Corporate failures and the denomination of corporate bonds: Evidence from emerging Asian economies over two financial crises

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Abstract

Using a novel financial data-set which covers an extensive time period between 1995 to 2012, we test for the impact of currency denomination of bonds on Asian firms' survival probabilities. Our data span two financial crises: the 1997–98 Asian crisis and the 2007–09 global financial crisis. We find that during the former crisis firms with foreign currency denominated bonds face a higher probability of failure compared to firms with domestic bonds. On the other extreme, we find no notable differences between the 2007-09 financial crisis and tranquil times for both domestic and foreign issuers.

Key words: Firm survival, Bond financing, Domestic and foreign currency debt, Financial crises
JEL: F32, F34, G15, E30; L20

1 Introduction

It is generally accepted that during hard times lenders are more likely to withhold funds and interrupt lines of credit to less creditworthy firms forcing some of them to fail. The recent global financial crisis and the ensuing recession have spurred renewed interest in the relationship between access to capital markets and the incidence of corporate failures. Becker and Ivashina (2014) find evidence of substitution from loans to bonds at times characterized by contraction in bank lending supply and tight monetary policy. In the context of emerging market economies, Bolton and Freixas (2008) argue that bond financing, as a form of long-term finance, does not expose firms to the risks of bank runs and systemic crises. While bank-financed firms are fully exposed to the risk of bank loans, bond-financed firms are shielded from the adverse effects of a financial crisis and therefore are more likely to survive. In the Asian region, one lesson learned from the Asian crisis in 1997–98 suggests that providing access to well-developed bond markets could mitigate the negative effects of a financial crisis. Asia is potentially more prone to the adverse effects of foreign loan dependence due to the low level of corporate debt securities outstanding. Asian countries have been aware of this weakness since 1997 and have sought to develop their financial markets.

Since the 1997–98 Asian financial crisis, policymakers in the region have taken several steps to develop and strengthen their bond markets. One of the most well known regional initiatives was to establish an Asian Bond Fund to purchase dollar and local currency government bond issues (see Packer and Remolona (2012)). In particular, the ASEAN countries have co-ordinated the issue and trading of sovereign and quasi-sovereign bonds since 2003. They have also improved the infrastructure as part of a wider Asian Bond Market Initiative (ABMI) to create a more integrated regional market.

In this paper we assess the role of bond finance, considering the currency denomination of bonds, in firm survival during extreme economic events. Our data spans the 1997–98 crisis as well as the 2007–09 crisis and hence it provides a natural experiment to explore the impact of currency denomination of bonds over two different financial crises. This paper

seeks to determine whether the beneficial impact of bond finance on firm survival holds when we distinguish between firms with foreign and domestic bonds during the Asian crisis and the recent global financial crisis.

Our work is related to two different strands of literature. First, we build on the empirical and theoretical literature that looks at the importance of financial status and borrowing constraints on firms' survival chances and concludes that firms in bad financial shape are more likely to fail (see Zingales (1998); Bunn and Redwood (2003); Clementi and Hopenhayn (2006) and Bridges and Guariglia (2008)). Our work moves this literature forward by examining the role of bond currency denomination. In addition, the present study differentiates the effects of domestic and foreign bond finance across crises and tranquil periods. This contribution speaks directly to the literature which has emphasized the important role of macroeconomic environment in survival (see Alvarez and Görg (2009) and Bhattcharjee et al. (2009)).[1]

A second related line of work is the literature on the emerging economies financial development. According to Turner (2012), the development of the domestic corporate bond market will help firms to better endure financial crises and avoid currency mismatches. There is also significant evidence that firms increased cash stocks in Asia as a precautionary motive to ensure investment and growth (Guariglia and Mizen (2012)). The progress of development in Asia, especially for corporate bonds, has been rapid and steady since 2005, although it is lacking in terms of depth and liquidity compared to Western counterparts (Genberg and Sulstarova (2008), Packer and Remolona (2012) and Mizen and Tsoukas (2014)). In our study we find that access to domestic bond finance is one factor that could ameliorate emerging markets crises and protect firms against failures. Hence, the promotion of deep and liquid regional bond markets should be at the top of the policymakers' agenda.

The remainder of the paper is laid out as follows. Section two illustrates the empirical

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[1]Alvarez and Görg (2009) offer evidence from Latin America and Bhattcharjee et al. (2009) from the UK showing that changes in the macroeconomic environment may interact with relevant firm and industry features in amplifying exit hazards.

specifications and the econometric methodology. In Section three we present a descriptive analysis of our data. Section four presents the empirical evidence. Section five concludes the paper.

2 Theoretical background and hypotheses

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 the impact of access to bond markets on corporate failures. One basic premise of this study is that access to bond finance is associated with the establishment of reputation in the market. Companies with bond issues can directly tap the capital markets and therefore may be able to replace bank funding with funds directly raised on financial markets. In light of the above discussion, our first testable hypothesis is as follows:

Hypothesis 1: Access to a corporate bond market reduces firms' probability of bankruptcy.

Our motivation to examine the impact of currency denomination of bonds on corporate failures stems from the fact that foreign currency liabilities played a crucial role in amplifying the adverse effects of several crises in emerging markets (Bordo et al. (2010)). The idea of foreign debt exposure is central in the above paper since the authors argue that in the face of a sudden and large depreciation of exchange rates, reliance on foreign debt will make private and public debt default more likely. One plausible question is whether being a bond issuer in Asia was more of an advantage in attenuating failure hazards given that many firms were relying on bonds denominated in foreign currency when the Asian crisis burst in 1997. Therefore, we consider the following testable hypothesis:

Hypothesis 2: The currency denomination of a bond can have an (positive or negative) impact on firms' probability of bankruptcy.

The East Asian twin crisis (currency and banking crisis) is an ideal setting to study the link between firms' survival and access to bond markets because during this period most corporations were heavily dependent on domestic and foreign bank finance to supplement internal funds for investment, with smaller and medium sized enterprizes almost exclusively reliant on domestic bank loans. When the crisis erupted the funding to banks and then to corporations fell dramatically, and in the absence of local corporate bond markets to provide an alternative source of funding the effects of the crisis were amplified (Eichengreen et al. (2006))[2]. After the devaluation of domestic currencies, indebted firms found it expensive to repay their foreign currency denominated debt. This had a sharp adverse effect on investment, output and firms' chances of survival. Following the discussion above, we stipulate the third hypothesis as follows:

Hypothesis 3: During the Asian crisis firms that borrowed more heavily in foreign currency are more likely to fail.

The global financial crisis is a somewhat different story for the Asian region. Most economists and policy makers agree that Asian economies were better prepared and insulated against this crisis because they had adopted relatively conservative financial policies after the 1997-98 Asian financial crisis (Turner (2012)). In addition, Asian economies have adopted a series of measures in order to develop and foster their domestic bond markets (see Burger et al. (2010)). Specifically, policy makers in the Asian region encouraged the expansion and liquidity in the local bond markets by implementing several regulatory reforms (see Packer and Remolona (2012)). The upshot is that the growth of the corporate bond market has played a catalytic role in building resilience, reducing currency mismatches, and ultimately providing a "spare tyre" for firms when banks interrupted their lines of credit[3]. In the context of firm survival, we expect to find that external shocks from advanced economies were better weathered by Asian economies compared with the 1997-98 crisis. We therefore

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[2]See Kaminsky and Pereira (1996) for more details on the Latin American crises.

[3]During the global financial crisis, European banks were deleveraging, forcing some adjustment in corporate capital structure away from loans towards debt securities. This would suggest that banks changed their risk appetite and became less tolerant of companies facing a high risk in the crisis.

hypothesise that:

Hypothesis 4: The link between bond issuance and survival might not be significantly different in and out of the global financial crisis.

Having developed the testable hypotheses for the present study, we now turn to the empirical implementation.

3   Empirical strategy

Probit and hazard models are commonly used in the related empirical literature to model corporate failures (e.g Zingales (1998); Bridges and Guariglia (2008); Alvarez and Görg (2009); Bhattcharjee et al. (2009) and Tsoukas (2011)). However, these models do not account for potential endogenous regressors and this is likely to be of particular importance in the bond issuance context.[4] For example, it is likely that firms' desire to access the bond market is linked to certain balance sheet characteristics that reflect firm quality and survival is correlated with these characteristics. Similar arguments can also be made regarding the potential endogeneity of the other firm-level variables such as firms' leverage. We address this issue by allowing our bond financing variables and firm-specific indicators to be endogenous and then instrumenting for them through a two-stage procedure. Our approach to employ instrumental variable techniques (IV probit) is formally justified by using a Wald test of exogeneity. We report p-values of the test at the foot of the tables of results. In all cases the Wald test emphatically rejects the null of exogeneity in our regressors vindicating our endogenous approach.

The identification of the impact of bond financing requires the availability of exogenous instruments that are correlated with bond issues, but do not directly affect firm survival. We propose that two variables–the Chin-Itto index and the distance to the closest major financial center (New York, Hong Kong, London)– can provide a plausible exogenous source

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[4]As it has been emphasized for linear models, endogeneity in binary choice models results in biased coefficients and, therefore, incorrect inferences (Maddala (1983) and Rivers and Vuong (1988)).

of variation in the bond issuance probability. To begin with, the Chinn-Ito Index is used to measure financial liberalisation and financial openness which provides an incentive for investors to hold foreign assets in order to increase gains from diversification. Thus financial openness is likely to encourage bond issuance (see Mizen et al. (2012)). Second, closer physical distance to major centers of financial activity would promote financial integration and may encourage firms to issue bonds directly by reducing their issuance costs, lowering the cost of entering and exiting the market for investors and providing easier access to domestic firms that typically face thresholds that bar their entry to international bond markets (Mizen et al. (2012) and Mizen and Tsoukas (2014)). To the extent that the financial openness index and physical distance of the markets influence firms' ability to issue corporate bonds, they provide reasonable exogenous instruments for firm's access to bond markets. On the other hand, it can be argued that the above variables do not impact directly on firm survival.

As well as instrumenting bond finance, we instrument for our financial variables. The instrument set for the firm-specific variables includes lagged values of size, leverage, profitability, investment and collateral. It is generally agreed that lagged variables (which are often referred to as 'internal' instruments) are distributed independently of the error process and that they are sufficiently correlated with the included endogenous regressors. Hence they are frequently used as instruments in the literature.[5] We employ the Sargan and the Anderson test statistics, obtained from a linear instrumental variables model, to check for the validity and the relevance of the proposed instruments.

To assess the importance of bond currency denomination in influencing firm survival we estimate the following model:

$$Pr(FAIL_{it} = 1) = F(a_0 + a_1 ISSUER_{it} + a_2 FIN_{it} + a_3 SIZE_{it} + a_4 AGE_{it} + a_5 GDP_t + v_j + v_c + \epsilon_{it})$$

(3.1)

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[5]See for example Almeida et al. (2010) who show that IV estimators that make use of 'internal' instruments are very effective in controlling for measurement error in the regressors.

where $FAIL$ is a dummy variable that equals 1 when the company's status is that of dead, and 0 otherwise. The subscript i identifies firms, and the subscript t, time. $F(.)$ denotes the standard normal distribution function. The error term is made up by three components. v_j is an industry-specific effect, which we take into account by including industry dummies that control for fixed effects across industries. v_c stands for the country-specific effect, which we control for by including country dummies that control for institutional differences between countries. Finally, ϵ_{it} is an idiosyncratic error term.

The major interest in this paper is the impact of bond financing, which offers firms the option of an alternative source of financing. $ISSUER$ is a dummy variable that takes the value 1 if a firm has issued a bond in the past (and the bond did not mature as of year t), and 0 otherwise. In addition, we are able from the data to make the distinction between firms that issue bonds in foreign currency and those that make local currency bond issues. Therefore, we construct the dummy $DOMESTIC$ which takes the value 1 if a firm has issued a domestic bond, and 0 otherwise and the dummy $FOREIGN$ which takes the value 1 if firm has issued a foreign bond, and 0 otherwise. The reference (base) category is the $NON\text{-}ISSUER$ dummy which takes the value 1 if firm i has never issued a bond throughout the sample period, and 0 otherwise. As an alternative to foreign bond debt, we employ the long-term debt percent (LTD).

At the next stage, Equation (3.1) is modified to include interactions between bond issuers (both domestic and foreign) with a crisis dummy to show variations in firms' survival prospects for crisis and non-crisis periods. We consider the following model:

$$Pr(FAIL_{it} = 1) = F(a_0 + a_1 DOMESTIC_{it} + a_2 FOREIGN_{it} + a_3 DOMESTIC_{it} * CRISIS_t$$

$$+ a_4 FOREIGN_{it} * CRISIS_t + a_5 CRISIS_t + a_6 FIN_{it} + a_7 SIZE_{it} + a_8 AGE_{it} + a_9 GDP_t$$

$$+ v_j + v_c + \epsilon_{it}) \quad (3.2)$$

We account for the Asian financial crisis using $CRISIS= ASCD$ that takes the value 1 in years 1997–98 and 0 otherwise to allow for the the fact that the second half of 1997 saw an unprecedented collapse of the stock markets and currencies of five Asian economies Indonesia, Malaysia, Korea, the Philippines and Thailand with secondary effects through the rest of Asia. We also consider the global financial crisis employing $CRISIS= GFCD$ that takes the value 1 in years 2007–09 and zero otherwise to determine the impact of the most recent crisis on corporate failures.[6] This test is motivated by the argument of Bolton and Freixas (2008), that bond-financed firms are shielded from the direct effect of a financial crisis. The sign and significance of the interacted terms will reveal whether the impact of bond finance on firm survival differs between tranquil and turbulent periods.

3.1   Financial characteristics

In the vector FIN we consider four dimensions of financial health from the balance sheet, namely leverage, profitability, liquidity and collateral assets. Considering the likely response of leverage ($LEVERAGE$), as measured by the firm's long-term debt to total assets, we remark 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)). Zingales (1998), Bridges and Guariglia (2008) and Tsoukas (2011) show that highly leveraged carriers, start-ups and domestic firms are less likely to survive. We expect therefore a positive relationship between leverage and the probability of failure.

The next financial component is a profitability ratio ($PROFITABILITY$) defined as the ratio of the firm's profits before interests and tax to its total assets. Following Bunn and Redwood (2003) Bridges and Guariglia (2008) and Tsoukas (2011), we use this measure to proxy for the firm's ability to generate profits. We anticipate a positive relationship between

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[6]To avoid overlap between "normal times" and credit crunch periods, we exclude the 2007-09 years from the Asian crisis dummy and the 1997-98 years from the global crisis dummy. We obtain robust results.

profitability and the likelihood of survival.

We also control for the firm's financing needs ($INVESTMENT$), as measured by the ratio of investments over sales. This variable measures investment opportunities and we expect a positive association between investment and the probability of firm survival.

As an additional financial indicator we include a measure of tangible assets, which indicates the firm's ability to pledge collateral for debt finance ($COLLATERAL$). Firms can raise external finance by pledging the underlying productive assets as collateral.In the event that the firm reneges on its debt, creditors will seize those assets. Collateral has also been found to affect firms' chances of survival. Bridges and Guariglia (2008) and Tsoukas (2011) document that firms with a larger fraction of tangibles in their balance sheets are more likely to survive for a longer period of time. Thus, we expect a negative relationship between collateral and the incidence of failure.

3.2   Other influences

In addition to financial characteristics, our specifications include a choice of control variables guided by the existing empirical and theoretical literature on the determinants of firm survival. It is recognized that a firm's size plays an important role in determining firm failure, (Clementi and Hopenhayn (2006)), and is expected to decrease the incidence of failure. Large firms tend to face lower barriers in accessing the capital markets, while smaller firms with more severe information problems tend to face a higher risk of insolvency and illiquidity and consequently a higher risk of failure (Mata and Portugal (1994); Audretsch and Mahmood (1995) and Dunne et al. (1998)). Hence, we introduce size ($SIZE$) measured as the logarithm of the firm's real total assets.

Firm AGE is measured by the number of years elapsed since the firm's first Initial Public Offering (IPO). This is done in line with prior studies that measure firm age using the number of years since listening (see for example Shumway (2001) and Fama and French (2004)). 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.

We also attempt to control for macroeconomic and industry-specific conditions in our models. To this end we control for macroeconomic effects by adding the growth in GDP. We expect the GDP growth (GDP) to be negatively associated with the firm's probability to fail.

4 Data

4.1 Data description

The data for this paper are drawn from different sources including Compustat Global, Bloomberg, Zephyr, the Bank for International Settlements and the Asian Development Bank. These are combined in a new way to cast light on the probability of failure in the Asian region. The data are recorded on an annual basis and cover firms in emerging Asia most affected by the 1997-98 crisis - Indonesia, Korea, Malaysia, Singapore and Thailand. The time period is 1995 through 2012, which covers the period of the East Asian crisis and the most recent global financial crisis.

The Compustat Global database offers balance sheet and profit and loss accounts data for firms in the East Asian region. We provide information on financial accounts and ratios for Asian firms operating in all sectors of the economy. The data on bond issues are drawn from Bloomberg. Our coverage of bond issues therefore embraces both firms with issues in hard currencies, which are almost exclusively US dollar denominated, and firms with local currency denominated bonds. Before the Asian crisis, issuance in domestic bonds by corporations was very limited but in the post-Asian crisis period it increased markedly (see Mizen et al. (2012)). In our data 59% of bonds are denominated in domestic currency and the remaining 41% in foreign currency. The use of such a unique dataset will enable us to scrutinize the role of bond finance in survival. Data on the real effective exchange rates,

which are meant to proxy for changes in the macroeconomy, are taken from the Bank for International Settlements.

We use Zephyr to obtain data on mergers and acquisitions for the sampled firms. Compustat Global 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. Employing Zephyr we are able to identify and drop those firms that are mistakenly coded as 'dead' in our data. This will ensure that our dependent variable has been accurately constructed to capture firms that failed and did not exit the sample due to mergers and acquisitions.[7]

Data on our exogenous instruments for bond financing are taken from two different sources. First, the Chinn-Ito measure is a combination of four binary dummy variables published in IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Second, we obtain data from Rose and Spiegel (2009) on the physical distance of a country from financial activity in order to measure the proximity to major international financial centers (New York, Hong Kong, London).

Following normal selection criteria used in the literature, we control for the potential influence of outliers, by excluding observations in the 1 percent from upper and lower tails of the distribution of the regression variables. Our combined sample contains data for 446 firms in Indonesia, 1,612 in Korea, 1,219 in Malaysia, 848 in Singapore and 644 in Thailand, a total of 4,769 firms.

4.2 Sample analysis

By way of preliminary analysis, we show the evolution of failures over time in Figure 1. This figure shows that our sample is dominated by firms that failed in 1997 which coincided with the onset of the Asian crisis and 1998 which marked the end of the crisis. Apart from this period the distribution of failures over time is reasonably stable. During the 2007–09

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[7]it should be noted that some mergers and acquisitions, especially those of financial companies, involve firms near bankruptcy being handed over to other firms using the form of mergers and acquisitions. These firms actually failed, but the regulatory authorities sometimes use mergers and acquisitions as means of resolution.

crisis we are unable to detect any significant increases in the number of corporate failures. We confirm, therefore, the idea that Asian companies entered the global financial crisis with limited exposure to subprime-related instruments, and most had relatively healthy financial positions and strong capital buffers. Moreover, the currencies of these countries were protected by large foreign exchange reserves, lowering the currency risk of investors in these countries.

In Figure 2 we depict the number of bond issues broken down by domestic and foreign currency over the sample period. This figure tells a tale consistent with the bond market development in Asia, and the variation through the two crises. It is clear that during the early years of the sample, and especially during the Asian crisis, most bonds were denominated in foreign currency. In the post-crisis period, domestic bond issues took off, before the Asian Bond Fund Initiatives in 2003 (see Mizen et al. (2012), Packer and Remolona (2012) and Mizen and Tsoukas (2014)), while the foreign bond issuance also increased from 2001 (albeit not significantly so). We also observe that domestic bonds expanded considerably during the 2007–09 crisis, while at around the same time the foreign market seemed to flatten.

Summary statistics for the variables used in our empirical analysis are provided in Table 1. Means and standard deviations of the firm-specific variables and financial indicators are presented for the total sample (column 1) and for failed and surviving firms (columns 2 and 3). Further, the p-values of a test for the equality of means are presented in column 4. Regarding the financial variables, surviving firms are less indebted and display higher levels of profitability and collateral. This supports the notion put forward by a number of studies (see Zingales (1998); Bunn and Redwood (2003); Clementi and Hopenhayn (2006) and Bridges and Guariglia (2008)) that firms which display healthier balance sheets are less likely to fail. In addition, we observe that surviving firms are larger than failed firms. This finding implies that firm size is an important determinant in business failures and is in line with the 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)). Further, surviving firms are more likely to be bond issuers and to hold foreign long-term debt. These differences between sub-samples are statistically significant in all cases but one.

In Table 2 we present statistics for the main variables distinguishing between the two crises periods. It is evident that the average failure rate is higher during the Asian crisis compared to tranquil times. In terms of its magnitude the average failure rate during the final years of our sample is much smaller than it is around the time of the Asian crisis. In addition, we show that overall firms displayed worse balance sheet characteristics during the Asian financial crisis than the other years in the sample.

In summary, these preliminary statistics show that firms' failure rates are related to bond finance, financial healthiness and the two financial crises. In the sections that follow we provide formal econometric analysis of the determinants of firm failures, the effect of financial crisis, and the role of bond financing. Thus, it remains to be seen whether these statistical findings are confirmed when we control for a number of factors which are known to play a role in survival models.

5 Results

5.1 Main results

The East Asian financial system suffered severe damages during the 1997–98 crisis primarily due to the underdeveloped bond market and the weak banking sector. As already mentioned, companies with market exposure are likely to have established track record reputation. If reputational effects are in play, we should expect to find bond issuers to be less likely to fail, everything else equal.

Table 3 presents estimates of Equation (3.1) reporting the marginal effects obtained from the endogenous probit regressions. In column 1 of Table 3 we report the direct impact of bond finance using the $ISSUER$ dummy variable. We observe that the bond issuance

dummy has a significant negative marginal effect. Hence, issuing a bond exerts a negative impact on the likelihood of failure. This finding is not only statistically but also economically important. Changing the firm status from non-issuer to bond issuer would reduce the exit probability by 2.7%.

Financial indicators have the expected impact on firms' chances of failure. In particular, firms with high levels of $LEVERAGE$ face higher probabilities of failure compared to those with low leverage confirming previous reported empirical evidence (Zingales (1998)). High levels of debt would increase moral hazard and asymmetric information problems, and would lead to a higher probability of failure. The effect is economically important since a one percent increase in leverage would raise the probability of failure by 14.1%.

Next, $PROFITABILITY$ measures the extent to which high-profitable firms face a lower risk of failure. It enters with the expected negative sign implying that an increase in profitability ratio lowers the hazard of failure. This result is consistent with previous findings which show that more profitable firms are less likely to fail (Bunn and Redwood (2003); Bridges and Guariglia (2008) and Tsoukas (2011)). A one percent increase in firms' profits would decrease failure rates by 15.9%.

$COLLATERAL$ and $INVESTMENT$ both have negative effects on the probability of failure. Firms with higher level of investment opportunities are able to obtain more external funding but also to pursue risk-shifting strategies (Bridges and Guariglia (2008)). This effect is meaningful since raising collateral and investment by one percent would reduce the incidence of failure by 2.8% and 4.3%, respectively.

With respect to our control variables, the results on $SIZE$ and AGE indicate that larger and older firms are less likely to fail, although the real impact is rather small. Further, the proxy for the macroeconomic condition (GDP) has the expected negative effect on failure.

In column 2 of Table 3, we make the distinction between firms with domestic and foreign bond issues. We observe that both domestic and foreign dummies attain negative and significant marginal effects confirming our previous finding. In other words, firms with

bond issues, irrespective of the currency denomination, are less likely to fail compared to non-issuers. We view this result as signaling the 'track record' reputation that firms can establish in the bond market. Firms that are able to borrow through the issuance of bond debt are those that can bear the significant fixed costs of accessing the bond market (such as disclosure costs and underwriting fees). On the other hand, non-issuing firms, which are more informationally opaque and lack track record, are more likely to fail. This empirical result supports the argument of good reputation established through bond issuance.[8] The marginal effects suggest that changing the dummy of non-issuer to either domestic or foreign would reduce the probability of failure by 4.8% and 14.3%, respectively.

Both equations have satisfactory diagnostics, showing instrument validity (Sargan) and relevance (Anderson).

5.2   Currency denomination and the two financial crises

5.2.1   The Asian financial crisis

Having established the link between domestic and foreign bond issuers and firm survival, we now explore the role of bond currency denomination in firm survival during crisis periods. We anticipate the denomination of bonds in foreign currency to be of particular importance during the Asian crisis, since during this period most corporations were heavily dependent on foreign debt.

In column 1 of Table 4 we present interactions of bond dummies with the Asian crisis period.[9] We show that the marginal effects on domestic bonds are negative and significant during tranquil and crisis periods. Firms issuing bonds denominated in domestic currency face a lower hazard of failure both in and outside the crisis. This empirical result confirms

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[8]Given that bond finance is not the only available option for firms' external finance, one concern is that other sources such as equity finance, bank finance and trade credit may have a central place in determining business failures. In unreported regressions we find that adding controls for the numbers of years since the firms's equity IPO, bank dependency and trade credit does not alter the effect of bond financing on firm survival.

[9]The interactions gauge the change in the response to bond financing variables for the crisis and non-crisis years.

the view taken by Bolton and Freixas (2008) that bond issuers are shielded from the effect of a financial crisis. Yet, we show that this is the case only for firms with domestic bonds. By contrast, the marginal effects on firms with foreign bonds are negative and significant outside the crisis, but positive and significant during the Asian crisis. This striking result shows that firms with foreign bond issues were fully exposed to the Asian crisis and had a particular problem during this period since debts became much more burdensome when the exchange rate collapsed. The devaluation of the asset side of the firm's balance sheet relative to its liabilities pushes the firm into failure. In other words, when a firm borrows in foreign currency in the form of either loans or bonds and the local currency of the country where the firm's main income comes from weakens, the debt repayment burden of the firm in local currency upon maturity increases, which could increase the probability of firm failure. In addition to the interaction terms, the dummy on the Asian crisis (ASCD) is positive and significant indicating that during this period firms were more likely to fail.

The findings discussed above are seemingly at odds with those obtained in Allayannis et al. (2003) regarding the impact of foreign currency debt on firm performance. Specifically, Allayannis et al. (2003) find that financial/operating performance does not respond more strongly to the use of foreign currency debt compared to local currency debt. They also show that firms which rely more heavily on foreign currency debt experienced an increase in sales during the Asian crisis. However, as noted by the authors, these results are not in line with prior research and they are "contrary to suggestions that foreign currency debt is associated with underperformance". Moreover, they attempt to attribute these counterintuitive results to the potential role of the derivatives markets during the currency crisis. Unfortunately, however, data on derivatives at the firm level are not available within our data-set, so we are unable to test for these effects directly. In short, we argue that our findings mostly concur with previous research which suggests that firms which are exposed to foreign debt perform poorly and that the foreign debt exposure may be partly responsible for the Asian crisis (see Chang and Velasco (1999) and Harvey and Roper (1999)).

Financial indicators and other controls have the expected impact on firms' chances of failure, indicating that firms in good financial health are less likely to fail. Finally, the diagnostic tests confirm the validity and the relevance of our instruments.

5.2.2 The global financial crisis

We now turn our attention to the most recent global financial crisis. In column 2 of Table 4 we report interactions of domestic and foreign bond dummies with the Global financial crisis period (GFCD). In contrast to the results obtained above, it appears that there is no statistically significant difference in the link between bond finance and survival in and out of the crisis. For both crisis and non-crisis periods firms with domestic and foreign bond debt face lower exit probabilities. In other words, the negative and insignificant marginal effects on the interaction of domestic and foreign issuers with the crisis dummy indicate that the survival prospects of bond issuers were not significantly affected during the 2007–09 crisis. This suggests that bond issuance, as a measure of alternative source of funding, improves a firm's survival probabilities, irrespective of whether a firm is faced with the 2007-09 crisis or other times.

The dummy on the Global financial crisis period (GFCD) is positive and significant although its impact on firm failure is quantitatively smaller compared to the Asian crisis. We conclude that the external shocks emanating from advanced economies were better weathered by Asian economies during 2009 compared with the 1997-98 Asian crisis. This finding lends support to the idea that Asian firms were in better financial shape by following conservative financial policies (see Turner (2012)). Moreover, domestic bond markets were significantly developed (see Burger et al. (2010)) and hence currency mismatches were dramatically reduced. In addition, we note that the remaining control variables retain their sign and significance indicating the importance of firms' financial shape in determining corporate failures. Once again, the diagnostic tests do not suggest any problems with the validity and the relevance of our instruments.

In summary, the results in this table emphasise the differential effects of the two financial crises on survival probabilities for firms with domestic and foreign denominated bonds. Firms with foreign bonds were more likely to fail during the Asian crisis, while firms issuing domestic bonds were shielded from the adverse effects of the crisis. When we examine the recent financial crisis, we are unable to find any notable differences between domestic and foreign bond issuers and hence we conclude that both types of bond issuers were less likely to fail.

It is worth mentioning that the muted response of firm survival to variations of debt may be attributed to a number of different factors. For example, it could be that macroeconomic conditions were different this time, or that exchange rate moves were less dramatic. One might also argue that policy initiatives adopted in the region played a role in making the effects of the crisis less potent. It may also be the case that firms with foreign currency debt were better hedged. While we attempt to control for macroeconomic conditions using the growth in GDP and for country-specific effects using country dummies, we have not explicitly accounted for exchange rate movements. In the next sub-section, we investigate the role of exchange rate volatility during extreme economic events. As already mentioned, ideally, we would also like to test for potential hedging at the firm level, but due to data limitations we are unable to conduct this test.

5.2.3   Exchange rate volatility

One important argument made so far is that depreciation of the local currency makes borrowing more expensive and this may increase firms' exit probabilities. This is a dominant channel which is likely to be operative during the Asian crisis when the exchange rate collapsed. To further strengthen our finding presented in Table 4, column 1 (i.e that foreign bond issuers are more likely to fail during the Asian twin crisis), we interact our domestic and foreign bonds with a measure of exchange rate volatility (VOL).[10] This provides a way

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[10]We use the Real Exchange Rate (REER) taken from the BIS. Using monthly real exchange rate series, a GARCH (1,1) model is implemented and the monthly measures are annualised to match the frequency of the panel data.

to explicitly assess the direct impact of currency depreciation on corporate failures.

We report estimation results in Table 5. We find that the interaction term of foreign bond and exchange rate volatility is positive and significant. This is an important result, considering the arm's length nature of bond finance and the prevalence of uninformed investors. This verifies that the 'exchange rate volatility' channel is very influential in determining the probability of failure, especially for bonds denominated in foreign currency. In other words, the crisis effect is really an exchange rate collapse effect. On the other hand, we find that the interaction between domestic bonds and volatility is insignificant and statistically unimportant. Finally, the impact of the variables discussed in the previous section is very similar in magnitude and level of significance and in the interest of space we do not discuss them here.

5.2.4 An alternative measure of debt

Thus far, we have employed dummy variables to indicate the use of foreign or domestic bonds. Given the firm-level nature of our data-set, we attempt to make use of a richer measure that takes into account the amount of long-term when a firm is categorised as foreign/domestic issuer. In line with Allayannis et al. (2003), we construct the ratios of long-term debt to total debt for domestic and foreign issuers and then take the difference of the above measures. We reproduce the main results replacing the foreign/domestic dummies with the the long-term debt percent variable (Ltd) to gauge the response of firm survival to differences in the percentage of foreign debt.

Table 6 illustrates the results when we consider the difference in the long-term debt percent on its own. Our findings are in line with previously reported results in Table 3. In particular, we find in column 1 that the long-term debt percent variable is negatively signed and statistically significant at the 1% level. Hence, firms which rely more heavily in foreign debt tend to experience a higher probability of failure. We also find in columns 2 and 3 that the effects are more pronounced for the Asian crisis. Finally, results presented in column 4

are comparable with those in Table 5. Thus we can conclude that our results are robust to an alternative measure of debt exposure.

6   Conclusion

Corporate failures are typically higher during economic downturns, but the recent financial crisis and the ensuing recession have spurred renewed interest in the relationship between access to capital markets and the incidence of failures. Using a novel financial data-set which covers an extensive time period between 1995 to 2012 we are able to cover two financial crises: the 1997–98 Asian crisis and the 2007–09 global financial crises. We ask whether access to bond finance, and in particular to domestic or foreign bonds, was beneficial for firms during crisis periods compared to tranquil times.

We find that firms issuing either foreign or domestic corporate bonds are less likely to fail compared to non-issuers. In addition, we show that the currency denomination of bonds affects significantly different the survival chances of firms during the Asian crisis, with foreign bond issuers facing a higher probability of failure and domestic issuers being unaffected. On the other hand, it appears that there is no statistically significant difference in the link between domestic and foreign bond finance and survival during the global financial crisis.

Our results have important policy implications. If access to domestic bond finance is one factor that could ameliorate emerging markets crises and protect firms against failures, then the promotion of deep and liquid regional bond markets should be at the top of the policymakers' agenda. All of these developments will spur the bond market and create conditions for a more diversified and efficient financial sector.

Further research on the influence of bond market development is warranted since the results reported here pool investment and speculative grade bonds. It is possible that certain segments of the corporate bond market may have responded more favorably than others to the increase in market size and liquidity, especially in crisis years. These distinctions are on

20

the agenda for future research.

Appendix

Structure of the panel

Number of observations per firm	Frequency	Percent	Cumulative
	(1)	(2)	(3)
1	194	0.44	0.44
2	904	2.07	2.52
3	726	1.66	4.18
4	1,120	2.57	6.75
5	1,390	3.19	9.94
6	1,902	4.36	14.30
7	1,855	4.25	18.55
8	2,144	4.92	23.46
9	2,592	5.94	29.41
10	3,440	7.89	37.29
11	2,464	5.65	42.94
12	2,484	5.69	48.64
13	2,548	5.84	58.48
14	2,674	6.13	60.61
15	3,135	7.19	67.80
16	5,232	11.99	79.79
17	3,757	8.61	88.40
18	5,058	11.60	100.00
Total	43,619	100	

Correlation matrix

	Leverage	Profitability	Investment	Collateral	Size	Age	Issuer	GDP
Leverage	1.000							
Profitability	-0.067	1.000						
Investment	-0.009	-0.127	1.000					
Collateral	0.301	0.006	-0.078	1.000				
Size	0.241	0.043	-0.063	0.106	1.000			
Age	0.026	-0.041	-0.002	-0.025	-0.022	1.000		
Issuer	0.075	0.036	-0.018	0.008	0.057	0.077	1.000	
GDP	-0.001	-0.042	-0.025	-0.033	-0.034	0.171	0.008	1.000

Notes: The table presents the correlation coefficients between regressors.

Definitions of the variables

- *Fail*: is a dummy that equals 1 if a firm has failed, and 0 otherwise.

- *Issuer*: is a dummy that equals 1 if a firm has issued a bond, and 0 otherwise.

- *Domestic*: is a dummy that equals 1 if a firm has issued a local currency bond, and 0 otherwise.

- *Foreign*: is a dummy that equals 1 if a firm has issued a foreign currency denominated bond, and 0 otherwise.

- *Ltd*: is the long-term debt percent. It is calculated by taking the difference in the ratios of long-term debt to total debt for local and foreign currency respectively.

- *Vol*: is the exchange rate volatility calculated using a GARCH (1,1) model.

- *Leverage*: is measured as the firm's long-term debt to total assets.

- *Profitability*: is the ratio of the firm's profits before interest and tax to its total assets.

- *Investment*: is the ratio of the firm's investments over sales.

- *Collateral*: is defined as the ratio of the firm's tangible assets over its total assets.

- *Size*: is denoted by the log of real total assets.

- *Age*: is the number of years elapsed since the firm's first Initial Public Offering.

- *GDP*: is the growth in GDP.

- *ASCD*: is a dummy that equals 1 in years 1997-98, and 0 otherwise.

- *GFCD*: is a dummy that equals 1 in years 2007-09, and 0 otherwise.

References

Allayannis, G., Brown, G. and Klapper, L.: 2003, Capital structure and financial risk: Evidence from foreign debt use in East Asia, *Journal of Finance* **58**, 2667–2709.

Almeida, H., Campello, M. and Galvao, A.: 2010, Measurement errors in investment equations, *Review of Financial Studies* **23**, 3279–3382.

Alvarez, R. and Görg, H.: 2009, Multinationals and plant exit: Evidence from Chile, *International Review of Economics and Finance* **18**, 45–51.

Arghyrou, M. and Kontonikas, A.: 2012, The EMU sovereign-debt crisis: fundamentals, expectations and contagion, *Journal of International Financial Markets Institutions and Money* **22**, 658–677.

Audretsch, D. and Mahmood, T.: 1995, New firm survival: New results using a hazard function, *Review of Economics and Statistics* **97**, 97–103.

Becker, B. and Ivashina, V.: 2014, Cyclicality of credit supply: Firm level evidence , *Journal of Monetary Economics* **62**, 76–93.

Bhattcharjee, A., Higson, C., Holly, S. and Kattuman, P.: 2009, Macroeconomic instability and business exit: Determinants of failures and acquisitions of UK firms, *Economica* **76**, 108–131.

Bolton, P. and Freixas, X.: 2008, How can emerging market economies benefit from a corporate bond market?, *in* E. Borensztein, K. Cowan, B. Eichengreen and U. Panizza (eds), *Bond Markets in Latin America. On the verge of a big bang?*, MIT Press.

Bordo, M., Meissner, C. and Stuckler, D.: 2010, Foreign currency debt, financial crises and economic growth: A long-run view, *Journal of International Money and Finance* **29**, 642–665.

Bridges, S. and Guariglia, A.: 2008, Financial constraints, global engagement, and firm survival in the UK: Evidence from micro data, *Scottish Journal of Political Economy* **55**, 444–464.

Bunn, P. and Redwood, V.: 2003, Company accounts based modelling of business failures and the implications for financial stability, *Working Paper 210*, Bank of England.

Burger, J., Warnock, F. and Warnock, V.: 2010, Emerging local currency bond markets, Working Paper 16249, National Bureau of Economic Research.

Chang, R. and Velasco, A.: 1999, The Asian liquidity crisis, Working Paper 6796, National Bureau of Economic Research.

Clementi, L. and Hopenhayn, H.: 2006, A theory of financing constraints and firm dynamics, *Quarterly Journal of Economics* **54**, 229–265.

Dunne, T., Roberts, M. and Samuelson, L.: 1998, Patterns of firm entry and exit in US manufacturing industries, *Rand Journal of Economics,* **19**, 495–515.

Eichengreen, B., Borensztein, E. and Panizza, U.: 2006, A tale of two markets: Bond market

development in East Asia and Latin America, *Occasional paper*, Hong Kong Institute for Monetary Research.

Fama, E., French, K., 2004. New lists: Fundamentals and survival rates. *Journal of Financial Economics*, **73**, 229-269.

Genberg, H., Sulstarova, A., 2008. Macroeconomic volatility, debt dynamics, and sovereign interest rate spreads. *Journal of International Money and Finance*, **27**, 26-39.

Guariglia, A. and Mizen, P.: 2012, Investment and asset growth of Asian firms: Evidence for financial resilience in the recent financial crisis, *Working paper* No 32/2012, Hong Kong Institute for Monetary Research.

Harvey, C. and Roper, A.: 1999, The Asian bet, *in* A. Harwood, R. Litan, and M. Pomerleano (eds), *The crisis in Emerging Financial Markets*, Brookings Intittution Press, Washington, DC.

Jovanovic, B.: 1982, Selection and evolution of industry, *Econometrica* **50**, 3–37.

Kaminsky, G. and Pereira, A.: 1996, The debt crisis: Lessons of the 1980s for the 1990s, *Journal of Development Economics* **50**, 1–24.

Levin, A., Natalucci, F. and Zakrajsek, E.: 2004, The magnitude and cyclical behaviour of financial market frictions', *Working Paper 2004–70*, Board of Governors of the Federal Reserve System.

Maddala, G.: 1983, *Limited-Dependent and Qualitative Variables in Econometrics*, Vol. 3, Econometric Society Monographs, Cambridge University Press.

Mata, J. and Portugal, P.: 1994, Life duration of new firms, *Journal of Industrial Economics* **27**, 227–243.

Mizen, P., Packer, F., Remolona, E. and Tsoukas, S.: 2012, Why do firms issue abroad? Lessons from onshore and offshore corporate bond finance in Asian emerging markets, *Working Paper 401*, Bank for International Settlements.

Mizen, P. and Tsoukas, S.: 2014, What promotes greater use of the corporate bond market? A study of the issuance behaviour of firms in Asia, *Oxford Economic Papers* **66**, 227–253.

Packer, F. and Remolona, E.: 2012, Attracting foreign participation in Asian local currency bond markets: The case of the Asian Bond Fund 2 initiative, *Pacific Economic Review* **17**, 415–433.

Rivers, D. and Vuong, H.: 1988, Limited information estimators and exogeneity tests of simultaneous probit models, *Journal of Econometrics* **39**, 347–366.

Rose, A. and Spiegel, M.: 2009, International financial remoteness and macroeconomic volatility, *Journal of Development Economics* **89**, 250–257.

Shumway, T.: 2001, Forecasting bankruptcy more accurately: A simple hazard model, *Journal of Business* **74**, 101–124.

Tsoukas, S.: 2011, Firm survival and financial development: Evidence from a panel of emerging Asian economies, *Journal of Banking and Finance* **35**, 1736–1752.

Turner, P.: 2012, Whethering financial crises: Domestic bond markets in EMEs, *BIS Papers 63*, Bank for International Settlements.

Zingales, L.: 1998, Survival of the fittest or the fattest? Exit and financing in trucking industry, *Journal of Finance* **53**, 905–938.

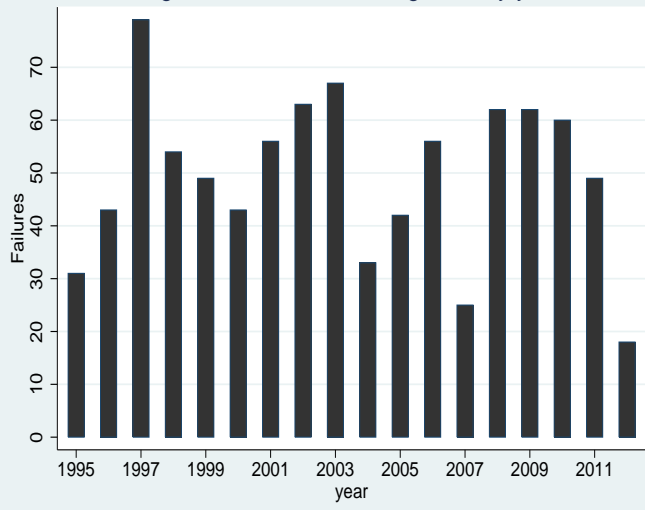Figure 1: Number of failing firms by year

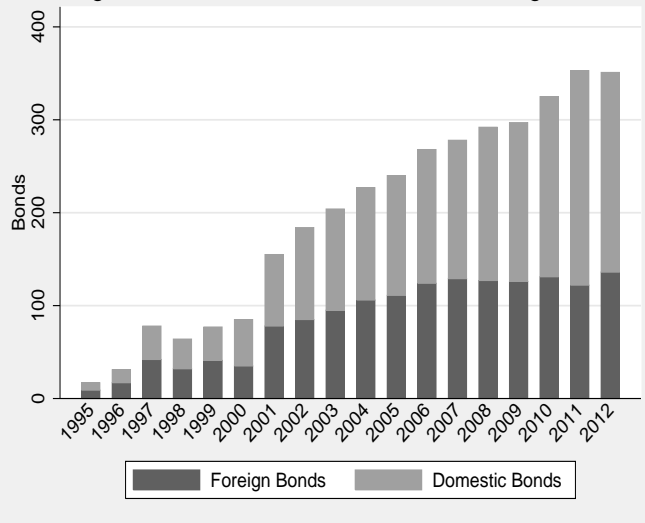Figure 2: Evolution of Domestic and Foreign bonds

27

Table 1: Summary statistics

	Total sample (1)	Fail=1 (2)	Fail=0 (3)	Diff. (4)
Fail	0.116	1.00	0.000	-
	(0.32)	(0.00)	(0.00)	
Leverage	0.091	0.097	0.091	0.003
	(0.11)	(0.12)	(0.11)	
Profitability	0.049	0.033	0.050	0.000
	(0.08)	(0.09)	(0.08)	
Investment	0.164	0.167	0.163	0.266
	(0.17)	(0.19)	(0.17)	
Collateral	0.349	0.348	0.358	0.016
	(0.20)	(0.20)	(0.21)	
Size	7.49	2.813	8.117	0.000
	(26.16)	(12.41)	(27.41)	
Age	10.884	10.614	10.893	0.592
	(9.58)	(9.14)	(9.98)	
Issuer	0.202	0.164	0.207	0.000
	(0.40)	(0.37)	(0.40)	
Ltd	0.056	0.041	0.058	0.000
	(0.19)	(0.19)	(0.16)	
Observations	29279	3420	25859	

Notes: The table presents sample means. Standard deviations are reported in parentheses. *Fail* is a dummy that equals 1 if firm i fails in year t, and 0 otherwise. *Leverage* is measured as the firm's long-term debt to assets ratio. *Profitability* is the ratio of the firm's profits before interest and tax to its total assets. *Investment* is defined by the ratio of investments over total sales. *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* is the number of years elapsed since the firm's first IPO. *Issuer*: is a dummy that equals 1 if the firm is a bond issuer, and 0 otherwise. *Ltd*: is the long-term debt percent. Variables are measured in thousands of US dollars.

Table 2: Statistics for the two financial crises

	ASCD=1	ASCD=0	Diff.	GFCD=1	GFCD=0	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)
Fail	0.229	0.113	0.000	0.088	0.126	0.000
	(0.42)	(0.31)		(0.28)	(0.33)	
Leverage	0.139	0.090	0.000	0.085	0.093	0.000
	(0.14)	(0.11)		(0.11)	(0.12)	
Profitability	0.043	0.048	0.056	0.048	0.047	0.851
	(0.08)	(0.08)		(0.08)	(0.09)	
Investment	0.175	0.163	0.032	0.164	0.164	0.987
	(0.16)	(0.17)		(0.18)	(0.17)	
Collateral	0.347	0.411	0.000	0.325	0.357	0.000
	(0.20)	(0.19)		(0.19)	(0.20)	
Size	15.33	7.24	0.000	6.875	7.706	0.017
	(40.49)	(25.51)		(25.82)	(26.27)	
Age	8.135	11.044	0.000	12.025	10.859	0.000
	(9.51)	(9.61)		(8.87)	(9.62)	
Issuer	0.206	0.196	0.203	0.192	0.205	0.022
	(0.40)	(0.39)		(0.39)	(0.40)	
Ltd	0.056	0.043	0.023	0.037	0.046	0.001
	(0.20)	(0.18)		(0.16)	(0.18)	
Observations	932	28347		7349	21930	

Notes: The table presents sample means. Standard deviations are reported in parentheses. *ASCD*: is a dummy that equals 1 in years 1997-98, and 0 otherwise. *GFCD*: is a dummy that equals 1 in years 2007-09, and 0 otherwise. Also, see notes to Table 1.

Table 3: Currency denomination of bonds and firm survival

	Bond finance	Bond currency denomination
	(1)	(2)
Issuer	-0.027***	
	(-3.90)	
Domestic		-0.048**
		(-2.10)
Foreign		-0.143***
		(-5.52)
Leverage	0.141***	0.125***
	(5.35)	(5.15)
Profitability	-0.159***	-0.174***
	(-3.66)	(-3.95)
Investment	-0.043**	-0.058*
	(-2.13)	(-1.85)
Collateral	-0.028**	-0.038**
	(-2.05)	(-2.46)
Size	-0.001***	-0.001***
	(-4.75)	(-4.28)
Age	-0.001***	-0.003***
	(-5.92)	(-4.22)
GDP	-0.0001*	-0.001***
	(-1.96)	(4.95)
Observations	21,438	21,438
P − values of		
test statistics		
Wald	0.019	0.019
Anderson	0.000	0.000
Sargan	0.412	0.365

Notes: Marginal effects of endogenous probit models are reported. The dependent variable is a dummy equal to one if a firm fails in year t, and zero otherwise. Robust z-statistics are presented in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Also, see notes to Table 1.

Table 4: Currency denomination of bonds and firm survival over two financial crises

	Asian crisis (1)	Global financial crisis (2)
Domestic	-0.042*	-0.021***
	(-2.01)	(-3.70)
Foreign	-0.154***	-0.094**
	(-5.49)	(-2.32)
*Domestic*ASCD*	-0.260**	
	(-2.31)	
*Foreign*ASCD*	0.351**	
	(2.26)	
ASCD	0.061***	
	(5.53)	
*Domestic*GFCD*		-0.233
		(-1.18)
*Foreign*GFCD*		-0.265
		(-1.04)
GFCD		0.015*
		(1.92)
Leverage	0.157***	0.137***
	(5.55)	(6.02)
Profitability	-0.171***	-0.234***
	(-3.82)	(-6.33)
Investment	-0.029**	-0.089*
	(-2.22)	(-1.85)
Collateral	-0.071**	-0.021
	(-2.26)	(-1.45)
Size	-0.001***	-0.001***
	(-4.00)	(-7.39)
Age	-0.001**	-0.001***
	(-2.38)	(-4.22)
GDP	-0.001***	-0.001***
	(8.24)	(7.54)
Observations	21,438	21,438
P − values of test statistics		
Wald	0.009	0.010
Anderson	0.000	0.000
Sargan	0.256	0.489

Notes: Marginal effects of endogenous probit models are reported. The dependent variable is a dummy equal to one if a firm fails in year t, and zero otherwise. Robust z-statistics are presented in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Also, see notes to Tables 1 and 2.

Table 5: Exchange rate volatility and firm survival

Domestic	-0.033**
	(-2.35)
Foreign	-0.064*
	(-1.82)
*Domestic*Vol*	-0.001
	(-1.41)
*Foreign*Vol*	0.085***
	(2.89)
Leverage	0.138***
	(5.20)
Profitability	-0.133***
	(-3.05)
Investment	-0.059***
	(-2.73)
Collateral	-0.026*
	(-1.89)
Size	-0.001***
	(-4.62)
Age	-0.001***
	(-5.05)
Vol	0.0001*
	(1.68)
GDP	-0.001*
	(1.74)
Observations	21,438
P − values of	
test statistics	
Wald	0.000
Anderson	0.005
Sargan	0.375

Notes: Marginal effects of endogenous probit models are reported. The dependent variable is a dummy equal to one if a firm fails in year t, and zero otherwise. Vol: is the exchange rate volatility calculated using a GARCH (1,1) model. Robust z-statistics are presented in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Also, see notes to Tables 1.

Table 6: Long term debt percent and firm survival

	Bond finance (1)	Asian crisis (2)	Global financial crisis (3)	Exchange rate vol (4)
Ltd	-0.112***	-0.104**	-0.082**	-0.039**
	(-2.90)	(-2.26)	(-2.40)	(-2.15)
Ltd*ASCD		0.229***		
		(2.68)		
ASCD		0.070***		
		(6.35)		
Ltd*GFCD			-0.057	
			(-1.14)	
GFCD			0.071***	
			(8.35)	
Ltd*Vol				0.098***
				(2.75)
Vol				0.0002***
				(9.38)
Leverage	0.148***	0.137***	0.142***	0.133***
	(5.26)	(4.57)	(6.12)	(4.75)
Profitability	-0.155***	-0.172***	-0.239***	-0.189***
	(-3.51)	(-3.90)	(-6.44)	(-4.30)
Investment	-0.043*	-0.041*	-0.004	-0.029*
	(-2.00)	(-1.72)	(-0.98)	(-1.87)
Collateral	-0.042**	-0.053***	-0.022*	-0.081*
	(-2.15)	(-3.26)	(-1.83)	(-1.81)
Size	-0.001***	-0.001***	-0.001***	-0.001***
	(-4.46)	(-4.38)	(-7.35)	(-4.05)
Age	-0.001***	-0.001***	-0.001***	0.0001
	(-4.22)	(-2.71)	(-2.89)	(1.12)
GDP	-0.001***	-0.001***	-0.0001***	-0.0001*
	(-6.96)	(8.05)	(-13.26)	(-1.91)
Observations	21,438	21,438	21,438	21,438
$P-values\ of$ $test\ statistics$				
Wald	0.005	0.012	0.000	0.001
Anderson	0.000	0.000	0.000	0.000
Sargan	0.385	0.631	0.225	0.289

Notes: Marginal effects of endogenous probit models are reported. The dependent variable is a dummy equal to one if a firm fails in year t, and zero otherwise. Robust z-statistics are presented in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Also, see notes to Table 1.