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What matters for corporate failures in Asia? Exploring the role of firm-specific characteristics during the Asian crisis

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Abstract

Empirical investigation of business failures has considered the effects of macroeconomic conditions and financial healthiness in isolation. Using a panel of five Asian economies - Indonesia, Korea, Malaysia, Singapore and Thailand - over the period 1995–2007 we analyse the link between firm survival and financial healthiness during the 1997-98 Asian crisis. We show that the sensitivity of survival to financial indicators is significantly higher during the crisis compared to tranquil periods. In addition, we find that the effect of financial indicators is quantitatively and qualitatively more important in economies with less developed stock exchanges.

JEL classification: D21, G32, F20

Key words: Financial indicators; firm survival; emerging Asian economies, economic crisis

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1 Introduction

A large and growing set of empirical studies has highlighted the role of financial healthiness in influencing corporate failures. A stylised fact established by this literature is that balance sheet position matters for firm survival. For instance, it is found that firms with low profitability and high capital gearing are more likely to fail (see Zingales (1998); Fotopoulos and Louri (2000); Bunn and Redwood (2003); Bridges and Guariglia (2008) and Bellone et al. (2008)). In recent years the research agenda has attempted to investigate the importance of macroeconomic environment in firm survival. Alvarez and Görg (2009) show that exit rates for foreign plants increase during severe slowdowns by highlighting the 1999 Chilean recession. Bhattcharjee et al. (2009) find that UK firms are more likely to go bankrupt during periods which are marked by high inflation and exchange rate instability. These studies, however, focus on the direct effect of macroeconomic conditions on business exits without allowing for the fact that firms with varying levels of financial healthiness might respond to economic downturns disproportionately. The purpose of this paper is to fill this gap by investigating whether the 1997-98 Asian crisis had an indirect effect on corporate failures through balance sheet indicators.

Understanding the link between firm survival and balance sheet healthiness during the 1997-98 Asian crisis is an important consideration since imperfect capital markets generate a transmission mechanism through which an economic shock can create large and persistent domestic balance sheet effects.[1] There is evidence that real firm decisions such as fixed investment and inventory activity respond to firms' financial healthiness significantly different for recessions and non-recessions (Gertler and Gilchrist (1994)). Intuitively, we do not expect all firms to be affected by changes in macroeconomic conditions in the same way. Firms which display healthier balance sheets are more likely to be able to endure extreme economic conditions compared to firms which are characterised by poorer balance sheet positions. To

[1] According to the financial accelerator theory (Bernanke et al. (1999)), procyclical movements in the firm's net worth and credit constraints can amplify and propagate the real or monetary policy shock.

this end, we analyse for the first time the effects of financial indicators on firms' survival prospects, differentiating between crisis and out of crisis periods. In addition, in our paper we recognise that the link between firms' survival chances and financial healthiness may differ across economies with different levels of financial development. Therefore, we allow for the fact that firms operating in economies with less developed stock exchanges might respond to the Asian crisis differently.

The East Asian currency and banking crisis is an ideal setting to study the link between firm survival and financial healthiness because during this period most corporations were exposed to loans denominated in foreign currency. After the depreciation of the exchange rate highly leveraged firms experienced severe balance sheet damage and in some cases they were forced into bankruptcy.[2] The conditions firms faced in Asia were due in large part to asymmetric information and financial accelerator mechanisms thrown into reverse. Thus, firms with worse balance sheets were more likely to face higher external finance premia and were more vulnerable to adverse economic shocks. In turn, this might have hindered their performance and survival prospects.

Our contribution to the literature is threefold. First, we examine the response of the crisis on firm failure with respect to financial variables. This exercise will provide us with the indirect effect of the crisis on survival through interactions with firm-specific financial variables. While previous studies have included financial variables in equations modelling firm survival (see Zingales (1998); Bunn and Redwood (2003); Bridges and Guariglia (2008) and Huynh et al. (2010, 2012a)) our intention is to test the importance of firms' financial status on their survival prospects distinguishing between crisis and tranquil periods.

Second, we examine whether the link between firm survival and financial healthiness during the 1997-98 Asian crisis differs across economies with more and less developed financial systems. Firms operating in less market-oriented economies with limited access to capital markets and stronger reliance on financial intermediaries are more likely to suffer a shortage

[2]At that time the banking system was poorly regulated or supervised and drew back loans as their own liquidity dried up.

of credit during the crisis compared to more market-based economies. Therefore, we examine whether the link between firm survival and financial health during the crisis differs between more and less developed financial markets.

Finally, we provide evidence on corporate failures with a focus on the Asian economies rather than Europe or the US. This is important if we consider that Asian capital markets are largely underdeveloped compared to Western economies and therefore bank runs during the 1997-98 crisis might have accelerated the negative effects on firms' performance. Further, we use a novel database that combines several sources including Thomson Financial Primark, Zephyr and the Asian Development Bank, covering the period 1995 to 2007 for Indonesia, Korea, Malaysia, Singapore and Thailand.

The remainder of the paper is laid out as follows. Section 2 reviews the theoretical and empirical literature on firm survival. Section 3 illustrates the econometric modelling strategy. In Section 4 we describe our data and provide summary statistics. Section 5 presents the empirical evidence. In section 6 we check the robustness of our findings. Section 7 concludes the paper.

2 Economic background

In this section we review theoretical and empirical studies that are mostly related to our work. We start with a discussion of firm survival and firm-specific characteristics before we consider the analysis of macroeconomic conditions and extreme economic events.

2.1 Theoretical background on firm survival

A number of theoretical papers have emphasised learning by firms as a determinant of exit (Jovanovic (1982) and Pakes and Ericson (1998)). In these models, firms are all single establishments, and their exit hazard rate fall as they age, i.e they use their experience of market signals to learn about their own productivity. The main idea is that the risk of closure is

highest after firms' birth and decreases over time. This thesis might be explained by noisy selection models underlined by Mata and Portugal (1994) for the Portuguese manufacturing sector. Apart from the noisy selection models, there are further theoretical predictions on hazard rates. In Hopehayn (1992), firm productivity is driven by a persistent stochastic process. Younger firms are smaller because their initial productivity is lower than the incumbent's mean. Moreover, their growth is faster and more volatile, because of decreasing returns to scale. Both Jovanovic (1982) and Pakes and Ericson (1998) develop theoretical models in which firms are uncertain not only about the firm-specific shocks that they will face, but also about their own ability. In these models, hazard rates also depend on age and firm size. Hazard rates decline with size since a large firm rationally believes it is a good quality firm and so is less likely to exit. In addition, small firms typically face higher restrictions on capital markets leading to a higher risk of insolvency and liquidity. To sum up, Hopehayn (1992) presents a formal model where in each period firms are subject to individual productivity shocks after which they decide whether to exit or not. Under certain assumptions, hazard rates are lower for old and large firms.

Recent work by Clementi and Hopenhayn (2006) complements previous theoretical predictions. The framework introduced by Jovanovic (1982), Hopehayn (1992) and Pakes and Ericson (1998) does not rely on moral hazard. The main advantage of Clementi and Hopenhayn (2006) is that their theoretical model, differently from the pre-existing literature, generates a nontrivial role for capital structure creating a repeated moral hazard model. In other words, the authors argue that the Modigliani-Miller proposition does not hold and therefore financing considerations significantly complicate the investment relationship, introducing important determinants beyond neoclassical fundamentals. Specifically, Clementi and Hopenhayn (2006) introduce the idea of borrowing constraints since there is asymmetric information between the lender and the firm. At the beginning of each period, the firm faces a cash-in-advance constraint: it requires the bank to finance the fixed cost that it has to pay in order to stay in the market. The bank makes a take-it-or-leave-it offer to the

firm and issues funds at an interest rate r that is different across firms. Therefore, in their theoretical model firm heterogeneity is prevalent and the presence of borrowing constraints has important implications on firms' chances of survival.

2.2 Empirical background on firm survival

The empirical literature on the determinants of firm survival is in agreement with the theoretical models discussed above. In particular, it has highlighted that considerable heterogeneity exists across firms. Part of this heterogeneity has been explained by firm-specific characteristics such as size, age and the type of plant, and part by industry effects, such as the importance of capital intensity and technology. With respect to the firm-specific determinants, there is a consensus that the likelihood of survival is positively associated with the size of the firm. This finding seems to be quite robust across a number of countries (see Mata and Portugal (1994)). In addition to firm size, the literature has found that age matters for firm survival, with the youngest companies experiencing the highest levels of risk (see Mata and Portugal (1994)). Besides size and age, another strand of literature has considered the type of the establishment as determinant of firm survival. In particular, Bandick and Görg (2010) examine the effect of foreign acquisition on survival probability of target Swedish plants, while Görg and Strobl (2003) and Alvarez and Görg (2009) investigate whether affiliates of foreign multinationals are more or less likely to exit than domestic firms in Ireland and Chile respectively. Their findings show that the survival for acquired Swedish exporters improves post acquisition, whereas foreign plants in Chile and Ireland are more likely to exit the economy than domestic plants. Finally, there is a literature related to characteristics specific to the industry, such as industry concentration and capital intensity. These characteristics were found by Audretsch and Mahmood (1995) to play a negative role on firm survival, while Görg and Strobl (2003) show that technology affects positively the survival of indigenous firms.

A large and growing set of empirical studies has highlighted the role of financial health-

iness in influencing corporate failures. A stylised fact established by this literature is that balance sheet position matters for firm survival. For instance, it is found that firms with low profitability, high debt levels and high capital gearing are more likely to fail (see Zingales (1998); Fotopoulos and Louri (2000); Bunn and Redwood (2003); Bridges and Guariglia (2008); Bellone et al. (2008) and Huynh et al. (2010)). Specifically, Zingales (1998) uses data on the US tracking industry to examine how debt affects market share and sales. He considers a survival model where debt can affect a firm's ability to compete and eventually survive in the industry and concludes that high debt adversely affects survival. Using data for Greece, Fotopoulos and Louri (2000) have shown that, controlling for other firm- and industry- specific characteristics, firms' debt to assets ratios have a significantly negative effect on their survival probabilities, while their ratios of tangible assets to total assets have a positive effect. Similar results were obtained by Bunn and Redwood (2003). In a study of U.K firms, they find that a range of financial variables including the debt to assets ratio play a significant effect on firms' survival probabilities. In the same spirit, Bridges and Guariglia (2008), using UK data, investigate the effects of financial characteristics on survival probabilities. The authors find that lower collateral and higher leverage result in higher failure probabilities for purely domestic than for globally engaged firms. Using French data, Bellone et al. (2008) show that firms with negative profits are twice as likely to exit the industry than firms with positive profits. More recently, Huynh et al. (2010, 2012b) show that leverage has a nonlinear effect on firm survival. At low levels of leverage the effect is negative but at the high quantiles it becomes positive.

In recent years the research agenda has attempted to investigate the importance of macroeconomic environment on firm survival. This is based on the idea that firms respond to market pressures taking into account the relative costs and benefits associated with the different options available to them. The literature by Alvarez and Görg (2009, 2011) and Bhattcharjee et al. (2009) refers to this issue. More specifically, Alvarez and Görg (2009) show that exit rates for foreign plants increase during severe slowdowns by highlighting

the 1999 Chilean recession. Alvarez and Görg (2011) use the same empirical setting of the Chilean economic slowdown to show that multinationals are more likely to exit contributing to the employment contraction during the crisis. Bhattcharjee et al. (2009) find that UK firms are more likely to go bankrupt during periods which are marked by high inflation and exchange rate instability. They conclude that macroeconomic instability raises the probability of bankruptcy. These studies, however, focus on the direct effect of macroeconomic conditions on business exits without allowing for the fact that firms with varying levels of profitability, debt and collateral might respond to economic downturns disproportionately. This is motivated by the fact that firms which display healthier balance sheets are more likely to be able to endure extreme economic conditions compared to firms which are characterised by poorer balance sheet positions.

The link between firm survival and balance sheet healthiness during the crisis may differ for countries with more and less developed stock exchanges. This argument is based on the consideration that macroeconomic shocks are magnified by the existence of significant financial intermediation in economies where firms have limited access to external finance (Beck et al. (2006)). Asian markets are inherent to bank runs and therefore higher levels of banking development could impede firms' performance and survival prospects.[3] Firms operating in economies with less developed financial markets may limit themselves to bank finance, due to the absence of a developed capital market, and therefore they might face an increased hazard of failure during the Asian crisis (see Tsoukas (2011)). In our context economies with higher levels of equity market development are more likely to provide firms with better access to external finance through capital markets, while those with lower levels of equity market development are more likely to limit firms' access to external funding. Therefore, we argue that firm survival and financial health in market-based countries is different compared with bank-based economies.

[3]Furman and Stiglitz (1998) argue that Asia's dependence on banks was important for the 1997-98 crisis.

3 Methodology

3.1 Empirical specifications

The theoretical rationale for expecting an effect from firms' financial position on their survival prospects is well documented in Clementi and Hopenhayn (2006). In their model borrowing constraints affect firm survival and this generates a role for capital structure in an asymmetric information setup. In our empirical analysis we take on board these predictions and we also consider whether the impact of financial indicators on corporate failures differs between crisis and tranquil periods. We define a firm as failed in a given year when its company status is that of dead.[4] Following the empirical literature on firm survival (see for example Mata and Portugal (1994); Görg and Strobl (2003); Yang and Temple (2012) and Huynh et al. (2010, 2012a)) we use a Cox proportional hazard model (Cox (1972)) with time-varying covariates. The proportional hazard of a firm failing in time t is formulated as:

$$h(t, x) = h_0(t)e^{\beta X} \tag{3.1}$$

where $h(t)$ is the rate at which firms fail at time t given that they have survived in $t-1$, for a given number of covariates as defined below. $h_0(t)$ is the baseline hazard function at time t when all of the covariates are set to zero. The semi-parametric nature of the Cox model allows us to estimate the relationship between the hazard rate and covariates without requiring any restrictive assumptions regarding the baseline hazard. **Every parameter estimate to be reported in this paper is the hazard ratio, which is the ratio of the hazard rate when the variable increases by one unit. In other words, a hazard ratio over one implies than an increase in the given explanatory variable increases the hazard or probability of exit. On the other hand, a hazard ratio below one means that an increase in the variable reduces the hazard (or increases**

[4]Details on the construction of our dependent variable are provided in the next section. Also note that we use the terms failure and survival interchangeably.

the probability of survival).

Our main goal is to examine whether the impact of financial indicators on corporate failures was different during the Asian crisis than in other periods. Taking the above argument into consideration, we specify a dummy representing the Asian crisis ($Crisis$) that takes the value 1 in years 1997-98, and 0 otherwise. We interact our financial indicators in vector X (defined below) with the $Crisis$ and $(1 - Crisis)$ terms to capture the sensitivity of failure to financial indicators in and out of the crisis. Thus the following model is specified:

$$h(t) = h_0(t)e^{(\beta_1 XCrisis + \beta_2 X(1-Crisis) + \beta_3 Y + \beta_4 Z)} \tag{3.2}$$

The model evaluates whether the Asian crisis alters firms' propensity to fail through financial indicators. In other words, we check whether the impact of the financial crisis on failure can be amplified by firms with weak balance sheets. In addition, our model includes country dummies to control for institutional differences between countries and industry dummies to control for fixed effects across industries.

3.2 Financial variables

Vector X considers three dimensions of financial health, namely leverage, profitability and collateral assets. This is motivated by the theoretical model of Clementi and Hopenhayn (2006)[5] and previous empirical studies (Bunn and Redwood (2003) and Bridges and Guariglia (2008)). To begin with financial leverage ($Leverage$), which is measured as the ratio of total debt over total assets, we note that high levels of existing debt are associated with a worse balance sheet situation, which would increase moral hazard and adverse selection problems, and lead to the inability of firms to obtain external finance at a reasonable cost (see Levin et al. (2004) and Bougheas et al. (2006)). Zingales (1998) and Bridges and Guariglia (2008) argue that higher leverage results in higher failure probabilities. Accordingly,

[5]Their model generates a role for capital structure in an asymmetric information setup. The theoretical frameworks on survival were firstly introduced by Hopehayn (1992) and Jovanovic (1982) without considering a role for moral hazard.

we expect a positive relationship between leverage and the probability of survival.

Profitability ($Profitability$) is defined as the ratio of the firm's profits before interests and tax to its total assets. We use this indicator to measure a firm's ability to generate profits. It is widely accepted that internal funds can serve as a buffer to absorb unexpected losses, reducing the probability of insolvency and, therefore, the expected bankruptcy cost (see Bunn and Redwood (2003) and Bridges and Guariglia (2008)). We therefore expect to find profitability to decrease the probability of failure.

Collateral ($Collateral$) is defined as tangible assets over total assets and proxies for the firm's ability to pledge collateral for external finance. In the survival literature, access to collateral assets is very important since Farinha and Santos (2006) and Bridges and Guariglia (2008) document that firms with a larger fraction of tangibles in their balance sheets are more likely to survive. Thus, we expect firms with a high collateral ratio to experience lower probabilities of failure.

3.3 Control variables

The covariates used in the vector Y are all chosen in view of other work on firm survival and what is available in the data. We add the firm size ($Size$) measured as the logarithm of real total assets and its squared term to control for nonlinearities. According to Geroski (1995), a firm's size plays an important role in determining firm failures. The argument is that large firms experience higher survival probabilities than their smaller counterparts because they have access to alternative sources of external finance and they are less informationally opaque. Thus large firms are less at risk of failure than small firms (Dunne et al. (1998) and Clementi and Hopenhayn (2006)). In our analysis we expect to find a positive relationship between firm size and the probability of survival. We also include the age of the firm (Age) which measures the number of years a firm has been listed on the stock exchange. Firms with an established track record are less likely to fail than those that are younger because they are usually more able to withstand past economic and financial downturns and therefore

face a smaller liquidation risk. This would be the case both for domestic and multinational firms as noted by Görg and Strobl (2002). Consequently, we anticipate a negative association between age and the incidence of failure.

In vector Y we also control for the macroeconomic conditions by adding the real exchange rate, which measures the exchange rate environment. Baggs et al. (2009) document a negative association between survival and appreciation of the Canadian dollar. We expect the exchange rate ($Exchange$) to be positively associated with the firm's probability to fail.[6] In addition, we account for industry effects by adding the minimum efficient scale of the industry (MES), measured as the log of median output in each sector of the economy. One might expect firms entering industries with large minimum efficient scale to have lower probabilities of survival than firms entering other industries, Mata and Portugal (1994).[7] Lastly, vector Z is a set of country and industry dummies that control for institutional differences between countries and for fixed effects across industries.

4 Data and summary statistics

4.1 Data description

We use data from profit and loss and balance sheet accounts recorded in Thomson Financial Primark which cover firms in emerging Asia mostly affected by the 1997-98 crisis -Indonesia, Korea, Malaysia, Singapore and Thailand. The choice of Asian markets in our analysis is justified by three important considerations. First, emerging East Asian economies are characterised by a highly volatile environment and high risk of bankruptcy providing therefore a fertile ground for the analysis of corporate failures.[8] Second, our data cover the period

[6]We attempted to include both the real exchange rate and its volatility in the regression models but they never attracted significant coefficients. The results on the financial variables, however, remain unchanged and therefore we report only the models with the real exchange variable controlling for macroeconomic effects.

[7]All variables in the models with the exception of MES are time-varying.

[8]Compared to Western economies, emerging Asian countries experience significantly higher corporate failure rates: the average failure rate for the five economies included in the present study is 9%, compared to only 1.5% in the UK (Bridges and Guariglia (2008)).

1995–2007 and therefore the Asian crisis presents a natural experiment to test the indirect effects of extreme economic conditions on corporate failures. Third, our sample takes into account the fact that there is a wide regional variation in Asian markets in terms of size, liquidity and sophistication. Therefore, we expect to observe significant heterogeneity with respect to financial architecture.

Our database reports firms as 'dead' but it may be possible that some firms could be recorded as 'dead' not because they failed but because they merged with another firm instead.[9] Thus we also rely on the Zephyr database, which is distributed by Bureau Van Dijk, to obtain data on mergers and acquisitions to clean our sample from firms falsely recorded as 'dead' from Thomson Financial Primark. Finally, data on the real effective exchange rates are taken from the Bank for International Settlements.

To clean our data we apply normal selection criteria used in the literature and we exclude firms that did not have complete records for all explanatory variables and firm-years with negative sales and profits. We also exclude observations in the 0.5 percent from the upper and the lower tails of the distribution of the regressors to control for the potential influence of outliers. Our sample contains data for 358 firms in Indonesia, 917 in Korea, 871 in Malaysia, 596 in Singapore and 530 in Thailand, a total of 3,272 firms. A large fraction of these firms (88.4%) are listed on the stock exchange and only a small fraction are unlisted (11.6%). It should be noted that our estimations include only publicly traded firms since the *Age* variable measures the number of years a firm has been listed on the stock exchange. Therefore, our final panel includes 2,892 listed firms for five Asian economies, which are operating in all sectors of the economy for the years 1995-2007. To make sure that our sample is representative of the aggregate economies, in terms of the population of listed firms, we present some graphical analysis. Figure 1 shows the number of listed firms in our data and those reported in the World Bank database (WDI). Comparing the two lines, we observe that they paint a similar picture of the state of listed firms in Asia over time. Finally,

[9]Thomson Financial Primark data do not provide details on the status of firms i.e. whether the company status is that of receivership, liquidation, in default or dissolved.

we note that the two series are highly correlated and exhibit similar variation across time. They both present an upward trend which is consistent with the view that stock markets have become increasingly important in Asia over the last decade.

4.2 Descriptive statistics

To begin with the descriptive analysis, figure 2 shows the distribution of corporate failures over time. We observe that most failures occur in 1997 which coincides with the onset of the Asian crisis and in 1998 which marks the end of the crisis. Apart from this period the distribution of failures over time is reasonably stable. Table 1 reports summary statistics for the variables used in our empirical analysis. Means and standard deviations of the firm-specific variables and financial indicators are presented for the total sample (column 1), for failed and surviving firms (columns 2 and 3) and for firms during and outside the crisis (columns 5 and 6). Further, the p-values of a test for the equality of means are presented in columns 4 and 7. Looking at columns 2 and 3 we observe that surviving firms are less indebted, more profitable and more collateralised compared to failing firms. These statistics confirm previous empirical results (see Zingales (1998); Bunn and Redwood (2003); Farinha and Santos (2006) and Bridges and Guariglia (2008)) that firms which display healthier balance sheets are less likely to fail. In addition, we find that survivors are larger and longer listed on the stock exchange which is in line with previous empirical and theoretical research, which shows that the probability of exit decreases with firm size and age (e.g Jovanovic (1982) and Clementi and Hopenhayn (2006)). These differences between sub-samples are statistically significant in all cases.

When comparing crisis and out of crisis periods (columns 5 and 6), we note that the average failure rate is almost two times larger during the 1997-98 crisis. This statistic confirms the association between corporate failures and adverse economic events as shown in Figure 2. In addition, during the crisis firms display worse balance sheets than in other periods which suggests that during downturns, economic activity faces a general slowdown

which is likely to affect bank credit, business profitability and survival among other firms' real decisions. P-values suggest that differences between sub-samples are statistically significant in all but one cases.

Taken together these summary statistics suggest that there is a significant correlation between firms' failure rates, their financial health and the state of the economy. It remains to be seen, though, whether these preliminary findings continue to hold when we control for a number of factors which are known to play a role in determining firms' survival chances. In the sections that follow we test within a formal regression analysis framework whether the sensitivity of survival to financial indicators is significantly higher during the Asian crisis compared to tranquil periods.

5 Results

5.1 Financial health and the Asian crisis

To assess the role of the East Asian financial crisis in firms' hazard of failure, we focus on the indirect impact of the crisis on the probability of survival. We specify a time-period dummy variable to indicate that firms faced the Asian crisis. The crisis dummy is constructed to take the value 1 in years 1997-1998 and the value 0 otherwise. Our empirical model contains interactions of the financial indicators (Leverage, Profitability and Collateral) with the crisis dummy to examine whether there was an asymmetric response of financial variables to business failure during the crisis.

Results are reported in Table 2, where the financial indicators interacted with $Crisis$ and $(1 - Crisis)$ terms are used one by one in successive columns. At the foot of the Table we present tests of equality which suggest significant differences between the interacted terms. In column 1 we observe that *Leverage* during the crisis is statistically significant at the 1% level. Higher levels of debt are often associated with an unhealthy balance sheet indicating that highly leveraged firms face greater difficulties obtaining funds on the markets,

especially during extreme economic conditions. Our findings are not only statistically but also economically important since the hazard ratio associated with leverage during the crisis equals 1.329. This means that, highly indebted firms are more likely to fail during the crisis compared to less indebted firms, with the exit risk for the former being about 1.3 times higher than that of the latter.

In column 2 we observe the important role of $Profitability$ in firm survival (see Bunn and Redwood (2003)) since the hazard ratios are below one. In other words, an increase in profitability increases the probability of survival. Once again, the effects are significantly larger for the crisis period. Thus, firms which are able to generate profits can use their internal funds as a buffer to absorb unexpected losses, reducing the probability of insolvency and the hazard of failure. In terms of economic magnitude, the survival probability of a profitable firm during the crisis is as much as 1.2% higher compared to a less profitable firm.

In column 3 we show that the estimates of $Collateral$ are statistically significant at the 1% level both in and out of the crisis. This finding indicates that being able to pledge collateral for external finance is associated with higher chances of survival (Bridges and Guariglia (2008)). This effect is more potent during the crisis suggesting that high collateralised firms are able to raise external finance even when banks decide to interrupt lines of credit. Therefore, firms with high levels of tangibility can mitigate the risk of failure. To gauge the economic effect we rely on the hazard ratios.

a 1% increase in collateral would reduce the hazard of failure by 60% during the Asian crisis and by 48% outside the Asian crisis.

Finally, in column 4 we consider all financial indicators. Once again, we find a significant and economically important association between financial healthiness and the probability of failure during the Asian crisis. With respect to our control variables, we find that $Size$ has a non-linear effect on firm survival, while MES is quantitatively unimportant. The estimates of Age are statistically significant at the 1% level and the hazard ratios are below one, indicating that older firms are less likely to fail. Finally, the proxy for the macroeconomic

condition has a positive effect on failure which supports the theory that a stronger local currency raises the probability of firms to fail (Baggs et al. (2009)).[10]

To summarise, we find that survival prospects are more sensitive to financial indicators during the Asian crisis uncovering an important link between financial health and firm survival which is stronger during economic downturns. This gives support to the idea that good financial shape is an important determinant of survival during economic shocks since firms might face difficulties in accessing external finance.

5.1.1 Accounting for unobserved heterogeneity

One potential concern with the Cox model employed in this paper is that it does not take into account unobserved heterogeneity. This particular heterogeneity may be thought of, in general terms, as firm-specific differences in some unobservable attribute (e.g. management ability), that might affect firm survival and might consequently cause an omitted variable bias in the Cox regression. To address this issue, we estimate shared-frailty models:

$$h(t, x) = h_0(t)e^{\beta X}\eta \tag{5.1}$$

where the parameter η accounts for any unobserved heterogeneity. The usual gamma distribution is chosen to account for this unobserved heterogeneity/shared-frailty. Following Huynh et al. (2010, 2012a), the unobserved heterogeneity is captured in terms of industrial and regional groupings. Specifically, our data cover the following nine industries: 1) Agriculture, fishing, quarrying; 2) Manufacturing; 3) Electricity, gas and water supply; 4) Construction; 5) Wholesales and retail trade, hotels, restaurants; 6) Transport, post and telecommunications; 7) Finance and business activities; 8) Public and personal services; 9) Activity not stated. In addition, our data span the following Asian economies: Indonesia, Korea, Malaysia, Singapore and Thailand.

[10] As a robustness, we have also estimated our regressions parametrically, using Weibull distribution. We find, but do no report for brevity, that this modification does not alter our results.

The results for the shared-frailty models are reported in Table 3. We find that our main results are upheld. In particular, with the exception of leverage the interaction terms between financial variables and the crisis period are significantly different. We show that the impact of profitability and collateral is more potent during the Asian crisis compared to other periods. In other words, our main results are not a by-product of not accounting for unobserved heterogeneity.

To assess the model specification, we present and discuss the baseline hazards obtained from the models with and without unobserved heterogeneity. As a rule, the baseline hazard is an important diagnostic in the Cox proportional hazard models. The main idea is that the baseline hazard should capture any aggregate time variation related to firm survival.[11] Figure 3 displays the estimated baseline hazards obtained from the model without shared-frailty (NH) and the model that accounts for unobserved heterogeneity (H). Both models follow a very similar pattern generating negative duration dependence i.e the longer a firm is operating the more likely it is to survive. This negative duration dependence is consistent with the implications of theoretical models such as Jovanovic (1982) stating hazard rates decline with age. All in all, we conclude that our main findings are not driven by unobserved heterogeneity not accounted for in the Cox models.

5.2 The differentiated effect of financial systems

Thus far we have shown the average effect of financial variables on firm survival over all countries, without making distinctions about the level of financial development. In this subsection, the possible differentiated effect of financial systems is investigated by conducting a country-by-county analysis. To formally motivate our pooled versus country-by-country analysis, we formulate a likelihood ratio test based on the baseline hazard. In particular, we estimate the Cox model as shown in Equation 3.2 with a common baseline hazard (Model A). Then, we estimate a Cox model with a strata of baseline, allowing each country to have their

[11] In the Cox model, the baseline hazard is estimated non-parametrically so it should be robust to mis-specification, especially in the presence of shared frailty (see Huynh et al. (2012b)).

own baseline hazard (Model B). Finally, we retrieve the log likelihood from each model and form a likelihood ratio test. Table 4 reports the outcome of the above test for both models. The likelihood ratio statistic indicates that the country-by-country model fits significantly better than the pooled model.

FOOTNOTE?It is important to check this poolability because the results of the F-tests of equality for Leverage, Profitability and Collateral could be driven by country specific-trends. For example, there could be a latent factor that affects both stock market development and firm survival i.e. political institutions. For example, Hallward-Driemeier and Rijkers (2010) report that Indonesia firms that were connected to the Suharto regime suffered disproportionately (higher failure rate) during Asian financial crisis.

In addition to the likelihood ratio test, there are reasons to believe that the five economies included in this study have experienced different levels of financial development.[12] In the aftermath of the Asian crisis, Asian governments have issued increasing numbers of sovereign or quasi-sovereign bonds and there is evidence that Asian financial systems are less bank-centered than before (see Tsoukas (2011)). While most emerging Asian economies are thought to be mainly bank-based, we can still observe significant heterogeneity with respect to financial market development. According to our data, throughout our sample period the average ratio of total stock market value traded to GDP, which is a measure of stock market liquidity, is 1.36 for Korea followed by 0.98 for Singapore. The corresponding figures for Indonesia, Malaysia and Thailand are 0.10, 0.66 and 0.37, respectively.[13] In this subsection we compare the five countries during the Asian crisis to acquire more evidence regarding the differentiated effects of financial systems. Accordingly, we estimate our models from Table 2 on a country-by-country basis. The results are reported in Table 4 and we are able to identify significant differences across countries in the hazard ratios of the financial variables.

[12]For instance, Kim and Shamsuddin (2008) using the level of equity market development categorised Korea and Singapore into the 'advanced' or 'developed' group of emerging economies and Indonesia, Malaysia and Thailand into the 'secondary' emerging markets group.

[13]Heterogeneity in financial development is also apparent if we consider alternative indicators of financial development such as the ratio of private bank credit to GDP, the ratio of deposit-money bank assets to GDP and stock market capitalization.

To begin with *Leverage*, we find significant positive effects for both crisis and tranquil periods for Indonesia, Korea and Malaysia. Based on the tests of equality reported at the bottom of the Table, the point estimates on the interacted terms are significantly different from each other only for Indonesia and Malaysia, while we find no significant differences for the Korean sample. In addition, we find no significant effects for Singapore both in and out of the economic crisis. With respect to Thailand, we find that the coefficient on leverage is positive and significant during the crisis, while insignificant when interacted with the out-of-crisis time period. Based on our results, leverage appears to be more important during the crisis for Indonesia, Malaysia and Thailand. As discussed above, these countries rely heavily on banks and their stock market is less developed compared with Korea and Singapore. Thus our results imply that higher levels of existing debt could adversely affect firms' survival chances in economies which are characterised by high levels of financial intermediation. This is consistent with the view that during economic downturns banks might limit the provision of credit to highly indebted bank-dependent companies. Firms that have suffered a severe shortage of credit are more likely to face a higher probability of failure unless credit becomes cheaper and more readily available.

Moving to $Profitability$, we find that higher levels of profits would reduce firm failures during the economic crisis. This is the case for all countries apart from Korea and Singapore. Comparing the coefficients in rows 3 and 4 we find that the interactive terms for Indonesia, Malaysia and Thailand are significantly higher during the crisis. This is evident from the tests of equality reported in Table 3. Thus, we conclude that profits are more important in shaping business failures across bank-based countries such as Indonesia, Malaysia and Thailand. This result suggests that the viability of firms, operating in bank-oriented economies, during the crisis is determined by the stronger reliance on profits since access to banks is sometimes prohibitively expensive.

Collateral attracts negative and significant coefficients during the crisis period for Indonesia, Malaysia and Thailand. At the other extreme, the coefficients on collateral when

they are interacted with the out-of-crisis dummy are insignificant for all economies, apart from Korea and Singapore. The coefficients, however, are significantly different from each other for Indonesia, Malaysia and Thailand, as shown from the tests of equality reported at the foot of the Table. As we would expect higher levels of tangible assets would increase firms' survival prospects in economies with less developed stock exchanges because firms will not have access to alternative sources of funding and thus pledging tangible assets as collateral is a comparative advantage for receiving bank debt. On the contrary, we do not identify significant differences when we look at economies with developed financial markets (i.e Korea and Singapore). This result implies that having more tangible assets is not necessarily an advantage in economies where firms are able to access alternative sources of finance and therefore can obtain external funding at a reasonable cost. We can conclude that firms in bank-centered economies might have to signal to banks their ability to post collateral in order to obtain external funding since tangibility increases the value that can be recaptured by creditors if firms default. Finally, the signs and significance of the control variables do not change once we compare the five countries.

In summary, we show that the response of the financial variables to survival during the crisis differs across the five economies included in this study. Specifically, we show that financial variables exert a significant effect on the likelihood of survival during the crisis for firms operating in Indonesia, Malaysia and Thailand which are bank-based countries. On the contrary, the effect of financial variables on survival is not important for Korea and Singapore, which are characterised by developed stock exchanges. Therefore, our results strongly support the second hypothesis which postulates that financial variables are more important in influencing firm survival in economies with less developed stock exchanges. This is consistent with the notion that when financial intermediaries decrease the supply of loans to corporations, firms have to display good financial health to avoid exit from the market.

6 Additional robustness tests

6.1 Addressing concerns about endogeneity in our regressors

Our empirical models include a set of firm-specific financial variables that may be endogenous. Therefore, one potential concern is that our results may be driven by endogeneity in our regressors. We address this issue by allowing the firm-specific variables to be endogenous and then instrumenting for them through a two-stage procedure. Leverage, profitability, collateral, size and size squared are instrumented using their lagged levels in *t-1*;*t-2*. Our approach to employ instrumental variable techniques in the estimations is formally justified by using a Wald test of exogeneity. In all cases the Wald test emphatically rejects the null of exogeneity in our regressors vindicating our endogenous approach. We further test for the validity and the relevance of the instruments using the Sargan test of overidentifying restrictions and the Anderson test. Both tests are obtained from a linear instrumental variables model using the same set of instruments as in the two-step IV model. We report p-values of the tests at the foot of the tables of results.

Tables XXX and XXX show our estimations corrected for endogeneity and these should be compared with Tables 2 and 3, respectively. To begin with the baseline model in Table 4, we show that during the 1997-98 crisis firms' survival prospects were more sensitive to changes in leverage, profitability and collateral. Thus we find results that confirm our findings presented in Table 2. In particular, the role of firms' financial status is significantly associated with their likelihood of survival during the Asian crisis. Further, the results for partitioning our sample into five countries, as shown in Table 5, confirm the importance of good financial health on the hazard of failure for Indonesia, Malaysia and Thailand, which are bank-based economies, during economic unrest. In line with our previous results in Table 3, we find that firms operating in bank-dependent economies are more likely to survive the crisis if they exhibit healthy balance sheets. On the contrary, we do not find a significant link between firms' financial healthiness and survival for economies with developed equity markets such

as Korea and Singapore. In addition, all control variables retain their signs and significance. In both Tables, the Sargan and Anderson tests do not indicate any problems regarding the choice and the relevance of our instruments. We therefore conclude that the extent of endogeneity bias is very limited in our sample and our findings are robust to an instrumental variables technique.

6.2 An alternative definition for firm failure

Thus far our definition of failed firms is related to the status of the firms as reported in Thomson Financial Primark and Zephyr. However, to ensure that our results are not driven from the way that we define failed firms, we re-define our dependent variable by focusing on whether firms drop out of the sample. Specifically, the disappearance of a previous identification number means that this firm has exited the sample and therefore is considered as failed.[14] To avoid any measurement error in our calculations, we also use Zephyr to identify and drop firms that exited the sample due to takeovers. We re-estimate our model with the new definition of failure and report results in Table 6. Column 1 refers to the baseline where we explore the interaction between the Asian crisis and financial indicators, while columns 2 to 6 refer to the model which distinguishes across the five economies included in our sample. Once again, our results should be compared with those reported in Tables 2 and 3. We continue to observe that firm-specific financial indicators are more important in explaining the incidence of failures during the crisis compared to other times. In addition, when considering these effects across economies with different levels of equity development our main results remain unchanged. In particular, the impact of financial indicators is more important in economies with less developed stock exchanges. In sum, we conclude that our results are robust to modifying the definition of firm failure.

[14]The opposite is true when a new identification number appears which implies that a new firm has entered the sample.

7 Conclusion

Empirical investigation of business failures has considered the effects of macroeconomic conditions and financial healthiness in isolation. Even few papers have looked at the emerging Asian economies. In this paper we examine the indirect effect of the Asian crisis on firm survival since firms with varying levels of profitability, debt and collateral might respond to the crisis differently. Our results based on firm-level data of five Asian economies - Indonesia, Korea, Malaysia, Singapore and Thailand - over the period 1995–2007 suggest that the sensitivity of survival to financial indicators is significantly higher during the Asian crisis compared to tranquil periods. Therefore, the Asian crisis had an impact through the balance sheet on firms' hazard of failure, and could have operated alongside the bank and commercial paper channels with an influence over real variables. In addition, when we estimate our results across the five countries included in our paper, we find that the effect of financial indicators is quantitatively and qualitatively more important in economies with less developed stock exchanges (Indonesia, Malaysia and Thailand). We show that firms operating in bank-based economies, which are likely to suffer from a credit cut during the crisis, might have to exhibit good financial health to continue their operations.

The present study has implications for policy makers both in Asian and western economies, particularly during the current economic climate. We conclude that firms with bad financial health that suffer a shortage of credit during recessions should have access to cheap credit to improve their survival prospects. Therefore, one way for policymakers to mitigate the effect of financial crises is to make finance cheaper and more easily available.

Finally, out study has institutional implications. The development of diversified financial systems in which well developed stock and bond markets would complement their banking systems should become a priority in the national governments' agenda. This will help to facilitate the development of a balanced economy and to create appropriate conditions that will improve firms' performance and survival prospects.

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Figure 1: Comparing our data with the World Bank database

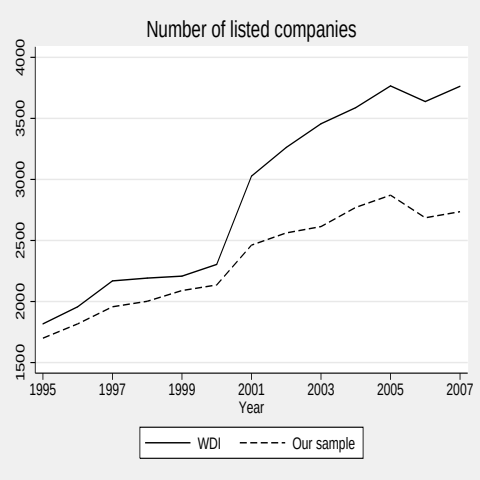

Figure 2: Number of failing firms by year

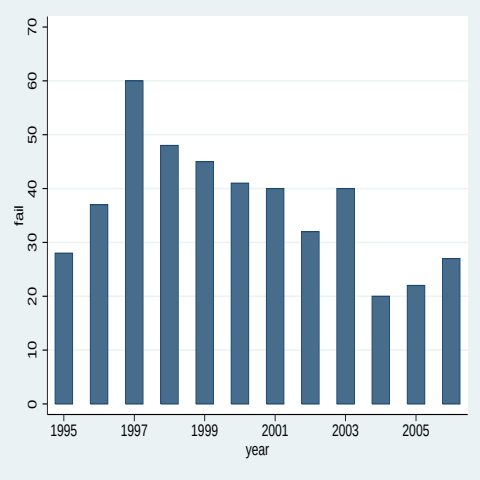

Figure 3: Baseline hazards

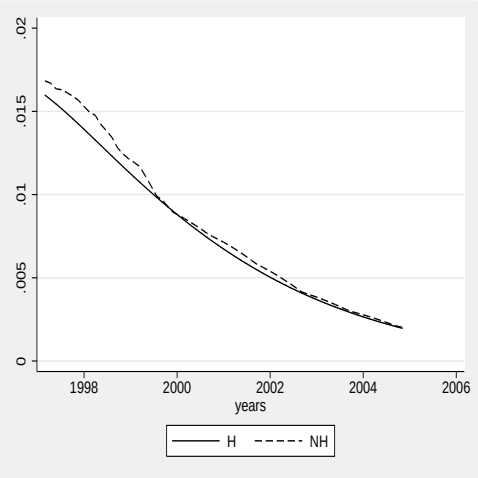

Table 1: Summary statistics

	All firms	Fail=1	Fail=0	Diff.	Crisis=1	Crisis=0	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fail	0.129	1.00	0.00	-	0.220	0.114	0.000
	(0.33)	(0.00)	(0.00)		(0.41)	(0.31)	
Leverage	0.562	0.635	0.551	0.000	0.697	0.540	0.000
	(0.53)	(0.59)	(0.52)		(0.60)	(0.51)	
Profitability	7.603	-1.025	8.899	0.000	1.528	8.598	0.000
	(29.05)	(31.40)	(28.46)		(31.35)	(28.54)	
Collateral	0.723	0.638	0.735	0.000	0.721	0.730	0.126
	(0.30)	(0.37)	(0.29)		(0.30)	(0.31)	
Size	14.548	14.292	14.586	0.000	14.332	14.583	0.000
	(3.55)	(3.34)	(3.57)		(3.61)	(3.53)	
Age	14.196	13.447	14.310	0.000	14.584	14.134	0.000
	(4.97)	(5.01)	(4.95)		(4.84)	(4.99)	
Observations	25,718	3,383	22,335		3,574	22,144	

Notes: The table presents sample means. Standard deviations are reported in parentheses. The p-value of a test of the equality of means is reported. *Fail* is a dummy that equals 1 if the firm fails, and 0 otherwise. *Crisis* is a dummy representing the Asian crisis and takes the value 1 in years 1997-98, and 0 otherwise. *Leverage* is measured as the firm's total debt to assets ratio. *Profitability* is the ratio of the firm's profits before interest and tax to its total assets. *Collateral* is defined as the ratio of the firm's tangible assets over its total assets. *Size* is denoted by the log of real assets. *Age* measures the number of years a firm has been listed on the stock exchange. The time period is 1995-2007. Variables are measured in thousands of US dollars.

Table 2: Survival and the Asian crisis

	(1)	(2)	(3)	(4)
$Leverage * Crisis$	1.329***			1.627***
	(4.58)			(3.81)
$Leverage * (1 - Crisis)$	1.085			1.212***
	(0.70)			(3.94)
$Profitability * Crisis$		0.988***		0.990***
		(-5.77)		(-5.02)
$Profitability * (1 - Crisis)$		0.996**		0.996***
		(-2.38)		(-2.59)
$Collateral * Crisis$			0.232***	0.182***
			(-6.72)	(-6.22)
$Collateral * (1 - Crisis)$			0.648***	0.646***
			(-3.58)	(-3.43)
$Size$	0.970	0.920	0.912	0.883
	(-0.31)	(-0.81)	(-0.99)	(-1.23)
$Size^2$	1.004	1.006	1.006*	1.007*
	(1.26)	(1.64)	(1.77)	(1.93)
Age	0.951***	0.954***	0.955***	0.954***
	(-6.93)	(-6.51)	(-6.38)	(-6.45)
$Exchange$	1.063***	1.066***	1.064***	1.068***
	(17.12)	(17.45)	(15.88)	(17.66)
MES	1.467	1.380	1.475	1.437
	(0.88)	(0.74)	(0.89)	(0.84)
$Observations$	21700	21659	21700	21659
$Log - likelihood$	-4642	-4616	-4631	-4591
F-test of equality				
$Leverage$	0.081			0.054
$Profitability$		0.005		0.021
$Collateral$			0.000	0.000

Notes: Cox regression results are reported. The dependent variable is a dummy equal to one if the firm fails, and zero otherwise. Robust z-statistics are presented in the parentheses. The following countries are included in the regressions: Indonesia, Korea, Malaysia, Singapore and Thailand. * significant at 10%; ** significant at 5%; *** significant at 1%. Country dummies and industry dummies are included in the models. Also see notes to Table 1.

Table 3: Survival and the Asian crisis with shared frailty models

	(1)	(2)	(3)	(4)
$Leverage * Crisis$	1.321***			1.624***
	(3.87)			(4.95)
$Leverage * (1 - Crisis)$	1.086			1.287***
	(0.96)			(3.35)
$Profitability * Crisis$		0.988***		0.990***
		(-5.30)		(-4.03)
$Profitability * (1 - Crisis)$		0.996**		0.996**
		(-2.22)		(-2.27)
$Collateral * Crisis$			0.227***	0.177***
			(-5.75)	(-5.59)
$Collateral * (1 - Crisis)$			0.630***	0.627***
			(-3.36)	(-3.28)
$Size$	0.976	0.925	0.916	0.886
	(-0.23)	(-0.69)	(-0.84)	(-1.09)
$Size^2$	1.004	1.006	1.006	1.007*
	(1.12)	(1.49)	(1.58)	(1.75)
Age	0.950***	0.953***	0.954***	0.953***
	(-6.34)	(-5.89)	(-5.79)	(-5.82)
$Exchange$	1.063***	1.066***	1.064***	1.068***
	(10.14)	(10.52)	(10.19)	(10.59)
MES	0.752*	0.776	0.839	0.844
	(-1.70)	(-1.61)	(-1.14)	(-1.11)
$Observations$	21700	21659	21700	21659
$Log - likelihood$	-4654	-4627	-4642	-4602
F-test of equality				
$Leverage$	0.076			0.051
$Profitability$		0.009		0.052
$Collateral$			0.000	0.000

Notes: Cox regression results are reported. The dependent variable is a dummy equal to one if the firm fails, and zero otherwise. Robust z-statistics are presented in the parentheses. The following countries are included in the regressions: Indonesia, Korea, Malaysia, Singapore and Thailand. * significant at 10%; ** significant at 5%; *** significant at 1%. Country dummies and industry dummies are included in the models. Also see notes to Table 1.

Table 4: Likelihood ratio test

	Observations	Log likelihood (null)	Log likelihood (model)	Degrees of freedom	Likelihood ratio chi2(4)
A	22329	-4830.943	-4612.844	14	
B	22329	-3968.702	-3779.129	18	
A *and* B					1667.43
$Prob > chi2$					0.000

Notes:

Table 5: Survival and financial sector development

	Indonesia	Korea	Malaysia	Singapore	Thailand
	(1)	(2)	(3)	(4)	(5)
$Leverage * Crisis$	0.823**	0.820***	0.736***	-0.677	1.072**
	(2.40)	(5.07)	(3.39)	(-0.79)	(1.96)
$Leverage * (1 - Crisis)$	0.136*	0.640***	0.336**	-0.174	0.147
	(1.68)	(4.17)	(2.10)	(-0.90)	(1.22)
$Profitability * Crisis$	-0.009***	-0.007	-0.022***	-0.003	-0.015***
	(-3.20)	(-1.27)	(-3.92)	(-1.26)	(-3.26)
$Profitability * (1 - Crisis)$	-0.001	-0.006**	-0.006	-0.002	-0.005*
	(-0.69)	(-2.04)	(-1.43)	(-0.95)	(-1.95)
$Collateral * Crisis$	-1.441***	-0.283	-1.082**	-0.660	-1.099***
	(-3.02)	(-0.53)	(-2.45)	(-1.27)	(-4.26)
$Collateral * (1 - Crisis)$	-0.68	-0.808*	-0.271	-0.814***	-0.396
	(-0.26)	(-1.93)	(-1.19)	(-3.16)	(-1.27)
$Size$	0.667	-0.592	0.019	1.049***	0.898*
	(1.59)	(-0.58)	(0.05)	(2.63)	(1.84)
$Size^2$	-0.027*	0.023	0.000	-0.040**	-0.030*
	(-1.66)	(0.84)	(0.01)	(-2.48)	(-1.90)
Age	-0.268***	0.001	-0.025*	-0.006	-0.117***
	(-10.92)	(0.06)	(-1.71)	(-0.40)	(-8.93)
GDP	-0.721***	-0.109***	-0.272***	-0.091***	-0.181***
	(-3.67)	(-4.68)	(-2.92)	(-4.12)	(-4.25)
MES	0.985***	1.802	-0.947	0.475	0.541
	(6.21)	(1.51)	(-0.81)	(0.54)	(0.72)
$Observations$	2,100	6,117	5,600	4,296	3,546
$Log - likelihood$	-342.7	-749.0	-1233	-682.4	-1035
$F - test\ of\ equality$					
$Leverage$	0.001	0.280	0.071	0.561	0.026
$Profitability$	0.040	0.879	0.024	0.747	0.054
$Collateral$	0.010	0.241	0.088	0.745	0.080

Notes: Cox regression results are reported. The dependent variable is a dummy equal to one if the firm fails, and zero otherwise. Robust z-statistics are presented in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Country dummies and industry dummies are included in the models. Also see notes to Table 1.

Table 6: Robustness: IV probit, baseline model

	(1)	(2)	(3)	(4)
$Leverage * Crisis$	0.157***			-0.530***
	(3.23)			(-3.14)
$Leverage * (1 - Crisis)$	0.272***			0.245***
	(8.05)			(5.34)
$Profitability * Crisis$		-0.022***		-0.026***
		(-4.86)		(-5.05)
$Profitability * (1 - Crisis)$		-0.010***		-0.008***
		(-8.45)		(-6.21)
$Collateral * Crisis$			-0.454***	0.178
			(-3.50)	(1.35)
$Collateral * (1 - Crisis)$			0.191	-0.233***
			(1.43)	(-4.09)
$Size$	0.261***	0.197***	0.284***	0.197***
	(6.22)	(4.64)	(5.81)	(4.65)
$Size^2$	-0.006***	-0.005***	-0.007***	-0.005***
	(-4.37)	(-3.23)	(-4.35)	(-3.25)
Age	-0.040***	-0.038***	-0.038***	-0.037***
	(-14.84)	(-13.79)	(-12.50)	(-13.64)
$Exchange$	0.006	-0.002	-0.075	-0.001
	(0.11)	(-0.04)	(-0.98)	(-0.02)
MES	-0.210*	-0.164	-0.305**	-0.137
	(-1.65)	(-1.28)	(-2.11)	(-1.07)
$Observations$	20,553	20,514	17,178	20,514
F-test of equality				
$Leverage$	0.000			0.003
$Profitability$		0.015		0.721
$Collateral$			0.002	0.085
P-values of test statistics				
$Wald\ Test$	0.000	0.000	0.000	0.000
$Sargan\ Test$	0.215	0.432	0.325	0.302
$Anderson\ test$	0.001	0.000	0.012	0.005

Notes: IV Probit regression results are reported. The dependent variable is a dummy equal to one if the firm fails, and zero otherwise. Robust z-statistics are presented in the parentheses. The following countries are included in the regressions: Indonesia, Korea, Malaysia, Singapore and Thailand. * significant at 10%; ** significant at 5%; *** significant at 1%. Country dummies and industry dummies are included in the models. Also see notes to Table 1.

Table 7: Robustness: IV probit, financial sector development

	Indonesia	Korea	Malaysia	Singapore	Thailand
	(1)	(2)	(3)	(4)	(5)
$Leverage * Crisis$	0.289	0.047	0.557***	-0.138	-0.113
	(1.13)	(0.07)	(3.18)	(-0.30)	(-0.51)
$Leverage * (1 - Crisis)$	0.129**	-0.189	0.174**	-0.172	-0.572***
	(2.02)	(-0.56)	(2.42)	(-0.65)	(-4.06)
$Profitability * Crisis$	-0.002	-0.002	-0.003	-0.021	-0.007*
	(-0.69)	(-0.21)	(-1.11)	(-1.35)	(-1.73)
$Profitability * (1 - Crisis)$	-0.010*	-0.019**	-0.014***	-0.002	-0.024***
	(-1.96)	(-2.42)	(-4.87)	(-0.38)	(-3.73)
$Collateral * Crisis$	-0.280	1.986	-0.812**	-0.915**	-0.812**
	(-0.40)	(1.16)	(-2.02)	(-2.41)	(-2.13)
$Collateral * (1 - Crisis)$	0.234	0.348	-0.262**	-0.311	-0.861***
	(0.97)	(1.31)	(-2.40)	(-1.13)	(-3.79)
$Size$	-0.835***	-0.771	0.700***	1.054***	1.111***
	(-3.73)	(-1.59)	(4.91)	(5.72)	(3.42)
$Size^2$	0.026***	0.020	-0.023***	-0.042***	-0.033***
	(4.03)	(1.59)	(-4.19)	(-5.57)	(-3.18)
Age	-0.264***	0.002	-0.026***	-0.017***	-0.197***
	(-14.50)	(0.20)	(-5.53)	(-2.78)	(-17.89)
$Exchange$	0.658	0.359	-0.194***	-0.296	-0.167**
	(1.19)	(1.51)	(-3.23)	(-1.24)	(-2.55)
MES	0.017	-0.007	-0.063**	0.384	-0.183
	(0.08)	(-0.02)	(-1.97)	(0.97)	(-0.68)
$Observations$	1,758	4,400	4,441	3,416	3,050
F-test of equality					
$Leverage$	0.022	0.8351	0.055	0.351	0.004
$Profitability$	0.011	0.256	0.002	0.947	0.039
$Collateral$	0.005	0.759	0.036	0.144	0.029
P-values of test statistics					
$Wald\ Test$	0.000	0.000	0.000	0.000	0.000
$Sargan\ Test$	0.115	0.256	0.301	0.289	241
$Anderson\ test$	0.000	0.005	0.000	0.007	0.003

Notes: IV Probit regression results are reported. The dependent variable is a dummy equal to one if the firm fails, and zero otherwise. Robust z-statistics are presented in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Country dummies and industry dummies are included in the models. Also see notes to Table 1.

Table 8: Robustness: an alternative definition of failure

	Baseline Model	Indonesia	Korea	Malaysia	Singapore	Thailand
	(1)	(2)	(3)	(4)	(5)	(6)
$Leverage * Crisis$	0.495**	0.827***	0.710**	0.761***	-0.568	0.716***
	(4.89)	(5.44)	(2.24)	(5.65)	(-0.76)	(4.87)
$Leverage * (1 - Crisis)$	0.262***	0.419*	0.659***	0.332*	0.675**	0.210*
	(3.01)	(1.90)	(3.72)	(1.77)	(2.05)	(1.82)
$Profitability * Crisis$	-0.014***	-0.014***	-0.007	-0.016***	-0.005	-0.019***
	(-7.29)	(-4.76)	(-1.25)	(-5.32)	(-0.92)	(-4.82)
$Profitability * (1 - Crisis)$	-0.010***	-0.006*	-0.013*	-0.006*	0.003	-0.007*
	(-6.59)	(-1.67)	(-1.75)	(-1.70)	(0.79)	(-1.68)
$Collateral * Crisis$	-0.663***	-0.831***	1.084	-0.875***	-0.388	-1.151***
	(-4.48)	(-4.25)	(1.39)	(-5.75)	(-0.71)	(3.85)
$Collateral * (1 - Crisis)$	-0.383	-0.356	-0.347	-0.410	-0.460	-0.365
	(-1.46)	(-1.57)	(-0.63)	(-1.63)	(-1.54)	(-1.53)
$Size$	0.141	0.287	1.793*	0.072	1.187***	1.285***
	(1.09)	(1.13)	(1.74)	(0.18)	(2.73)	(2.65)
$Size^2$	-0.001	-0.008	-0.039	0.002	-0.041**	-0.040**
	(-0.15)	(-0.89)	(-1.46)	(0.12)	(-2.46)	(-2.57)
Age	-0.094***	-0.145***	0.005	-0.062***	-0.026*	-0.221***
	(-9.23)	(-8.65)	(0.21)	(-3.12)	(-1.66)	(-11.44)
GDP	0.003	-0.009	0.049	0.010	-0.024	-0.049***
	(0.22)	(-0.22)	(1.47)	(0.29)	(-1.07)	(-2.65)
MES	0.451	0.055	1.934*	0.672	0.752	0.926
	(0.95)	(0.06)	(1.84)	(0.88)	(0.80)	(0.98)
$Observations$	24,242	2,372	6,448	6,745	4,786	3,891
$Log - likelihood$	-3647	127.34	162.66	3487.6	4784.3	419.51
F-test of equality						
$Leverage_{it}$	0.071	0.007	0.884	0.084	0.893	0.006
$Profitability_{it}$	0.088	0.051	0.325	0.012	0.234	0.035
$Collateral_{it}$	0.299	0.093	0.106	0.088	0.894	0.04

Notes: Cox regression results are reported. The dependent variable is a dummy equal to one if the firm drops out of the data, and zero otherwise. Robust z-statistics are presented in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Country dummies and industry dummies are included in the models. Also see notes to Table 1.