bank relationships implies that the disadvantages of multiple-bank relationships are more acute in the case of domestic banks. One possible reason is that domestic-bank loans are relationship loans, while foreign-bank loans are mainly transaction loans. Domestic banks have close relationships with local firms, and they play a more important role than foreign banks in monitoring, reducing information asymmetries, and providing financial flexibility. These functions are delivered less effectively as more domestic banks perform them.

Firms with low bank loan ratios have higher average returns than firms with high bank loan ratios (difference significant at the 10% level). Firms borrowing from banks with a less-established reputation have significantly lower average returns than firms borrowing from prominent banks. Firms borrowing from more prominent banks outperform firms borrowing from less prominent banks by about 1.5 percentage points, with the difference significant at the 1% level. This supports the claim that higher-quality banks play a better role in monitoring firms and reducing information asymmetries.

The last three columns of Table II show the results for the crisis period. Firm performance is negatively and significantly associated with number of total bank relationships, number of domestic-bank relationships, and bank loan ratio. Similarly, firms borrowing from more prominent banks perform better. While firms with more foreign-bank relationships still exhibit a higher return on assets, the difference is insignificant. This can be explained by the fact that firms rely less on foreign banks, as indicated by the change in the number of foreign-bank relationships and foreign-bank loan ratios during the financial crisis.

### C. Simultaneous Equation Results

Table III presents the results for bank relationship-firm performance regressions. There is no significant relation between the choices of single- or multiple-bank relationships and firm performance in either pre-crisis or crisis period. Only a few control variables in the probit regression are significantly related to the choice of multiple-bank relationships.

The value of the pseudo-R-square is very high (around 70%), which indicates potential estimation problems. One explanation for this result is that more than 90% of our sample

**Table II. Firm Performance for Firms with High Values and Low Values of Bank Relationship Variables**

This table shows the average return on assets for two groups of firms. We classify subgroups depending on the mean or median of each bank relationship variable. A firm belongs to the high (low) group if its bank relationship variable is higher than (lower than or equal to) the sample mean or median. NUM is the number of bank relationships, i.e., the number of banks from which a firm borrows. FNUM and DNUM are the number of relationships with foreign and domestic banks, respectively. BLR is ratio of bank loans to total loans. REP is a proxy for bank quality. It equals 1,008 minus the weighted average of the lending banks' ranking in *The Banker* magazine's top 1,000 list. The values are the average return on assets for the groups. The t-statistics are for the mean difference in return on assets between groups. Numbers in parentheses are numbers of observations.

	Pre-Crisis Period (1994-1996)			Crisis Period (1997-1998)		
	Low	High	t-statistic	Low	High	t-statistic
<i>NUM</i>						
By mean	5.64% (321)	5.49% (213)	0.29	4.11% (204)	2.15% (152)	1.99**
By median	5.68% (304)	5.45% (230)	0.43	4.23% (191)	2.17% (163)	2.17**
<i>FNUM</i>						
By mean	4.95% (336)	6.66% (198)	-3.27*	2.97% (251)	4.04% (103)	-0.88
By median	4.77% (280)	6.47% (254)	-3.38*	2.69% (219)	4.23% (135)	-1.51
<i>DNUM</i>						
By mean	6.32% (319)	4.48% (215)	3.57*	4.51% (215)	1.38% (139)	3.07***
By median	6.61% (273)	4.50% (261)	4.16*	4.56% (190)	1.80% (164)	2.93***
<i>BLR</i>						
By mean	6.08% (269)	5.08% (265)	1.98***	4.28% (183)	2.21% (171)	2.26**
By median	6.08% (268)	5.07% (266)	1.96***	4.99% (176)	1.60% (178)	3.74***
<i>REP</i>						
By mean	4.83% (270)	6.34% (264)	-2.97*	1.43% (169)	4.97% (185)	-3.83***
By median	4.81% (268)	6.35% (266)	-3.04*	1.47% (179)	5.30% (175)	-3.83***

\*\*\*Significant at the 0.01 level.

\*\*Significant at the 0.05 level.

\*Significant at the 0.10 level.

firms borrowed from more than one bank. When there is such an extremely unbalanced distribution, we cannot effectively capture the relationship between the choice of multiple-bank relationships and firm performance using probit analysis. It is thus more meaningful to investigate the relations between firm performance and the number of bank relationships.

Table IV presents the two-stage least squares results for the relation between firm performance and the other five bank relationship variables during the pre-crisis period. Model 2 shows that the more total bank relationships (LNUM), the poorer the firm performance. The coefficient of LNUM is -1.67 (not significant at any conventional level). In Model 3, the coefficient of the number of foreign-bank relationships (LFNUM) is 1.58, significant at the 1% level. In Model 4, the coefficient of the number of domestic-bank relationships (LDNUM) is -3.69, significant at the 5% level. These findings indicate that firms with fewer domestic-bank relationships or more foreign-bank relationships perform better. We attribute the insignificance of LNUM to the fact that the numbers of foreign and domestic bank relationships are related to firm performance in opposite directions.

**Table III. Simultaneous Equation Estimates of the Relation Between Choice of Single- or Multiple-Bank Relationships and Firm Performance**

This table shows two-stage estimates of the relation between firm performance and the choice of single- or multiple-bank relationships. N is the number of observations. In the first stage, an OLS regression relates the return on assets to a set of exogenous variables. In addition, we use a probit regression to regress the bank relationship dummy (MULTIPLE = 1 for multiple-bank relationships, and zero otherwise) on the same set of exogenous variables using a probit regression. We then use the fitted values obtained from the first stages' probit regression (Fitted MULTIPLE) and OLS (Fitted ROA) as the explanatory variables in the second-stage estimations. AGE is the natural log of the number of years since the firm was founded. SIZE is the natural log of the firm's total assets. DEP is the ratio of depreciation expense to total sales, a proxy for growth opportunities. MNC equals one for multinational corporations, and zero otherwise. LEVERAGE is the debt-to-total-assets ratio. BOARD equals one if lending banks are represented on the board of directors, and zero otherwise. CEO equals one if the chief executive officer is also the chairman of the board, and zero otherwise. FAMILY equals one for firms controlled by a family group, and zero otherwise. GROUP equals one if the firm belongs to an industrial group, and zero otherwise. PUBLIC equals one for firms with issued public debt, and zero otherwise. ICR is the interest coverage ratio. LBLLP is the loan loss provision ratio of the largest lending bank. LBLEV and LBROE are the debt-equity ratio and return on equity of the largest lending bank, respectively. t-statistics are in parentheses.

Variable	Model 1			
	1994–1996 (N = 534)		1997–1998 (N = 356)	
	ROA (OLS)	MULTIPLE (Probit)	ROA (OLS)	MULTIPLE (Probit)
Intercept	2.89 (1.14)	-2.19 (-1.50)	-0.74 (-0.14)	-4.68** (2.18)
Fitted MULTIPLE	0.07 (0.20)		-0.46 (-0.63)	
Fitted ROA		0.10 (0.70)		0.01 (0.09)
AGE	-1.71*** (-2.88)	0.08 (0.23)	-0.60 (-0.50)	-0.34 (0.87)
SIZE	1.90*** (7.15)	0.03 (0.12)	2.13*** (3.79)	0.67* (2.58)
DEP	-0.09*** (-4.53)		-0.11*** (-3.79)	
MNC		0.16 (0.61)		0.03 (0.11)
LEVERAGE	-17.09*** (-8.33)	4.63** (2.01)	-25.51*** (-8.21)	2.44 (1.08)
BOARD	1.56 (1.64)	-0.41 (-0.90)	-1.28 (-0.58)	0.22 (0.32)
CEO	-0.46 (-0.75)		1.10 (0.99)	
FAMILY		0.62** (2.73)		0.87*** (2.94)
GROUP		0.29 (1.23)		-0.32 (-1.10)
PUBLIC		0.02 (0.07)		-0.43 (-1.26)

\*\*\*Significant at the 0.01 level.

\*\*Significant at the 0.05 level.

\*Significant at the 0.10 level.

**Table III. Simultaneous Equation Estimates of the Relation Between Choice of Single- or Multiple-Bank Relationships and Firm Performance (Continued)**

Variable	1994-1996		1997-1998	
	ROA (OLS)	MULTIPLE (Probit)	ROA (OLS)	MULTIPLE (Probit)
ICR		-0.01 (-1.00)		-0.01 (-1.17)
LBLLP		-0.07 (-0.40)		0.10 (0.41)
LBLEV		0.03* (1.87)		0.02 (1.06)
LBROE		0.01 (0.79)		-0.00 (-0.16)
Adjusted R <sup>2</sup>	0.24		0.24	
F-statistic	24.20		16.16	
Pseudo R <sup>2</sup>		0.74		0.69
Log-Likelihood		-95.94		-74.74

\*Significant at the 0.10 level.

In Model 5, BLR is significantly negative. This shows that the higher the firm's bank loan ratio, the worse the firm's performance. This result supports the pairwise analysis reported in Table II. In Model 6, the coefficient of bank reputation is 2.86, significant at the 5% level. This result confirms the importance of the bank's certification role.

Among the control variables, firm age is significantly negative related to firm performance. In addition, larger firms seem to perform better than smaller firms. LEVERAGE is negatively related to firm performance, but firms with better growth prospects are associated with better performance. We find a positive and significant relation between banks' board membership and firm performance. The coefficients of BOARD are significant in three performance equations (Models 2, 4, and 5).

In the bank relationship equations, the coefficients of ROA are negatively and significantly related to LNUM, LFNUM, BLR, and LREP. The negative link between firm performance and the number of bank relationships is contrary to the predictions of Detragiache et al. (2000), but consistent with the empirical findings of Degryse and Ongena (2001). The negative coefficient of the performance measure in the bank loan ratio equation (Model 5) supports the pecking order theory. Better-performing firms rely more on internal financing than bank financing.

The negative impact of firm performance on bank reputation (Model 6) implies that the certification role of banks is less important to better-performing firms than poorly performing firms. A conjecture is that better-performing firms may not borrow from top-quality banks for cost advantages. The Hausman t-statistics show that all the bank relationship variables, except the number of total and foreign bank relationships, are endogenous.

The results for the control variables in the bank relationship equations are generally consistent with our expectation. Older firms tend to have fewer banking relationships and to rely less on bank loans because they have lower information and monitoring costs. Larger firms have more bank relationships, consistent with the argument that large firms are complex and need multiple bank relationships to diversify their firm-specific credit risk.

MNCs have more total bank and more foreign-bank relationships than domestic firms, and MNCs also borrow from higher-quality banks. Leverage is negatively and significantly related to the number of foreign-bank relationships but positively related to the number of domestic-bank relationships. In addition, we find that more leveraged firms tend to borrow from less

**Table IV. Simultaneous Equation Estimates of Relation Between Firm Performance and Five Bank Relationships Variables (1994-1996)**

This table shows 2SLS estimates of the relation between firm performance and five bank relationship variables for the period 1994-1996. N is the number of observations. ROA is return on assets. LNUM is the natural log of the number of total bank relationships. LFNUM and LDNUM are the natural log of the number of relationships with foreign and domestic banks, respectively. BLR is the ratio of bank loans to total loans. LREP is a proxy for bank quality. It equals the natural log of 1,008 minus the weighted average of the lending banks' ranking in *The Banker magazine's* top 1,000 list. A higher value of LREP indicates better quality. AGE is the natural log of the number of years since the firm was founded. SIZE is the natural log of the firm's total assets. DEP is the ratio of depreciation expense to total sales, a proxy for growth opportunities. MNC equals one for multinational corporations, and zero otherwise. LEVERAGE is the debt-to-total-assets ratio. BOARD equals one if lending banks are represented on the board of directors, and zero otherwise. CEO equals one if the chief executive officer is also chair of the board. FAMILY equals one for firms controlled by a family group, and zero otherwise. GROUP equals one if the firm belongs to an industrial group, and zero otherwise. PUBLIC equals one for firms with issued public debt, and zero otherwise. ICR is the interest coverage ratio. LBLLP is the loan loss provision ratio of the largest lending bank. LBLEV and LBROE are the debt-equity ratio and return on equity of the largest lending bank, respectively. t-statistics are in parentheses.

	Model 2 (N = 534)		Model 3 (N = 534)		Model 4 (N = 534)		Model 5 (N = 534)		Model 6 (N = 534)	
	ROA	LNUM	ROA	LFNUM	ROA	LDNUM	ROA	BLR	ROA	LREP
Intercept	1.77 (0.63)	-0.54 (-1.44)	6.18** (1.98)	-1.41* (-1.72)	0.96 (0.36)	-0.42 (-1.32)	20.2*** (3.06)	0.71*** (5.30)	-18.22*** (-2.02)	6.57*** (5.87)
ROA		0.07* (-1.95)		-0.24*** (-2.90)		-0.01 (-0.25)		-0.04*** (-2.66)		-0.03*** (-2.75)
LNUM	-1.67 (-0.75)									
LFNUM			1.58* (1.77)							
LDNUM					-3.69*** (-2.44)					
BLR							-21.87*** (-2.94)			
LREP								2.86** (2.05)		
AGE	-1.69*** (-2.85)	-0.13 (-1.29)	-1.56*** (-2.62)	-0.52** (-2.36)	-1.58*** (-2.59)	0.03 (0.34)	-2.75*** (-3.36)	-0.11*** (-3.13)	1.26* (-1.67)	-0.07** (-2.20)
SIZE	2.21*** (4.64)	0.34*** (4.55)	1.33*** (3.19)	0.70*** (4.29)	2.50*** (7.05)	0.16** (2.53)	0.71 (1.40)	0.03 (1.33)	1.10** (2.26)	0.07*** (3.35)
DEP	-0.08*** (-3.92)		-0.11*** (-4.71)		-0.09*** (-4.25)		-0.02 (-0.59)		-0.15*** (-4.01)	
MNC		0.17** (1.97)		0.55** (2.90)		-0.07 (-0.95)		0.02 (0.75)		0.09*** (3.18)
LEVERAGE	-15.36*** (-5.75)	0.11 (0.17)	-14.22*** (-9.13)	-4.17*** (-3.08)	-10.25*** (-3.16)	1.67*** (3.20)	-10.79*** (-3.66)	-0.25 (-1.21)	-8.98** (-2.07)	-0.73*** (-4.18)
BOARD	1.70* (1.75)	0.20 (1.37)	1.34 (1.40)	2.12** (1.31)	2.13* (2.11)	0.18 (1.44)	2.13** (1.79)	0.01* (1.96)	1.29 (1.13)	0.03 (0.82)
CEO	-0.50 (-0.84)		-0.22 (-0.36)		-0.12 (-0.19)		-0.98 (-1.27)		0.02 (0.03)	

\*\*\*Significant at the 0.01 level.

\*\*Significant at the 0.05 level.

\*Significant at the 0.10 level.

Table IV. Simultaneous Equation Estimates of Relation Between Firm Performance and Five Bank Relationship Variables (1994-1996) (Continued)

	Model 2		Model 3		Model 4		Model 5		Model 6	
	ROA	LNUM	ROA	LFNUM	ROA	LDNUM	ROA	BLR	ROA	LREP
FAMILY		0.13** (2.06)		0.09 (0.68)		0.14*** (2.60)		0.02 (1.03)		-0.01 (-0.30)
GROUP		0.01 (0.15)		-0.22 (-1.33)		0.04 (0.64)		-0.07** (-2.42)		-0.01 (-0.57)
PUBLIC		0.15** (1.92)		0.26 (1.49)		0.12* (1.81)		-0.05*** (-1.87)		-0.00 (-0.06)
ICR		0.00 (1.28)		0.01** (2.53)		-0.00 (-0.25)		0.00 (1.07)		0.01* (2.23)
LBLP		0.00 (0.04)		-0.04 (-0.38)		0.03 (0.66)				
LBLEV		0.00 (0.47)		0.01*** (2.74)		-0.01*** (-4.15)				
LBROE		0.01*** (3.18)		0.02** (2.54)		0.01* (1.69)				
Adjusted R <sup>2</sup>	0.24		0.24		0.23		0.17	0.08	0.17	0.04
F-statistic	24.30***	12.44***	24.57***	4.11***	23.76***	15.87***	16.85***	5.83***	16.79***	3.21***
Hausman t-statistic	-0.40	-5.16***	0.97	-1.08	-1.73*	-6.52***	-3.81***	-5.51***	2.33**	2.99***

\*\*\*Significant at the 0.01 level.

\*\*Significant at the 0.05 level.

\*Significant at the 0.10 level.



prominent banks, while larger firms borrow from higher-quality banks. Firms with public debt have lower bank loan ratios and more total as well as domestic-bank relationships than firms without public debt. This suggests that public debt and bank loans are complements rather than substitutes for one another.

Liquidity is positively related to the number of foreign-bank relationships and bank reputation. In the bank loan equation, Model 5, the coefficient of GROUP is significantly negative, supporting the argument that fund transfers among members of an industry group reduce reliance on bank loans. The coefficients of FAMILY, however, are significant with an unexpected sign in the LNUM and LDNUM equations.

There is no significant relation between the largest lending bank's loan loss provision and the number of total, foreign-, and domestic-bank relationships. The coefficient of the largest lending banks' financial leverage (LBLEV) is significant and positive in the LFNUM equation; this result supports the multiple-bank bank distress hypothesis. The coefficient of LBLEV is significant but negative in the LDNUM equation. As borrowing firms need to diversify the risk of financial distress from their largest lending banks, they might turn to foreign banks and rely less on domestic banks.

The results for the largest lending bank's ROE do not support the multiple-bank bank distress hypothesis. As the largest lending bank's ROE increases, firms tend to borrow from more banks. It could be that profitable banks may negotiate more stringent loan terms and charge higher rates; therefore, firms borrow from more banks to meet their financial needs.

Table V reports the two-stage least squares results for the crisis period. The positive (negative) relation between numbers of foreign-bank (domestic-bank) relationship still holds for the pre-crisis period. The coefficient of LNUM remains negative, but becomes significant at the 10% level. The coefficients of BLR and LREP are still significant and of the expected sign. During the crisis period, the coefficients of ROA are significant in three of the five bank relationship equations (Models 3, 5, and 6). Again, firms that have fewer domestic-bank relationships, lower bank loan ratios, and that borrow from a higher-quality bank, perform better.

Self-selection bias may be a problem for Model 3 as only about 60% of the sample firms borrow from at least one foreign bank, so, we adjust this model for selection bias. We first estimate a probit model of the choice of foreign-bank relationship (i.e., the dependent variable is a dummy that equals one if the firm borrows from foreign banks, and zero otherwise), and calculate inverse Mills ratios. We then include the inverse Mills ratios in both the performance and the number of foreign-bank relationship equations.

The results show that none of the coefficients of the inverse Mills ratios are statistically significant.<sup>4</sup> This implies that the factors behind a decision to borrow from foreign banks have a similar effect on the extent of foreign-bank relationships, and self-selectivity bias is not a concern.

#### D. Other Results and Discussion

To test the robustness of the results, we replicate the simultaneous equation estimations using Tobin's Q as the performance measure. We measure Tobin's Q as the ratio of the book value of debt plus the market value of equity to total assets. The average Q is 1.81 for pre-crisis and 1.59 during crisis. Medians are 1.70 and 1.39. Both changes are significant at the

<sup>4</sup>The inverse Mills ratio is the ratio of the standard normal density of the fitted value of the probit regression to the normal cumulative probability of the fitted value. The t-statistics for the inverse Mills ratios are 1.373 and 0.368 in the foreign-bank relationship equations during the pre-crisis and the crisis period, respectively, and 0.733 and -1.553 in the firm performance equations.

Table V. Simultaneous Equation Estimates of Relation Between Firm Performance and Five Bank Relationship Variables (1997-1998)

This table shows 2SLS estimates of the relation between firm performance and five bank relationship variables for the period 1997-1998. N is the number of observations. ROA is return on assets. LNUM is the natural log of the number of total bank relationships. LFNUM and LDNUM are the natural log of the number of relationships with foreign and domestic banks, respectively. BLR is the ratio of bank loans to total loans. LREP is a proxy for bank quality. It equals the natural log of 1,008 minus the weighted average of the lending banks' ranking in *The Banker magazine's* top 1,000 list. A higher value of LREP indicates better quality. AGE is the natural log of the number of years since the firm was founded. SIZE is the natural log of the firm's total assets. DEP is the ratio of depreciation expense to total sales, a proxy for growth opportunities. MNC equals one for multinational corporations, and zero otherwise. LEVERAGE is the debt-to-total-assets ratio. BOARD equals one if lending banks are represented on the board of directors, and zero otherwise. CEO equals one if the chief executive officer is also chair of the board. FAMILY equals one for firms controlled by a family group, and zero otherwise. GROUP equals one if the firm belongs to an industrial group, and zero otherwise. PUBLIC equals one for firms with issued public debt, and zero otherwise. ICR is the interest coverage ratio. LBLP is the loan loss provision ratio of the largest lending bank. LBLEV and LBROE are the debt-equity ratio and return on equity of the largest lending bank, respectively. t-statistics are in parentheses.

	Model 2 (N = 356)		Model 3 (N = 356)		Model 4 (N = 356)		Model 5 (N = 356)		Model 6 (N = 356)	
	ROA	LNUM	ROA	LFNUM	ROA	LDNUM	ROA	BLR	ROA	LREP
Intercept	-4.97 (-0.80)	-1.17** (-2.33)	7.44 (1.26)	-2.09** (-2.13)	-5.80 (-0.93)	-0.81 (-1.56)	12.51* (1.75)	0.48* (3.27)	-31.33*** (-1.91)	6.49*** (4.43)
ROA		-0.02 (-0.88)		-0.14*** (-2.88)		0.02 (0.70)		-0.01*** (-1.82)		-0.02** (-2.12)
LNUM	-6.02* (-1.93)									
LFNUM			4.57** (2.82)							
LDNUM					-9.06*** (-3.37)					
BLR							-19.22*** (-2.65)			
LREP									4.87* (1.91)	
AGE	-0.14 (-0.11)	0.02 (0.11)	0.40 (0.31)	-0.15 (-0.72)	0.78 (0.54)	0.08 (0.78)	-0.90 (-0.70)	-0.04 (-1.06)	-1.14 (-0.75)	0.01 (0.36)
SIZE	3.33*** (3.80)	0.30*** (5.02)	0.57 (0.85)	0.42*** (3.53)	3.31*** (4.95)	0.21*** (3.32)	1.04*** (1.73)	0.01 (0.35)	0.97 (1.25)	0.04* (1.90)
DEP	-0.10*** (-2.96)		-0.17*** (-4.59)		-0.12*** (-3.52)		-0.08*** (-2.30)		-0.18*** (-3.48)	
MNC		0.06 (0.68)		0.27 (1.62)		-0.07 (-0.82)		0.00 (0.11)		0.06** (2.09)
LVG	-17.47*** (-3.17)	0.89 (1.47)	-26.09*** (-8.79)	-3.37*** (-2.70)	-10.85* (-1.91)	1.98*** (3.19)	-19.53*** (-4.92)	-0.02 (-0.08)	-15.20* (-2.23)	-0.63*** (-3.29)
BOARD	-1.35 (-0.57)	-0.05 (-0.26)	-1.16 (-0.51)	-0.54 (-1.40)	-1.18 (-0.46)	0.18 (0.88)	-1.01 (-0.45)	0.01 (0.21)	-0.25 (-0.09)	-0.05 (-0.78)
CEO	0.77 (0.66)		1.71 (1.47)		1.31 (1.04)		0.89 (0.78)		2.84*** (1.67)	

\*\*\*Significant at the 0.01 level.

\*\*Significant at the 0.05 level.

\*Significant at the 0.10 level.

Table V. Simultaneous Equation Estimates of Relation Between Firm Performance and Five Bank Relationship Variables (1997-1998)  
(Continued)

	Model 2		Model 3		Model 4		Model 5		Model 6	
	ROA	LNUM	ROA	LFNUM	ROA	LDNUM	ROA	BLR	ROA	LREP
FAMILY		0.18** (2.41)		0.20 (1.38)		0.13* (1.70)		0.03 (1.32)		-0.01 (-0.48)
GROUP		-0.02 (-0.17)		-0.05 (-0.30)		-0.03 (-0.29)		-0.05* (-1.86)		-0.01 (-0.35)
PUBLIC		-0.04 (-0.64)		0.46** (2.57)		-0.20** (-2.12)		-0.08*** (-2.84)		0.05** (1.70)
ICR		-0.00 (-1.32)		0.01 (1.59)		-0.01** (-2.23)		-0.00 (-1.54)		0.00 (1.55)
LBLLP		0.02 (0.40)		0.18 (1.59)		-0.05 (-0.77)				
LBLEV		0.00 (1.53)		0.01* (1.84)		-0.00 (-0.38)				
LBROE		-0.00 (-0.19)		0.03*** (3.23)		-0.01** (-2.48)				
Adjusted R <sup>2</sup>	0.21		0.23		0.20		0.22		0.16	0.03
F-statistic	14.20***	8.58***	15.82***	2.92***	13.35***	8.28***	15.16***	7.55***	10.83***	2.14**
Hausman t-statistic	-1.81*	-4.33***	2.40**	-2.31**	-3.39***	-4.04***	-3.74***	-4.23***	0.44	1.41

\*\*\*Significant at the 0.01 level.  
\*\*Significant at the 0.05 level.  
\*Significant at the 0.10 level.



1% level.

The results for the influence of bank relationships on performance are similar to those for ROA. That is, performance is negatively related to the number of domestic-bank relationships and positively related to the number of foreign-bank relationships. During the pre-crisis period, bank reputation has a positive impact on firm performance, and bank loan ratio a negative impact.<sup>5</sup>

To further investigate the importance of bank relationships in times of financial shock, we compare the characteristics of bank relationships for firms experiencing financial distress after 1997 and firms that remained intact. We classify as distress firms those were either delisted from the Taiwan Stock Exchange, or whose trading was halted, or whose margin trading was cancelled. A control sample selected for comparison includes comparable firms in the same industry and of a similar asset size. In total, 31 firms experienced one of the three distress events.

We find that distressed firms have significantly more bank relationships and more bank loans one to three years before the distress event. For example, one year before the distress event, distressed (non-distressed) firms have an average of 13.13 (9.03) bank relationships and a 47% (29%) bank loan ratio. There are also differences in the number of domestic-bank relationships; non-distressed firms have fewer domestic-bank relationships than distressed firms. The average numbers of domestic-bank relationships for distressed and non-distressed firms one year before financial distress are 11.32 and 7.71, respectively. Lenders to non-distressed firms are much more prominent than lenders to distressed firms, but, we find no significant difference between distressed and non-distressed firms in terms of number of foreign-bank relationships. These findings reaffirm the major conclusions we draw from the pairwise and regression analysis.<sup>6</sup>

Our results regarding changes in foreign bank lending during the Asian financial crisis period seem to contradict evidence in the literature regarding other emerging markets. Dages, Goldberg, and Kinney (2000) have reported that the presence of foreign banks may mitigate effects of national banking crises and stabilize a domestic financial system. Goldberg (2001) shows that US bank claims in emerging markets are not very sensitive to the local country's gross domestic product and interest rate. She provides additional evidence that US bank foreign activities stabilize overall lending in local regions. Our evidence, however, is that both the number of foreign bank relationships and foreign bank loan ratios declined during the Asian financial crisis.

To address this contradiction, we calculate the ratio of loans granted by banks from different foreign countries to total foreign bank loans for our sample firms. Table VI reports the ratios for the period 1994-1998. Since European banks and US banks dominate the foreign-bank loan market in Taiwan, we sum the loan ratios of banks from Belgium, France, Germany, the Netherlands, Switzerland, and the UK to form the ratio of European bank loans to total foreign bank loans and then compare its trend with that of US banks.

On average, European bank loan ratios declined during the crisis period. The average bank loan ratios of European banks for the pre-crisis and crisis period are 52.33% and 44.08%, respectively, an 8.25 percentage point drop. French banks in particular show a great drop in the loan ratio; their ratio declines from 15.34% to 11.04% and then to 10.30% between 1996 and 1998. Bank loan ratios of Canadian, Dutch, German, Japanese, and Singaporean banks

<sup>5</sup>To conserve space, we do not report the detailed results. The results are available upon request.

<sup>6</sup>In an alternative definition of financial distress, we define firms with interest coverage ratios of less than one as distress firms, and firms with interest coverage ratio greater than one as non-distressed firms. The alternative definition does not alter the main findings.

**Table VI. Percentage of Total Foreign Bank Loans by Country**

This table shows the ratio of a particular foreign country banks' loans to the total foreign bank loans (in terms of dollar value) for Taiwanese firms between 1994 and 1998. Numbers of loans provided by banks in different countries are in parentheses. The last two columns show the average for the pre-crisis period (1994-1996) and the crisis period (1997-1998). The ratio for Europe is equal to the sum of the ratios for Belgium, France, Germany, the Netherlands, Switzerland, and the UK. Others includes banks from Australia, New Zealand, Hong Kong, and South Africa. The last row (Foreign BL/Total BL) indicates the ratio of foreign bank loans to total bank loans for our sample of Taiwan firms. Totals may not equal 100% for reasons of rounding.

Country	1994	1995	1996	1997	1998	Pre-Crisis	Crisis
Belgium	0.47% (11)	1.15% (19)	0.94% (26)	0.96% (30)	1.55% (43)	0.85% (56)	1.26% (73)
Canada	8.25% (141)	9.57% (179)	10.58% (162)	10.44% (127)	7.45% (101)	9.47% (482)	8.95% (228)
France	26.00% (274)	19.60% (261)	15.34% (201)	11.04% (138)	10.30% (169)	20.13% (736)	10.67% (307)
Germany	2.30% (17)	3.21% (20)	5.61% (18)	5.19% (15)	3.30% (15)	3.71% (55)	4.25% (30)
Japan	7.10% (72)	7.74% (92)	8.95% (108)	10.14% (131)	6.06% (139)	7.93% (272)	8.10% (270)
Netherlands	12.86% (145)	14.84% (182)	17.09% (161)	14.85% (143)	9.56% (162)	14.93 (488)	12.21% (305)
Singapore	1.42% (38)	1.09% (32)	1.25% (34)	1.39% (37)	1.08% (40)	1.25% (104)	1.24% (77)
Switzerland	2.43% (11)	2.52% (18)	3.19% (19)	3.98% (21)	7.20% (17)	2.72% (48)	5.59% (38)
UK	8.32% (100)	11.69% (108)	9.39% (99)	9.60% (119)	10.63% (137)	9.80% (307)	10.12% (256)
US	25.23% (264)	21.95% (299)	21.54% (241)	27.74% (223)	37.40% (254)	22.91% (804)	32.57% (477)
Others	5.60% (103)	6.82% (104)	5.89% (95)	4.71% (83)	5.45% (101)	6.10% (302)	5.08% (184)
Europe	52.38% (558)	53.01% (608)	51.59% (524)	45.62% (466)	42.54% (543)	52.33% (1090)	44.08% (1009)
Foreign BL/ Total BL	14.78%	17.45%	15.97%	16.57%	14.86%	16.07%	15.72%

also dropped between 1997 and 1998.

Bank loan ratios of Belgium, Switzerland, the UK, and the US, on the other hand, increased during the crisis period. US bank loans rose sharply during the crisis period, with loan ratios increasing from 21.54% in 1996 to 37.40% in 1998. Although the US bank loan ratio rose from 22.91% to 32.57% on average from the pre-crisis to the crisis period, the percentage of total foreign bank loans fell from 16.07% to 15.72%.

The results in Table VI indicate that the sensitivity of foreign bank lending varies across banks from different countries. This is consistent with Goldberg's (2001) conclusion that foreign bank loans are more sensitive to the bank's home country economy than to the economy of the borrowing firm. As foreign bank home economies are different, different foreign banks would react differently to a change in overseas market conditions.<sup>7</sup>

Our results show that despite the decline in the number of foreign-bank relationships and foreign-bank loan ratios, there remains a positive linkage between firm performance and number of foreign-bank relationships during the crisis period in Taiwan.

## V. Summary and Policy Implications

We analyze a sample of Taiwanese firms to determine the change in bank relationships and its influence on firm performance during a financial crisis. In general, we find that during the 1997 Asian financial crisis, firms' relationships with domestic banks strengthened, while those with foreign banks weakened. Foreign-bank loan ratios fell, but domestic-bank loan ratios rose during the crisis, although patterns of foreign bank lending vary across banks from different countries.

During both pre-crisis and crisis period, the number of foreign-bank relationships is positively related to firm performance. This indicates that the benefits of diversification and flexibility in negotiation outweigh the disadvantages of more foreign-bank relationships.

On the other hand, we find a negative and significant association between the number of domestic-bank relationships and firm performance in both pre-crisis and crisis periods. The difference in the impact of domestic- and foreign-bank relationships on firm performance can be attributed to differences in domestic- and foreign-bank loans and their operating efficiency. Domestic-bank loans are more likely to be relationship loans, while foreign bank loans are transaction loans.

There is a significant and negative relation between bank loan ratio and firm performance. Bank reputation is important in explaining firm performance, especially in the crisis period. But, we find no significant linkage between performance and the choice of multiple-bank relationships.

Evidence on the determinants of bank relationships shows that the number of bank relationships is negatively related to firm performance, age, and leverage, and positively related to firm size and the largest lending bank's return on equity.

One limitation of this study is limited information on loan syndication. Syndication loans have been growing in Taiwan, which may in fact explain the large number of bank relationships we find. Confining our study to the lead bank in a syndicate could provide additional insights on the link between bank relationships and firm performance, but data on loan syndication are not available to us.

Our results have interesting policy implications. The negative relation between number of domestic-bank relationships and firm performance may be the result of excessive competition among domestic banks. Taiwan has been a victim of over-banking since the early 1990s. Taiwanese domestic banks are experiencing asset deterioration, low profitability, and low capital adequacy rates. To tackle the over-banking problem, the government has been encouraging bank consolidation.

Taiwan joined the World Trade Organization in January 2002, and its financial markets must open up gradually to foreign banks. We have found foreign bank participation to be beneficial to domestic firms. A positive relationship between the number of foreign-bank

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<sup>7</sup>Note that our result does not reflect the full picture of foreign bank lending pattern changes during the Asian finance crisis in Taiwan, and thus cannot be directly compared with the results in Dages, Goldberg, and Kinney (2000) and Goldberg (2001). Unlike Dages et al. (2000), we analyze firm data instead of bank data. As a result, we look only at commercial loans made by foreign banks to a sample of Taiwanese firms, not all foreign bank lending activities. Customer lending, mortgage lending, government lending, and interbank lending made by foreign banks in Taiwan are not considered.

relationships and firm performance in our sample period demonstrates that foreign banks provide benefits that domestic banks do not.

One caution is that the credit supply provided by foreign banks may be more volatile, and surely the stability of foreign bank credit varies across banks from different countries. Domestic firms should evaluate the availability of credit from foreign banks during financial crisis periods, because adjustment in credit policies for economic changes is a business decision of foreign banks that local government cannot control. ■

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