Did International Debt Sink the Banks of Asia?

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Abtstract: In this study, we examine firm level performance of financial institutions in emerging East Asian nations during the financial crisis of 1997-1998. A large fraction of these institutions were closed or nationalized or ceased trading for long periods of time making it impossible to directly measure performance using stock market data. We address this challenge by using limited dependent variable models and selection corrected models. As part of our analysis, we find that a number of factors affect the likelihood of firms going bankrupt in different ways than they affected the stock returns of firms which survived the crisis. We find that international debt exposure negatively impacted firm performance during the crisis and led to higher likelihood that financial intermediaries would be closed or nationalized in significant ways. However, short-term international debt was more associated with the probability that intermediaries would fail, while long-term international debt had a more significant negative impact on the performance of intermediaries that did not fail.

Keywords: International Debt Exposure, East Asian Crisis, Financial System
F3 International Finance

I. Introduction

A large number of theoretical studies of the Asian financial crisis attribute either the crisis itself or the contractionary effects of the crisis to the failures of various financial institutions, and point to the institutions' extensive use of foreign-currency debt as one of the main reasons for their failures. We examine this link between foreign-currency debt use and financial institution performance empirically. By conducting a cross-sectional analysis to study which firm-level factors determine the performance of East Asian financial institutions during the crisis, we shed light on the validity of these theories.

Currency crises can have significantly different implications for financial firms than for other corporations. On the one hand, financial firms typically have very high leverage and are particularly susceptible to market imperfections caused by asymmetric information. Prior to the crisis, East Asian financial intermediaries borrowed internationally in foreign currencies but lent domestically in the local currency, creating a currency mismatch without the natural hedge of exports available to traded-goods firms. On the other hand, financial institutions may have greater access than non-financial corporations to derivatives that hedge currency risks.

During the crisis, financial intermediaries in East Asia suffered large drops in their market values (see Kho and Stulz 2000) and operating profits (see Hanna and Huang 2002). Moreover, the shares of a large number of banks and finance companies ceased to trade (because they were closed, nationalized or folded into larger institutions), resulting in a complete loss in shareholder value. We are particularly interested in examining the impact of the large stocks of international debt that the financial institutions had issued on their performance during the crisis.

In the pre-crisis period, a large amount of capital flowed into the East Asian economies from international financial markets in the form of syndicated loans and debt securities. Much of this debt was intermediated by the East Asian financial sector (especially in Korea and Thailand). Virtually all external debt in the emerging markets in East Asia (and elsewhere) is denominated in foreign currencies (see Eichengreen and Hausmann 1999). In the initial stages of the crisis, a number of these countries experienced large currency depreciations. Ceteris paribus, an exchange rate depreciation increases the domestic currency value of unhedged foreign currency liabilities, and thus lowers the equity value of a firm.

We gather information on foreign currency debt issued by East Asian financial firms, from primary markets, to assess the firms' pre-crisis exposure. Information on new issues of debt in international financial markets is reported by the IFR Platinum database (from Thomson Financial). This data includes the face value, issue dates and maturity dates of foreign market bonds, Eurobonds, and syndicated bank loans. For each year between 1990 and 1998, we calculate the total foreign currency debt issued in international markets by financial corporations in Indonesia, Korea, Malaysia, Taiwan and Thailand. Figure 1 reports the results. In all countries but Taiwan, there is a surge in international debt issued by financial intermediaries in the years preceding the crisis. In the case of Korea and Thailand, the lending boom peaks in 1995. In the case of Indonesia and Malaysia, capital flows to financial institutions increase until 1997. The flows of international lending to the financial sectors of these four countries in 1997 is above the level in 1994, and contracts suddenly in 1998. In Taiwan, by contrast, international debt actually increases in the years following the crisis.

Testing the determinants of stock market performance in a population of firms with a high percentage of bankruptcies or other forms of closures presents a number of estimation issues. Due to limited liability, firms with a complete loss of equity value could be treated as corner solution outcomes. However, we find strong evidence that the firm-level characteristics that determine the probability of bankruptcy affect the stock returns of surviving companies in a different manner. Thus, we estimate the determinants of the probability of failure independently from the determinants of the surviving firms' performance. We estimate the determinants of the probability of failure with a variety of limited dependent variable models, and the determinants of the stock market performance of surviving firms with linear models corrected for selection.

After controlling for other factors, we test whether international debt exposure had a significant impact on the financial performance of East Asian financial intermediaries during the crisis. We find that international debt exposure was negatively associated with stock returns during this period. At a more detailed level, we find that short-term international debt was associated with the likelihood that a financial institution would fail (i.e. be closed or nationalized with a total loss for investors), and long-term international debt exposure was correlated with poor stock market performance among financial institutions that did not fail. Other aspects of a financial institution's balance sheet such as a high leverage, a high share of risky assets such as loans and securities, and a high market-to-book value of assets are also associated with poor

crisis period performance. We also see some evidence of a too-big-to-fail policy. Large financial institutions were less likely to fail than smaller firms, although size had little to do with the difference in performance across firms that did not fail.

II. Related Literature

A. Theoretical Literature

The financial crises that beset international capital markets in recent years have stimulated the growth of a large body of theoretical research. International debt plays a central role in many of these studies. For example, Aghion, Bannerjee, and Bacchetta (2000, 2001), and Krugman (1999) examine self-fulfilling exchange rate devaluations that arise due to the presence of foreign currency debt. Cespedes, Chang, and Velasco (2000), Cook (2000), Devereux and Lane (2000), and Gertler, Gilchrist, and Natalucci (2000) analyze the balance sheet effects of exchange rate depreciations when non-financial corporations issue foreign currency debt. Choi and Cook (2002) emphasize that banks with foreign-currency debt but domestic-currency assets are especially vulnerable to exchange rate devaluations. Burnside, Eichenbaum, and Rebelo (2001) show that government guarantees encourage banks to rely on unhedged foreign currency debt. When the domestic currency devalues, banks renege on their foreign debt and declare bankruptcy. By contrast, Ize and Levy-Yeyati (2003) argue that bank-level liability dollarization is consistent with optimal risk management in a number of emerging markets.

Another branch of the literature emphasizes the volatile nature of international capital flows. Specifically, some researchers argue that international lending is subject to self-fulfilling (see Calvo and Mendoza 2000, and Cook and Devereux 2001) or exogenous (see Calvo and Reinhart 1999, and Mendoza 2001) "sudden stops". In a sudden stop, international lenders refuse to roll over loans to an emerging market, adversely affecting firms that have issued short-term debt and must negotiate new funds. Christiano, Gust, and Roldos (2002) examine the conduct of monetary policy in a country that faces a sudden stop, and where bank liquidity is an input to production.

Other researchers focus on the maturity mismatch that arises from the banking sector's dual functions of financial intermediation and liquidity provision. Building on the work of Diamond and Dybvig (1983), these researchers show that such a maturity mismatch can lead to bank runs and self-fulfilling debt crises (see Chang and Velasco 2000, or Goldfajn and Valdes

1999). Chang and Velasco (2000), and Jeanne and Wyplosz (2003) further argue that a currency mismatch between foreign-currency liabilities and domestic-currency assets increases the likelihood that a maturity mismatch will lead to bank runs.

Many papers have argued that the Asian financial system, shielded by implicit government guarantees, was characterized by political favoritism, insider dealing, and poor risk management. Dooley (2000) argued that East Asian countries were in danger of financial crises due to unsustainable guarantees. Corsetti, Pesenti, and Roubeni (1999) suggest that financial crises may occur when government loan guarantees are withdrawn exposing risks firms to higher costs of capital. Schneider and Tornell (2000) argue that the cyclical implementation of bailout guarantees to intermediaries of international capital flows lead to cycles of lending booms followed by credit crunches.

B. Empirical Literature

Some previous works examine the performance of financial corporations during the Asian financial crisis. Bongini, Claessens, and Ferri (2001) estimate the probability that East Asian banks would face some distress, and the probability that they would be forced to close. The authors find that traditional bank risk factors such as the ratio of loans to deposits help predict the likelihood of closure. They also find that banks connected with large industrial groups were more likely to be distressed, and large banks were less likely to face closure. Hanna and Huang (2002) focus on the restructuring of the banking system in the post-crisis era. They find that the Asian crisis is more severe than other recent currency crises in terms of declining loan growth, but find little evidence of bank runs. Bongini, Ferri, and Kang (2000) find that Korean financial firms that relied on core deposits as a source of funding were less likely to face distress during the crisis period. Kho and Stulz (2000) study the currency exposure of the banking sector in five East Asian countries during the Asian financial crisis. They find that currency exposures had a negative impact on the sector's stock returns only in Indonesia and the Philippines.

Other studies examine the impact of foreign-currency debt on firm performance around financial crises. Allayannis, Brown, and Klapper (2002), using data reported by East Asian non-financial corporations on foreign debt and hedging, find that the performance of East Asian firms are negatively affected by three types of debt: domestic-currency debt, foreign-currency debt, and artificial domestic-currency debt (i.e., foreign-currency debt converted into domestic-

currency debt through hedging). Among these three types, they find that artificial domestic-currency debt has the most negative impact on firm performance. Aguiar (2002) finds that Mexican firms with a large share of its short-term debt denominated in foreign currencies had relatively low levels of investment in years immediately following the peso depreciation of 1994.

The above papers are part of a broader literature which examines various aspects of the East Asian crisis using firm level data. Claessens, Djankov and Xu (2000) find that East Asian corporations were highly leveraged and reliant on short-term debt and this financial fragility helped predict crisis era profit margins. Bris, Koskinen, and Pons (2001) find that East Asian firms increased their leverage before the crisis but also more surprisingly continued to increase their leverage after the crisis. Johnson and Mitton (2001) examined the stock market performance of Malaysian firms during the crisis categorized by their closeness to various politicians. They find that well connected firms initially suffered losses but did better than average following the imposition of capital controls. Forbes (2002) finds that firms with international sales do relatively well following depreciations, but finds no evidence leverage affects performance.

Finally, a related literature studies the determinants of financial crises at the macroeconomic level. Two papers in particular raise some doubt about the importance of currency mismatches in the banking sector during currency crises. First, Glick and Hutchison (1999) find that banking crises are likely to precede currency crises, but currency crises do not lead to banking crises. Second, Arteta (2003) finds that countries that have larger mismatches between foreign currency deposits and domestic currency assets are not more likely to experience severe banking or currency crises.

III. Firm Level Data

In this section, we define firm level variables associated with the crisis period performance of the East Asian financial institutions drawn from the Pacific Capital Markets (PACAP) database[1]. We extract data for 303 corporations in the financial sectors of Indonesia, Korea, Malaysia, Taiwan and Thailand for which stock prices were available in June 1997 and balance sheet data was available from the financial year prior to the crisis, 1996. We further

[1] We select firms that PACAP associates with financial industries. The names of financial industries differs across countries but we categorize the industries: “Banks”, “Banking” ,“Banking and Insurance”, “Insurance”, “Finance”, “Finance & Securities”, “Securities”, “Other Financial Services”, and “Merchant Banks” “Mutual Funds” as financial industries.

classify these financial firms into four sectors: *Banking, Insurance, Securities,* and *Other*. In each country, but Taiwan, PACAP directly classifies firms that belong to the *Banking* or the *Insurance* sectors. For Taiwan, we classify financial firms that have the word "Bank" or "Insurance" in their name into the *Banking* and *Insurance* sectors, respectively. Of the remaining financial institutions, we classify them in the *Securities* sector if 50% or more of their assets are classified by PACAP as investments in securities. *Other* is the residual category and includes finance companies and leasing firms as well as others. In our sample, there are 87 firms in the *Banking* sector, 57 firms in the *Insurance* sector, 44 firms in the *Securities* sector and 115 firms in the *Other* sector.

Using the debt listed in the IFR database, we calculate the pre-crisis international debt position of each firm. We define:

1) $IDEBT_j$ is the sum of the US dollar equivalent of the face value of the foreign currency debt (listed in IFR) issued by firm j before July 1997 with a maturity date after June, 1997[2].
2) $IDEBT98_j$ is the sum of debt issued before July 1997 with a maturity date between July 1997 and December 1998. In other words, $IDEBT98_j$ is the debt (short-term or otherwise) that came due during the crisis period.
3) $IDEBTLT_j$ is the difference between $IDEBT_j$ and $IDEBT98_j$.
4) CAP_j as the market capitalization of the common stock of firm j during June 1997 (converted to US dollars using the end of month exchange rate reported in the S&P Emerging Markets database).

Averages for this data (by country and sector) are reported in Table 1. Approximately 40% of the financial firms in the sample had issued some debt in international markets. However, this varies by sector and country. Only approximately 10% of financial firms in Malaysia and Taiwan had tapped international debt markets, while 40% in Korea and nearly 60% in Indonesia and Thailand had. Two-thirds of Asian firms classified as banks had issued international debt, while no firm in the insurance industry had; one-quarter of securities firms had issued international debt while the average of *Other* firms is the same as the overall average. In terms of

[2] It is important to keep in mind that this measure is not a comprehensive measure of foreign currency liabilities as it does not include foreign currency debt issued in domestic markets, foreign currency retail deposits or foreign currency debt that was not publicly disclosed and identified as such by the market observers that compiled the IFR dataset.

dollar values, the *Banking* firms have the largest international debt levels, especially in Korea and Thailand. The average East Asian bank had debt equal to US$300 million while the average Korean bank had debt of US$665 million and the average Thai bank with international debt of $625 million. Banks in the remaining 3 countries had much smaller international debt levels. *Securities* firms in general had small international debt levels averaging US$21 million.

The vulnerability of shareholders of a firm to an exchange rate depreciation is a function of the size of foreign currency debt relative to the size of equity. Since our measure of firm performance is the value of shareholder equity, we measure international debt exposure as the ratio of international debt to the equity markets' measure of capital ($IDEBT/CAP$)[3]. Though the median Asian financial firm had zero international debt, the average firm had international debt equal to 85% of market capitalization. There is large variation in this term among firms; the standard deviation of $IDEBT/CAP$ is equal to 2. By this measure, the largest foreign currency exposure is in the finance companies categorized in the *Other* sector, followed by the *Banking* sector. Amongst countries international debt exposure was concentrated in the *Other* sectors of Korea and Thailand. The banking sectors in Korea and Thailand also have relatively large concentrations of international debt exposure.

For those firms that did have international debt at the outset of the crisis, we calculate what percentage was due within the subsequent year and a half which we will refer to as short-term debt. Of the international debt outstanding at the onset of the crisis in June, 1997, an average of 40% was due within the next 18 months. Thailand and Indonesia firms had the highest share of debt which came due during the crisis period with 54% and 41%, respectively.

In our sample, 205 firms (which we will refer to as Type 1 firms) have continuously reported monthly stock returns (with dividends reinvested) over period July, 1997 to December 1998 which we define as the crisis period. Of the remaining 98 firms, 36 firms are still being traded in December 1998 or some time afterwards; we define these as Type 2 firms. For these firms, observations on stock returns are temporarily unavailable due to a lack of observed trades.

[3] There are a number of ways to normalize the international debt exposure of financial institutions (i.e. international debt relative to market cap, assets, financial value, etc.). We would argue that this measure best represents the foreign exchange exposure of firms through international debt especially when examining the response of equity returns. A large exchange rate devaluation could wipe out the equity of a firm with a large value of international debt to capital, even though international debts were only a small share of assets or liabilities.

The 62 Type 3 firms are identified through a variety of media sources as having been closed or nationalized by the authorities.

We calculate a gross annualized return for each Type 1 firm over the crisis period:

5) *RETURN*: For Type 1 firms, we compound monthly returns (with dividends reinvested) over the 18 months between July, 1997 and December, 1998. *R* is the net, annualized return measured in local currencies. For Type 2 firms, this variable is coded as missing. For the Type 3 firms which are closed or nationalized, we code this variable in one of two ways. As a rule, this variable will be coded as missing. In some Tobit regressions, we will code the net return to be equal to –1 indicating a total loss in value.
6) *FAIL*: This dummy variable is coded as 1 for failed Type 3 firms and 0 otherwise.

Descriptive statistics, by country and by sector, are reported in Table 1. In the first row, we report the average of *RETURNS* for the Type 1 firms which range between -8% in Korea and -69% in Indonesia. Of course, returns measured in US dollar terms in these countries would be substantially lower. Moreover, by necessity, we omit the Type 2 and 3 firms whose stocks ceased trading for a considerable period or went bust altogether. Even within the sample of Type 1 firms, there is considerable variation. The minimum return was -95% while some firms experienced positive net returns equal to 400%. The standard deviation of total returns for Korean and Thai firms is especially large. Especially notable is that those Korean and Thai firms in the *Securities* sector which did not fail actually had relatively high returns over the crisis.

Table 1 also shows the breakdown of firms which failed by country and sector. Twenty percent of the overall sample of firms were either closed or nationalized. However, none of the 25 financial firms in Taiwan and only 2 of 52 firms in Malaysia were closed during this crisis period. By contrast, fully 40% of Thai financial firms failed. In Korea and Indonesia approximately 20% of firms are Type 3 firms consistent with the overall average. Only 2 out of 57 insurance firms failed during the crisis. It was the *Other* categories of firms which showed extraordinarily high frequency of failure. This is especially true of the finance firms of Thailand; 60% of Thai firms in the *Other* category failed. Korean merchant banks also had a high frequency of failure during the crisis; 30% of Korean firms in the securities category failed. There were also relatively high rates of failure in the Indonesian *Bank* sector and the *Other* sector.

PACAP has additional data (from firms' balance sheets) on the balance sheets of firms. We construct variables which represent the financial position of the firm.

7) *LEVERAGE.* The ratio of the book value of firm liabilities relative to assets in 1996.[4]
8) *VALUE*. We calculate the market value of firms as the sum of its common stock market capitalization at the closing price in June, 1997 plus the book value of its liabilities in the financial report from year-end 1996 as a ratio to the book value of its assets in 1996.
9) *SIZE* The US dollar value of assets in 1996 converted into US dollars.

PACAP divides the assets of financial institutions into five categories: i) Loans; ii) Investments; iii) Cash; iv) Other Assets; and v) Tangible Assets. We construct two variables which measure the structure of assets.

10) *LOANS.* The ratio of the 1996 book value of the loan assets of the financial institution relative to total assets.
11) *PAPER.* The ratio of the 1996 book value of financial investments of the financial institution relative to total assets.
12) *TURNOVER* The average (over the period 1993:1-1997:06) monthly value of stocks traded relative to stock market capitalization.
13) *DEPOSITS* The ratio of the book value of liabilities classified as deposits or borrowings by PACAP relative to overall liabilities. PACAP has information on *DEPOSITS* for 282 of the 303 firms in the sample.

Country-level outcomes for some other random variables are reported in Table 2. First, we report information on overall leverage of firms. Overall, the ratio of liabilities to assets in the East Asian financial sector was .8; financial firms are typically highly geared as a matter of course. Korean firms had the highest leverage with *LEVERAGE* greater than 85% while Taiwan financial firms had the most solid balance sheets with a *LEVERAGE* approximating 75%. Interestingly, the median of *LEVERAGE* is substantially larger than the mean indicating the presence of a few highly capitalized firms. The ratio of market value to book value of firms,

[4] This is one representation of the overall leverage of the firm. We admittedly choose this one because it was the most robustly significant predictor of crisis period firm performance.

MARKET, is slightly larger than 1 for East Asian firms as a whole. We find that firms in Taiwan had the highest market to book value, above 1.6. By contrast, Indonesian, Korean, and Thai firms were given nearly the same valuation by the market as by their accountants.

The average financial firm had US$4.6 Billion in assets though the median firm had closer to US$1 billion. Unsurprisingly, East Asian financial institutions were highly leveraged with liabilities averaging 80% of total assets. On average, approximately half the assets of the firms are loans with an average of *LOAN* equal to 48.9% while securities holdings make up approximately one quarter of *PAPER* make up 27% of assets on average. Thai firms have a high average level of loans to assets while Indonesian and Korean firms have high levels of securities to assets. Seventy percent of the liabilities of the mean financial firm are raised through deposits or borrowings; the average of *DEPOSIT* is .7. This varies across countries. In Thailand, the average firm raises nearly 90% through this channel. In Malaysia, the figure is marginally greater than 50%.

Statistics measuring the average market *TURNOVER* are also shown in Table 2. Eight percent of the market capitalization of the average East Asian financial firm is traded per month. This varies greatly across markets. Only 3% of the market cap of the average Indonesian firm is traded per period while more than 18% of the average Taiwanese firm is traded. There may be a number of reasons that firms have small free floats. However, we would argue that 'crony' firms that expect to benefit from the personal connections of their managers with politicians would be unlikely to have widely dispersed stock ownership. There would be less incentive to invest in political connections if the benefits must be shared with small investors.

IV. Statistical Models of Crisis Performance

A. Tobit Model

In our initial analysis, we treat firms that have failed (Type 3 firms) as firms whose net return is observed to be at the minimum possible level, *RETURN* = -1. Ignoring Type 2 firms for the moment, we model returns as a linear function of country dummy variables, and firm level determinants. We estimate the Tobit model with 267 firms as:

$$r_j = \alpha_{COUNTRY} + X_j\beta + \varepsilon_j$$

$$RETURN_j = r_j \quad r_j > -1 \qquad RETURN_j = -1 \quad r_j \le -1 \tag{4.1}$$

We report estimates of β and corresponding marginal effects (evaluated at in sample variable means) along with standard errors in Column [A] in Table 3. We find that high levels of international debt exposure are associated with poor levels of crisis period performance; the coefficient on $IDEBT/CAP$ is statistically significant at the 1% critical value. In addition, foreign exchange exposure is also economically significant. The product of the marginal effect and the standard deviation is approximately -17%.

The overall leverage of the financial intermediaries is also statistically significant at the 1% critical value. A one standard deviation increase in the ratio of liabilities to assets (*LEVERAGE*) is associated with 22% lower net returns during the crisis. Other statistically significant random variables (at the 5% level) include *VALUE.* A one standard deviation rise in this variable would be associated with 8% lower returns during the crisis. This result is open to a variety of interpretations. If the crisis were attributed to a collapsed stock-market bubble, the most over-valued firms may have fallen the farthest. Alternatively, new negative macroeconomic information might affect the valuation of growth stocks most severely.

The coefficient on *LOANS,* the share of assets which are loans, was negative and significant at the 5% critical value while the coefficient on *PAPER,* the share of assets that were in securities, was insignificantly different than zero. A one standard deviation rise in the share of assets that are loans is associated with negative 12% returns. Loans as assets are characterized by specialized information on the part of financial intermediaries. Particularly poor performance by firms with high levels of loans may reflect the poor risk monitoring and insider dealing characterized by 'crony capitalism'. However, other explanations are available. Loans are relatively illiquid and a panic by creditors might hit firms with illiquid assets. Neither the coefficients on *SIZE* nor *TURNOVER* are significant at the 10% critical value, though each would be significant at the 12% critical value.

The Tobit model strengthens inference by assuming that those determinants which cause the observed stock return to be low among financial institutions that did not fail are the same as the determinants that increase the probability that a financial institutions would fail. This model specification can tested using the Fin-Schmidt (1984) likelihood ratio test. The Fin-Schmidt test rejects the hypothesis that the coefficients of the index function that determines the probability that the firm would close are the same as the coefficients of the linear model of the returns of those firms which did not fail with a p-value lower than .001. This strong rejection suggests

conducting inference on the probability of failure and the stock returns of non-failed firms separately.

B. Probit & Selection Correction

First, we examine a Probit model of probability that financial institutions were closed or nationalized (i.e. the probability that it was a Type 3 firm). The variable *FAIL* is 1 if a financial institution is categorized as Type 3 firm and 0 otherwise. An unobserved index variable, f_j is a linear function of the same determinants as in the previous section:

$$f_j = \alpha + X_j\beta + \varepsilon_j \quad \varepsilon \sim N(0,1)$$
$$FAIL_j = 1 \;\; if \;\; f_j \geq 1, \;\; FAIL_j = 0 \;\; if \;\; f_j < 1 \tag{4.2}$$

where the error term is distributed standard normal. Notice that we do not include country specific intercepts in this model. No Taiwanese firms failed, so a Taiwan dummy perfectly predicts the dependent variable. The coefficient on no other country dummy is significant at the 10% critical value when it is included independently. Therefore, to clarify inference we assume a constant intercept. We report the coefficient estimates and marginal effects with Standard Errors in Column [B] of Table 3.

A number of the results from the Probit equation are similar to the implications of the Tobit model. First, we find that the coefficient on international debt exposure is positive and significant at the 5% critical value. Multiplying the marginal effect by the standard error of $IDEBT/CAP$ suggests that a one standard deviation increase in international debt exposure is associated with an increased probability of failure by 6%. Since 20% of firms in the sample failed, this seems like a substantial amount. Overall leverage, *LEVERAGE,* is also a statistically and economically significant determinant of the probability of failure. A one standard deviation increase in *LEVERAGE* is associated with a 9% higher probability of failure.

There are also some interesting differences between the implications of the Tobit model and the estimates of the Probit model. First, we find that *SIZE* is a negatively significant determinant of firm failure. This could indicate that large financial institutions with a diversified asset base were more likely to survive a crisis than smaller firms. Another possibility is that governments followed a "too big to fail" policy. Another interesting distinction is that the coefficient on *VALUE* was negative significant at the 5% critical value. This contrasts with the

Tobit model which indicated a high market-to-book value was negatively associated with crisis period performance.

The asset composition of the financial institutions is also a significant determinant of failure during the crisis period. The coefficients on *LOAN* and *PAPER* are both significant at the 1% critical value. Thus, having a large share of assets in relatively risky assets increases the likelihood of failure. Interestingly, though the coefficient on *LOAN* is slightly larger than the coefficient on *PAPER*, this difference is not statistically significant. We conduct an F-test of the hypothesis that $\beta^{LOAN} = \beta^{PAPER}$ which has a p-value of approximately .244. The marginal effects of either variable are also roughly similar.

We then turn to examining the performance of the firms in which we were able to observe returns. Of the 303 firms, we were able to observe total stock returns for 205 Type 1 firms that did not hit a corner outcome of total equity loss. We estimate a linear function of stock returns with country dummy variables.

$$RETURN_j = \alpha_{COUNTRY} + X_j\beta + \varepsilon_j \qquad (4.3)$$

We estimate the model correcting for potential bias as in Heckman (1979). We include each of the variables X_j in the first stage selection equation (though we do not include country-specific intercepts in the selection equation for the reasons noted in the previous section). We report the estimates from the first stage selection equation in Column [C1]; the selection equation is a Probit regression where the dependent variable is a one if the financial institution *j* is a Type 1 firm (with an observed return) and a zero otherwise. Though conceptually somewhat different than the Probit equation reported in Column [B], the implications of the two specifications are similar. The same variables are significant in both equations (though naturally the coefficients are of the opposite sign). Thus, we will not further examine the selection equation.

In Column [C2], we report the estimates of the coefficients of (4.3) which show the effect of the dependent variables on the returns of those companies which we were able to observe. Note that the coefficients on $IDEBT/_{CAP}$, *LEVERAGE*, and *VALUE* are all significant at the 5% critical value. The significant coefficients are all very similar to the marginal effects estimated in the Tobit regression. We again note that the ratio of the market-to-book value, *VALUE*, is negatively associated with the performance of firms which did not fail, but positively associated with the probability of survivalfailure. None of the remaining variables is significant. Note that

though the composition of assets, *LOAN* and *PAPER*, and the total size, *SIZE*, of assets are important determinants of the probability that firms fail, they are not significantly associated with the returns of firms that did not fail.

C. Short & Long Term International Debt/Deposits

The previous section demonstrates that large international debt exposure is associated with both a high probability of firm failure but also with poor stock market performance for those firms that survived the crisis. The impact of international debt may operate through two channels. First, the international debt is denominated in foreign currencies and the exchange rate depreciations experienced by these countries may have increased the burden of repaying this debt. Second, international capital markets may be especially subject to herd behavior. Firms that rely on foreign lending may have been especially vulnerable to the sudden stops in global capital flows.

To differentiate the two channels we split our firm level of international debt into a short-term component, $IDEBT98/CAP$, and a long-term component, $IDEBTLT/CAP$. If the primary channel through which international debt led to negative crisis-period outcomes was a sudden stop in international lending, then this should work primarily through the short-term international debt which was unexpectedly not rolled over during the crisis. Conversely, if the foreign currency aspect of the debt was more important, then both short-term and long-term debt should reduce firm values.

In Table 4, Column [D], [E], and [F] we report estimated coefficients versions from the Tobit, Probit, and Heckman selection-corrected models with $IDEBT98/CAP$ and $IDEBTLT/CAP$ replacing their sum, $IDEBT/CAP$. Allowing the coefficients on $IDEBT98/CAP$ and $IDEBTLT/CAP$ to differ as we do in Columns [D], [E], and [F] has little impact on the estimates of the other coefficients. We find in the Tobit regression in column [D] that the coefficients on short-term and long-term debt are approximately equal, as well as similar to the estimate from the regression in Column [A] (in which these coefficients are restricted to be equal). The coefficient on $IDEBT98/CAP$ is significant at the 5% critical value; the coefficient on $IDEBTLT/CAP$ is significant at the 10% critical value. That long-term international debt has an equal negative impact on returns as short-term international debt argues against the idea that the crisis was driven solely by the sudden refusal of international capital markets to roll over short-term debt to financial corporations. However,

the Fin-Schmidt test again rejects the hypothesis that the dependent variables have an equal impact on the index that determines the probability that a firm fails as on the returns of firms that did not fail at any reasonable critical value.

In Column [E], we report the results from the Probit model of the probability that firms fail. Here only short-term international debt exposure matters. In this regression the coefficient on $IDEBT98/CAP$ is positive and significant at the 5% level; the coefficient on $IDEBTLT/CAP$ is insignificant. By contrast, Column [F] reports the selection corrected model of firms whose returns we observe and did not fail. Here, only the long-term debt matters. The coefficient on $IDEBTLT/CAP$ is positive and significant at the 1% level; the coefficient on $IDEBT98/CAP$ is insignificant. We cannot rule out the idea that a failure by international debt markets to roll-over short term debt drove many emerging markets banks into closure. However, the fact that long term foreign currency debt is a significant determinant of the returns of the remaining firms does indicate the importance of losses due to the effect of foreign currency debt in the presence of large exchange rate depreciation.

Some theories attribute financial bank crises to bank runs by depositors. This would indicate that raising funds through deposits may expose firms to more severe crises. In Column [G] of Table 4, we examine a version of the Probit model with *FAIL*, the dummy variable for the intermediary being nationalized as the dependent variable in which we add *DEPOSIT* to the list of right-hand side variables. The inclusion of the additional variable reduces the sample size but does not greatly change the estimates of the coefficients on the previously included variables (or change their significance). The coefficient on *DEPOSIT* is negative and significant at the 5 percent level. The negative sign indicates that firms with a large share of liabilities in the form of deposits and borrowings had a *lower* probability of failing during the crisis. We also add *DEPOSIT* to the model of returns for those firms whose returns we observe (corrected for selection). The coefficients, which are reported in column [H], are similar to those in the similar equation reported in Table 4, Column [F2]) with one exception. Here, we find that firms with a high pre-crisis level of *TURNOVER* have significantly (at the 10% critical value) more negative returns during the crisis. We also find that the coefficient on *DEPOSIT* is insignificant.

D. Alternate Specifications

The limited dependent variable models we estimate in the previous section are dependent on correct specification for consistency. In this section, we check the robustness of our results to some specification changes. First, we suggest some alternate models for the probability that firms fail. In this section, we will not report marginal effects to save space. Second, we examine some models of the performance of those firms whose stock market returns we can observe.

1. Models of Financial Institution Failure

We first estimate the discrete choice model, (4.2) with the change that the error term is distributed logistically. The estimates of the coefficients and standard errors of the Logit model are in Table 5, Column [I]. The coefficient estimates are somewhat larger in the Logit regression than in the benchmark Probit equation. The most notable in terms of the significance of the change is that here the coefficient on short-term international debt is significant at a p-value of .06 instead of a p-value of .04. The distribution of the error is symmetric in both the Logit and Probit model. In the fitted values of each of these cases, only about 30 firms are predicted to have a greater than 50% chance of failure which is only half of the 60 firms which did fail. We also estimate the binary choice model under the assumption that the error term is distributed according to the skewed Gompertz distribution. The fitted values of this distribution predict slightly more than 60 firms have a greater than 50% chance of failure (though of these roughly half did not fail). Each of the variables which are significant under the Probit and Logit specifications are also significant here as reported in Column [J].

We also allow for heteroskedasticity in the variance of the distribution of the error term. We estimate a Probit model in which the standard error is a linear function of dummy variables for Indonesia, Korea, Malaysia, and Taiwan. An F-test of the coefficients on these variables rejects homoskedasticity at any reasonable critical value. The standard errors increase drastically for all variables. Only *LOAN* and $IDEBT98/CAP$ are significant, respectively at the 5% and 10% critical value as reported in Column [K]. If the error term is distributed symmetrically, we can consistently estimate the coefficients using Manski's (1975) Maximum score estimator. We report the coefficient estimates for this estimator in Column [L] of Table 5. Standard errors are calculated using 500 Monte Carlo simulations (with replacement). Under this estimation, again, only *LOAN* and $IDEBT98/CAP$ are significant, this time at the 10% and 5% critical values.

Finally, we estimate a multinomial Logit model in which the discrete dependent variable takes on a 0 if the firm is a Type 1 firm for whom we observe total stock returns, a 1 if the firm is

a Type 2 firm with unobserved returns which does not fail and a 2 if the firm is a Type 3 firm which is either closed or nationalized. The Type 1 firm is the default choice. In Columns [M1] and [M2] of Table 5, we report the coefficients for the indexes of the probability that a firm is a Type 2 firm and the probability that a firm is a Type 3 firm which ultimately failed. We find that the *LEVERAGE* of the firm, the share of the firms assets which are in the form of a *LOAN* as well as the overall *SIZE* are significant determinants of the probability that we would not observe the firms' returns due to a cessation of trading for long periods. Increasing leverage, increasing the share of assets that are loans, and smaller firms had a higher probability of being Type 2 firms whose returns were not observed. The estimates of the coefficients from the index function of the probability of being a Type 3 firm which was closed are very similar the estimates in from the binomial Logit regression reported in Column [I], Table 5. The only multinomial Logit coefficient that is more than one standard deviation from its binomial counter-part is the coefficient on *SIZE*. Relatively small financial institutions (in terms of assets) were both likely to fail and to cease trading for substantial periods during the crisis.

2. Models of Returns for Firms which Did Not Fail

The selection correction of our estimates of the coefficients in (4.3) is based on a Probit selection equation. In Table 5, Column [N] we report the estimates from a model in which the selection equation is a multinomial Logit function using the method in Lee (1983). Again, it is not possible to reject the hypothesis that there is no selection bias (i.e. a t-test of the hypothesis that the coefficient on the fitted inverse mills ratio is not significantly different from zero). Moreover, the estimates are quite similar to those estimated using a Probit selection equation. We also estimated a truncated normal regression in which we assume that we observe only the returns of those firms with returns above zero. Results for this regression (in column [O]) are similar to the regression corrected with the Heckman selection equation.

Given the failure to reject the absence of selection bias, we are interested in examining the OLS estimates of the coefficients reported in column [P] along with heteroskedastic consistent standard errors. These coefficients are very similar to the selection corrected results. The primary difference between the OLS estimates and the selection corrected results is that the OLS standard error for the coefficient on $IDEBTLT/CAP$ is substantially smaller and the standard error on *VALUE* is somewhat larger. However, in the OLS regression as in previous specifications, $IDEBTLT/CAP$, *VALUE,* and *LEVERAGE* are significant and negative determinants of returns.

In addition, we estimate the model using a robust regression technique which iteratively weights the coefficients according to the size of the residuals following Hamilton (1992). We find that after trimming high-leverage variables, that the standard errors on $IDEBTLT/CAP$, *VALUE,* and *LEVERAGE* become very small and each of these variables is significant at the 1% critical value (see column [Q]). Interestingly, the coefficient on *TURNOVER* variable roughly doubles in size and becomes highly significant.

V. Conclusion

In this paper, we find that East Asian financial intermediaries' international debt levels had a strong, negative impact on their performance during the crisis. We find that high levels of international debt, relative to equity, were associated with higher probability of closure, nationalization or bankruptcy as well poorer performance in terms of stock returns during the crisis. This finding is robust to inclusion of other determinants of banks financial position including their overall leverage and the share of their assets which were in high risk categories. The finding is also is robust to differences in model specification. We find that short-term international debt was more linked with the probability of failure than was long-term debt while long-term international debt was more significantly associated with poor performance by firms which survived. We interpret the importance of long-term debt for returns to indicate that some property of international loans and bonds beyond its volatile nature impacted their issuers in negative ways. One obvious property of international debt in this circumstance was that it was issued in foreign currencies which might affect firm value following a currency depreciation.

This result stresses the importance of examining the impact of firm-level variables on both firms that survived the crisis as well as those that failed during the crisis. This does not stem from selection bias in our sample. Instead, we find that firm level variables often affect the likelihood of bankruptcy in different ways than they affect the returns of firms that survived the crisis. For instance, firms with large asset bases were less likely to go bankrupt, but firm size seems uncorrelated with returns of surviving firms. Firms with high market to book values prior to the crisis were less likely to go bankrupt, but had significantly lower returns if they survived.

In addition to examining international debt as a factor for crisis period performance we also consider some additional theories. It has been argued that the East Asian financial system developed under the umbrella of implicit governmental guarantees and that these inculcated a lack of proper risk management and a culture of crony capitalism and insider dealing. The crisis

could then be attributed to a withdrawal of these guarantees which exposed the financial system to sudden market discipline. One theory of the crisis is that it was caused by the sudden withdrawal of guarantees exposing the sector to sudden market discipline.

We are not able to test this hypothesis directly, though we can interpret some of our results in light of this theory. The shares of large financial institutions (in terms of assets) had a much lower likelihood of complete loss of equity though of those firms that survived the crisis, stock returns were not a function of firm size. This outcome seems consistent with the idea that governments practiced a "too big-to-fail" policy protecting the equity of large financial institutions which were in danger of failing. Thus, moral hazard may have played a role in pre-crisis behavior, though the continuance of "too big-to-fail" during the crisis suggests that not all implicit guarantees were withdrawn. Second, we find that overall leverage was an important determinant of the probability of failure and was negatively associated with the returns of those firms that survived. Moreover, we find that high levels of risky asset holdings were also associated with high rates of failure during the crisis. These findings are consistent with the idea that poor risk management by financial intermediaries was an important aspect of the crisis

Not all of the evidence we find points to "crony capitalism" among financial institution as a cause of the crisis. We find that loans (as a share of assets) are not a significantly greater predictor of the firm failure than holdings of other risky investments. Loans, based as they are on private information, might be thought to be more conducive to the insider dealings characterizing cronyism or poor assessment of default risk by individual financial intermediaries. That loans were no more associated with failure than other risky assets tends to point away from the crony capitalism/moral hazard hypothesis. Also East Asian firms, in general, are more likely to be under the control of a majority shareholder which might be conducive to abuse of minority shareholders. However, we find no evidence that firms which had low percentages of their shares traded in financial markets had worse performance during the crisis. We find that very liquid firms did, if anything, worse during the crisis.

Another hypothesis is that the crisis was due to a self-enforcing panic by international financial markets. We find some evidence in favor of this. Again, heavily leveraged financial institutions had worse performance during the crisis; heavily leveraged firms may have been more likely to experience a credit crunch after a sudden stop of international lending. As international institutional investors are more likely to purchase highly liquid stocks, such shares

would be more vulnerable to sudden outflows of capital. Indeed, those shares which were more heavily traded prior to the crisis did worse during the crisis, though this is not robust statistically. Third, we find that exposure to short-term international debt, in particular, was associated with a high likelihood of firm failure. Financial institutions which relied on short-term borrowing would be especially vulnerable to a refusal of international financial markets to roll over debt. However, it was long-term international debt which was associated with low returns of those firms which did not fail. This indicates that international debt worked through other channels than simply an international financial panic. Mendoza (2001) offers a theoretical model in which foreign currency debt exacerbates the effects of international financial panics. We also find that firms with deposits & borrowings as a high share of liabilities had a significantly lower probability of failure. The latter result points away from domestic bank runs as a cause of the crisis.

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Figure 1 The figure shows a country level, annual time series of the face value of new debt issued in international markets by financial intermediaries.

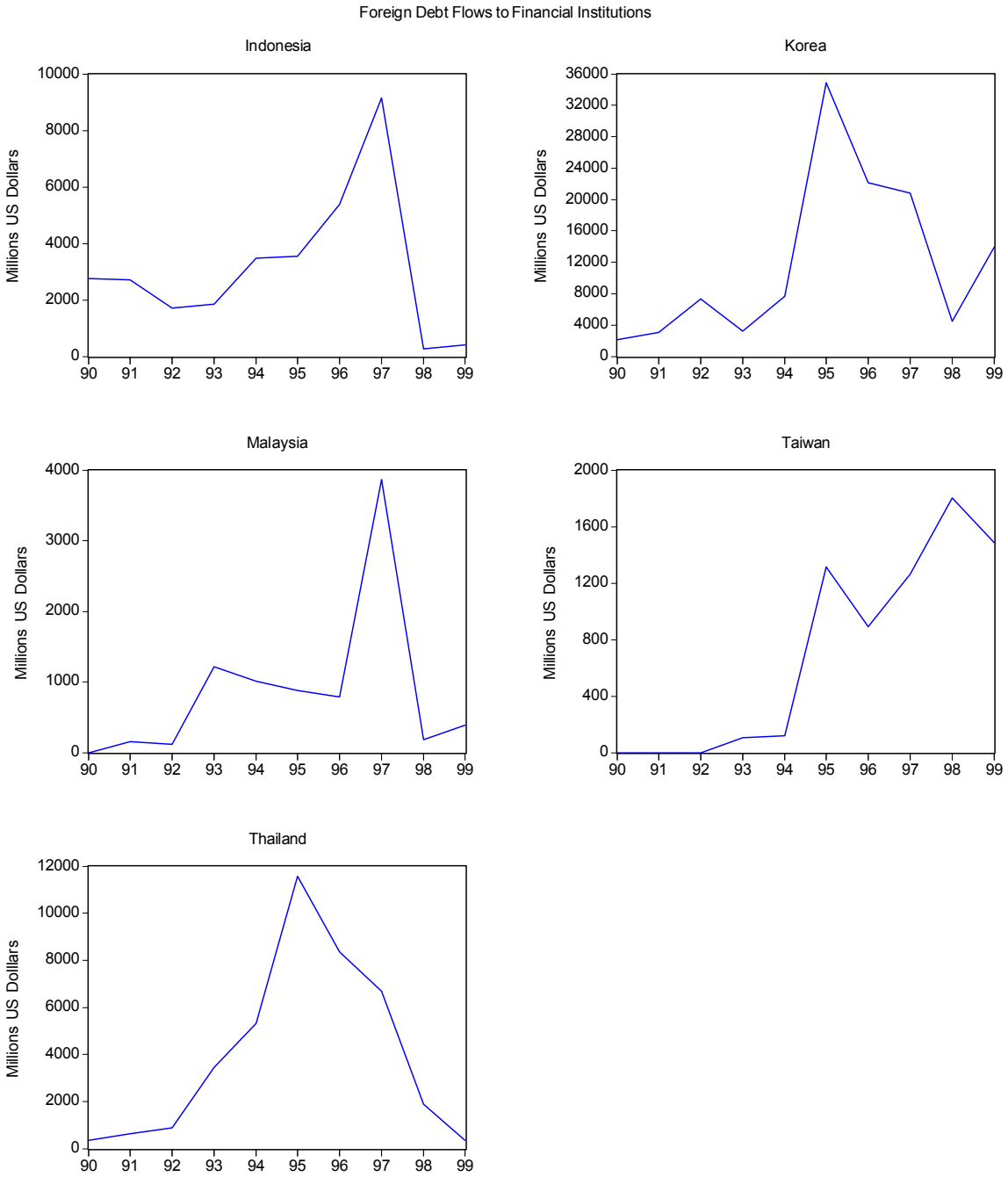

Table 1 ***Sector Level Descriptive Statistics*** This table shows sample means for stock returns and outstanding international debt broken down by country and sector. The variables are *N*, the number of firms in each sector in each country; *R* the annualized total stock return over the period July, 1997 to December, 1998; *Fail*, a dummy variable with a 1 representing a failed firm; *IDEBT* , the face value in millions of outstanding international debt and the share of firms which have any outstanding international debt; $IDEBT/CAP$ is *IDEBT* divided by the US dollar market value of common stock in June 1997. We also report the average share of the debt that came due between June 1997 and December 1998. Standard deviations are reported for appropriate variables.

	N	*IDEBT*		% of firms with *IDEBT* > 0	$IDEBT/CAP$		% of Debt that is short-term	*RETURN*		*Fail*
		Mean	S.D.		Mean	S.D.		Mean	S.D.	Mean
Indonesia	37	$44	(58)	57%	0.24	(.44)	41%	-0.69	(.15)	20%
Banking	22	$52	(48)	77%	0.28	(.49)	43%	-0.69	(.10)	16%
Insurance	8	$0	()	0%	0.00	(.00)	.	-0.61	-	4%
Securities	5	$67	(100)	60%	0.51	(.51)	15%	-0.73	(.27)	23%
Other	2	$73	(103)	50%	0.06	(.08)	86%	-0.61	-	31%
Korea	103	$207	(509)	43%	0.69	(1.27)	23%	-0.08	(.66)	17%
Banking	23	$665	(894)	83%	0.86	(.83)	19%	-0.35	(.34)	9%
Insurance	12	$0	()	0%	0.00	(.00)	.	-0.25	(.30)	0%
Securities	33	$14	(35)	18%	0.21	(.53)	32%	0.32	(.41)	30%
Other	35	$158	(253)	54%	1.26	(1.83)	25%	-0.15	(.94)	14%
Malaysia	52	$25	(76)	13%	0.01	(.02)	22%	-0.47	(.15)	4%
Banking	15	$80	(126)	40%	0.02	(.04)	9%	-0.45	(.14)	0%
Insurance	9	$0	()	0%	0.00	(.00)	.	-0.39	(.18)	0%
Securities	1	$0	.	0%	0.00	NA	.	-0.49	(.12)	0%
Other	27	$3	(18)	4%	0.00	(.01)	100%	-0.51	(.13)	7%
Taiwan	25	$17	(61)	8%	0.00	(.02)	0%	-0.33	(.14)	0%
Banking	13	$32	(83)	15%	0.01	(.02)	0%	-0.37	(.13)	0%
Insurance	7	$0	(0)	0%	0.00	(.00)	.	-0.29	(.12)	0%
Securities	2	$0	(0)	0%	0.00	(.00)	.	-0.30	(.19)	0%
Other	3	$0	(0)	0%	0.00	(.00)	.	-0.27	(.20)	0%
Thailand	86	$ 162	(292)	59%	2.06	(3.54)	54%	-0.08	(.68)	40%
Banking	14	$625	(442)	100%	1.20	(.74)	42%	-0.35	(.3)	36%
Insurance	21	$0	()	0%	0.00	(.)	.	-0.05	(.46)	0%
Securities	3	$36	(37)	67%	0.42	(.54)	100%	0.15	(.32)	0%
Other	48	$105	(143)	73%	3.31	(4.31)	57%	0.03	(.98)	60%
Total	303	$127	(346)	41%	0.85	(2.17)	39%	-0.27	(.54)	20%
Banking	87	$308	(571)	67%	0.50	(.72)	30%	-0.45	(.26)	16%
Insurance	57	$0	()	0%	0.00	(.)	.	-0.25	(.33)	4%
Securities	44	$21	(47)	25%	0.24	(.51)	40%	0.01	(.52)	23%
Other	115	$94	(177)	49%	1.77	(3.25)	47%	-0.25	(.75)	31%

Table 2 ***Descriptive Statistics*** This table reports means (broken down to the country level), standard deviation (in parentheses), minimum, maximum and median. The variables are *R*, the annualized stock return; $PROFIT/_{CAP}$, profits in 1997 and 1998 divided by June 1997 market capitalization; *LEVERAGE*, the ratio of liabilities to assets; *VALUE,* the sum of the book value of liabilities plus market value of common stock divided by book value of assets; *LOAN*, the ratio of loans (as assets) to assets; *PAPER*, the ratio of investments to assets; *SIZE*, the US dollar value of assets; *TURNOVER*, monthly value of shares traded to market capitalization averaged over 1993 to mid-1997; *DEPOSIT,* the ratio of deposits & borrowings to total liabilities; $IDEBT/_{CAP}$, face value of outstanding, international debt relative to market capitalization; $IDEBT98/_{CAP}$, face value of outstanding, international debt that came due during the crisis relative to market capitalization; $IDEBTLT/_{CAP}$, face value of outstanding, international debt that came due during the crisis relative to market capitalization.

	Indonesia	**Korea**	**Malaysia**	**Taiwan**	**Thailand**	**Total**			
	Mean (S. D.)	Mean (S. D.)	Mean (S. D.))	Mean (S. D.))	Mean (S. D.)	Mean (S. D.)	Min	Max	Median
RETURN	-0.719 (.11)	-0.083 (.66)	-0.471 (.15)	-0.314 (.15)	-0.066 (.68)	-0.248 (.55)	-0.942	3.994	-0.371
LEVERAGE	0.772 (.23)	0.856 (.14)	0.790 (.20)	0.752 (.27)	0.774 (.20)	0.803 (.20)	0.061	1.179	0.899
VALUE	1.122 (.31)	0.952 (.11)	1.321 (.33)	1.658 (1.05)	0.975 (.24)	1.101 (.43)	0.448	5.892	0.988
LOAN	0.473 (.3)	0.342 (.19)	0.514 (.26)	0.511 (.26)	0.651 (.29)	0.489 (.28)	0.000	0.978	0.462
PAPER	0.366 (.36)	0.358 (.21)	0.206 (.23)	0.213 (.18)	0.204 (.21)	0.278 (.24)	0.000	0.976	0.162
SIZE (in Millions)	$1,701 (2,509)	$5,873 (10,666)	$5,471 (10,918)	$2,698 (6,539)	$8,928 (9,950)	$4,646 (9,138)	$9	$67,709	$1,195
TURNOVER	0.030 (.03)	0.108 (.07)	0.053 (.06)	0.180 (.11)	0.065 (.06)	0.083 (.08)	0.001	0.525	0.061
DEPOSIT	0.701 (.42)	0.638 (.26)	0.524 (.25)	0.568 (.44)	0.887 (.16)	0.677 (.31)	0	1.00	0.765
$IDEBT/_{CAP}$	0.242 (.44)	0.688 (1.26)	0.008 (.02)	0.004 (.02)	2.056 (3.54)	0.849 (2.17)	0	17.986	0
$IDEBT98/_{CAP}$	0.088 (.15)	0.206 (.49)	0.003 (.01)	0.000 (0)	1.364 (2.85)	0.468 (1.64)	0	17.986	0
$IDEBTLT/_{CAP}$	0.154 (.35)	0.482 (.86)	0.006 (.02)	0.004 (.02)	0.692 (1.26)	0.380 (.88)	0	7.009	0

Table 3 Financial Performance This table reports the coefficient estimates and heteroskedasticity consistent standard errors from three specifications: a) a Tobit model of stock returns, R, treating failed firms as a corner outcome, R = -1; b) a Probit model of the probability that the financial intermediary would fail; and c) a Heckman corrected model of returns of those firms which did not fail. Each of the models and the right-hand side variables are *LEVERAGE*, the ratio of liabilities to assets; *VALUE,* the sum of the book value of liabilities plus market value of common stock divided by book value of assets; *LOAN*, the ratio of loans (as assets) to assets; *PAPER*, the ratio of investments to assets; *SIZE*, the US dollar value of assets; *TURNOVER*, monthly value of shares traded to market capitalization averaged over 1993 to mid-1997; $IDEBT/CAP$, face value of outstanding, international debt relative to market capitalization. Significant coefficients at the 1%, 5%, and 10% level are marked with ♠, ♥, and ♦ respectively.

Dependent Variable	A) *R*		B) *FAIL*		C1)	C2) *Return*
Model	Tobit		Probit		Heckman	
	Coeficient.	Marginal FX	Coeficient.	Marginal FX	Probit	OLS
$IDEBT/CAP$	-0.103♠ (.03)	-0.08♠ (.02)	0.138♥ (.06)	0.029♥ (.01)	-0.163♠ (.06)	-0.080♥ (.04)
LEVERAGE	-1.426♠ (.28)	-1.13♠ (.22)	2.302♠ (.88)	0.482♠ (.17)	-1.961♠ (.64)	-1.154♠ (.35)
VALUE	-0.259♥ (.10)	-0.20♥ (.08)	-1.552♥ (.66)	-0.325♠ (.12)	0.604♦ (.31)	-0.243♠ (.08)
LOAN	-0.559♥ (.23)	-0.44♥ (.18)	2.755♠ (.68)	0.577♠ (.15)	-2.085♠ (.53)	-0.122 (.33)
PAPER	-0.181 (.26)	-0.14 (.21)	2.234♠ (.84)	0.468♠ (.18)	-1.565♥ (.62)	0.117 (.28)
SIZE	0.052 (.03)	0.04 (.03)	-0.147♦ (.08)	-0.031♦ (.02)	0.408♠ (.07)	0.040 (.06)
TURNOVER	-0.984 (.60)	-0.78 (.48)	0.208 (1.37)	0.044 (.29)	0.431 (1.18)	-0.380 (.54)
Inverse Mills Ratio						0.176 (.34)
Pseudo R^2	0.1907		.244		.30327	
N	267		303		303	205/303

Table 4 Financial Performance Part II. This table reports the coefficient estimates and heteroskedasticity consistent standard errors from three specifications: a) a Tobit model of stock returns, R, treating failed firms as a corner outcome, R = -1; b) a Probit model of the probability that the financial intermediary would fail; and c) a Heckman corrected model of returns of those firms which did not fail. Each of the models and the right-hand side variables are *LEVERAGE*, the ratio of liabilities to assets; *VALUE,* the sum of the book value of liabilities plus market value of common stock divided by book value of assets; *LOAN*, the ratio of loans (as assets) to assets; *PAPER*, the ratio of investments to assets; *SIZE*, the US dollar value of assets; *TURNOVER*, monthly value of shares traded to market capitalization averaged over 1993 to mid-1997; $IDEBT98/CAP$, face value of outstanding, international debt that came due during the crisis relative to market capitalization; $IDEBTLT/CAP$, face value of outstanding, international debt that came due during the crisis relative to market capitalization; *DEPOSIT*, the share of liabilities which are classified as deposits or borrowings. Significant coefficients at the 1%, 5%, and 10% level are marked with ♠, ♥, and ♦ respectively.

Dependent Variable	D) *R*		E) *FAIL*		F1)	F2) *Returns*	G)	H) *Returns*
Model	Tobit		Probit		Heckman		Probit	Heckman
	Coeficient.	Marginal FX	Coeficient.	Marginal FX	Probit	OLS	Coeficient.	OLS
LEVERAGE	-1.424♠ (.28)	-1.128♠ (.22)	2.384♠ (.89)	0.505♠ (.17)	-1.999♠ (.65)	-1.071♠ (.36)	2.854♠ (.95)	-1.092♠ (.32)
VALUE	-0.258♥ (.10)	-0.204♥ (.08)	-1.547♥ (.66)	-0.328♠ (.12)	0.602♥ (.31)	-0.240♠ (.08)	-2.169♠ (.77)	-0.238♠ (.08)
LOAN	-0.564♥ (.23)	-0.447♥ (.18)	2.618♠ (.70)	0.555♠ (.15)	-2.001♠ (.54)	-0.118 (.32)	2.623♠ (.71)	-0.210 (.32)
PAPER	-0.186 (.26)	-0.147 (.21)	2.131♥ (.85)	0.452♥ (.18)	-1.507♥ (.63)	0.105 (.27)	1.627♦ (.89)	0.062 (.27)
SIZE	0.052 (.03)	0.041 (.03)	-0.147♦ (.08)	-0.031♦ (.02)	0.407♠ (.07)	0.026 (.06)	-0.194♥ (.08)	-0.003 (.05)
TURNOVER	-0.988 (.60)	-0.782 (.48)	0.135 (1.37)	0.029 (.29)	0.466 (1.18)	-0.459 (.53)	-0.519 (1.47)	-0.938♦ (.55)
$IDEBT98/CAP$	-0.098♥ (.05)	-0.078♥ (.04)	0.209♥ (.10)	0.044♦ (.02)	-0.214♥ (.11)	0.008 (.07)	0.219♥ (.10)	0.009 (.06)
$IDEBTLT/CAP$	-0.110♦ (.06)	-0.087♥ (.05)	0.032 (.13)	0.007 (.03)	-0.094 (.13)	-0.151♠ (.05)	-0.001 (.13)	-0.163♠ (.05)
DEPOSIT						0.087 (.15)	-0.901♥ (.40)	0.087 (.15)
Inverse Mills Ratio						.104 (.341)		-.021 (.26)
Pseudo R^2	.0.1908		.2469		.30569		.2564	
N	267		303		303	282	282	194/282

Table 5 Robustness Checks This model displays the coefficient estimates from a wide variety of models which are used to test the robustness of the results. The models are divided into two classes. The first uses linear index models with various assumptions about distribution to estimate the probability that the financial institutions went bankrupt. The coefficients of the index functions and standard errors are reported. The second class estimates linear models of the observed stock returns of non-failed firms with various assumptions about the probability of observation as well as a robust residual weighting estimation. The variables included are are *LEVERAGE*, the ratio of liabilities to assets; *VALUE,* the sum of the book value of liabilities plus market value of common stock divided by book value of assets; *LOAN*, the ratio of loans (as assets) to assets; *PAPER*, the ratio of investments to assets; *SIZE*, the US dollar value of assets; *TURNOVER*, monthly value of shares traded to market capitalization averaged over 1993 to mid-1997; $IDEBT98/CAP$, face value of outstanding, international debt that came due during the crisis relative to market capitalization; $IDEBTLT/CAP$, face value of outstanding, international debt that came due during the crisis relative to market capitalization;. gnificant coefficients at the 1%, 5%, and 10% level are marked with ♠, ♥, and ♦ respectively.

	Discrete Choice Models of Firm Failure						Linear Models of Firm Performance			
	I)	J)	K)	L)	M1)	M2)	N)	O)	P)	Q)
	Logit	Gompertz Distribution	Probit w/ Heteroskedasticity	Mean Score	Multinomial Logit		Heckman: Multii-Logit Selection	Truncated Regression	OLS	Robust Regression
					Type 2	Type 3				
LEVERAGE	4.770♠	1.878♠	2.148	0.287	3.469♥	5.429♠	-0.853♥	-1.249♠	-0.989♠	-0.706♠
	(1.82)	(.72)	(3.22)	(.38)	(1.41)	(1.86)	(.33)	(.36)	(.36)	(.14)
VALUE	-2.925♥	-1.290♥	-1.789	-0.063	-0.457	-2.967♥	-0.252♥	-0.362♥	-0.246♦	-0.288♠
	(1.34)	(.53)	(1.40)	(.28)	(.62)	(1.33)	(.08)	(.16)	(.13)	(.05)
LOAN	4.776♠	2.129♠	6.995♥	0.760♦	2.233♦	5.026♠	0.073	-0.050	-0.041	-0.009
	(1.31)	(.58)	(2.84)	(.42)	(1.28)	(1.34)	(.27)	(.31)	(.16)	(.11)
PAPER	4.065♥	1.670♥	3.746	-0.076	1.682	4.305♠	0.232	0.221	0.155	0.109
	(1.58)	(.71)	(2.74)	(.33)	(1.35)	(1.63)	(.25)	(.36)	(.17)	(.13)
SIZE	-0.233♦	-0.139♥	-0.204	-0.076	-1.102♠	-0.412♠	-0.015	0.002	0.009	-0.013
	(.14)	(.07)	(.15)	(.06)	(.20)	(.15)	(.05)	(.05)	(.03)	(.02)
TURNOVER	0.422	-0.206	4.245	0.305	-0.049	-0.044	-0.545	-0.762	-0.500	-0.988♠
	(2.36)	(1.27)	(3.04)	(.43)	(2.8)	(2.45)	(.52)	(.88)	(.71)	(.31)
$IDEBT98/CAP$	0.353♦	0.308♥	0.219♦	0.385♥	0.054	0.360♦	0.039	0.038	0.021	0.045
	(.19)	(.12)	(.11)	(.18)	(.33)	(.21)	(.06)	(.08)	(.02)	(.03)
$IDEBTLT/CAP$	0.035	-0.028	0.083	-0.288	0.252	0.084	-0.149♥	-0.241♥	-0.149♠	-0.113♠
	(.22)	(.13)	(.18)	(.20)	(.31)	(.24)	(.05)	(.10)	(.03)	(.03)
Pseudo R^2	0.2497	.17161	.3072		0.2554		.3066		.3496	
N	303	303	303	303	303		205/303	205	205	205