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Evidence on the External Finance Premium from the US and Emerging Asian Corporate Bond Markets

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Abstract

Empirical investigation of the external finance premium has been conducted on the margin between internal finance and bank borrowing or equities but little attention has been given to corporate bonds especially for the emerging Asian market. In this paper we hypothesize that balance sheet indicators of creditworthiness could affect the external finance premium for bonds as they do for premia in other markets. Using bond-specific and firm-specific data for the United States, Hong Kong, China, Korea and Thailand during 1995-2005 we find that firms with better financial health face lower external finance premia in all countries. When we introduce firm-level heterogeneity we show that financial variables appear to be both statistically and quantitatively more important in the Asian market than in the US. Finally, the premium is more sensitive to firm-level variables during credit crunches, recessions and sudden stops than other periods, with stronger effects for the Asian bond market.

Keywords: Financing Constraints, External Finance Premium, Emerging Asian Markets
JEL Classification: F32, F34, G32

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1. Introduction

The last decade has seen phenomenal growth in the theoretical and empirical investigation of corporate financial decisions through imperfect credit markets. The pathbreaking theoretical work of Jaffee and Russell (1976), Stiglitz and Weiss (1981) on asymmetric information has been extended by Bernanke et al. (1996, 1999) and Carlstrom and Fuerst (1997, 2001) to provide the canonical agency cost model of external borrowing from financial markets. The implication of this literature is that corporate financial structure will be affected by constraints arising from the availability and cost of external finance to firms, and will differ in relation to the observable characteristics used by lenders to determine their creditworthiness, see Gertler and Gilchrist (1993, 1994). Following an adverse shock, firms with poorer indicators of creditworthiness on their balance sheets will be more constrained than those that are considered creditworthy; the "flight to quality" by lenders, identified by Bernanke et al. (1996), underlies much of the dynamic adjustment observable in the macroeconomy due to the credit channel following an adverse shock. Furthermore, the experience of the US corporate bond market after the credit meltdown in 2001 and 2002 suggests that the financial system can generate an endogenous cycle (the accelerator) that propagates the initial shock over time c.f. Bernanke et al. (1996) and Kiyotaki and Moore (1997). Firms that are initially regarded as uncreditworthy and are refused external finance on this basis can find that their creditworthiness deteriorates further, putting future external finance out of reach.

Firms that are relatively constrained on the financial markets, will face higher agency costs of borrowing – a higher "external premium" – for raising capital from financial markets compared with the cost of internal finance funded from retained earnings as explained by Bernanke and Gertler (1995) with subsequent effects on real activity c.f Vermeulen (2002). The external finance premium is inversely related to the firms' balance sheet, i.e. net worth, and to macroeconomic conditions, creating a countercyclical movement in the premium for external funds, which serves to amplify borrower's spending and economic activity in the financial accelerator, see Bernanke et al. (1996). Extensions of the credit channel model to an open economy have been suggested by Aghion et al. (2001), Cespedes (2001) and Gertler et al. (2007), with particular reference to the implications of the currency crisis in Asia, and once again firm-level financial indicators are critical to ensure access to credit.

Much of the empirical investigation of the external finance premium has been conducted on the margin between internal finance and bank borrowing or on the margin for raising external finance through equity markets.[1] The majority of papers that consider the bond market in comparison with the equity market focus on developed countries.[2] As noted by Hale (2007a), relatively little attention has been

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[1] The bank borrowing literature includes papers by Kashyap et al. (1993); Bernanke and Gertler (1995); Bernanke et al. (1996). Equity premia are investigated by Lamont et al. (2001), Gomes et al. (2006), Campello and Chen (2005) and Whited and Wu (2006). This strand of literature is concerned with questions central to finance such as the nature of equity returns and risk pricing rather than the implications of the scale of the external finance premium for the financial accelerator as such. Among the papers in the finance literature Campello and Chen (2005) is something of an exception since they address risk pricing in equity and bond markets, but bond data is used in order to confirm findings for equity prices.

[2] Evidence for the euro area bond market in de Bondt (2004) examines the impact of macroeconomic and financial health indicators on the corporate bond spread finding evidence of a balance sheet channel that influences bond spreads. Campello and Chen (2005) report that bonds of financially constrained US firms in the Lehman Brothers Fixed Income Database command higher *ex ante* excess risk premia and these premia move countercyclically with economic and financial conditions. This result is also supported by Mody and Taylor (2004) who consider the movement of high yield bonds over government debt, i.e. the external finance premium, as a predictor for real economic activity. Levin et al. (2004) measures expected default risk and credit spreads on publicly-traded debt for US non-financial firms, finding that financial market frictions exhibit strong cyclical patterns.

devoted to the external finance premium on securities-based external finance in emerging markets, which is somewhat surprising given that bond financing appears to be equally important for both developed and emerging markets.[3]

A significant body of research has documented the potential benefits of greater capital flows on credit conditions for corporations in emerging markets. Chuhan et al. (1998) illustrate that during the 1990s there were substantial inflows of capital to East Asia in the form of portfolio flows (equity and bond flows) providing additional external finance at the country level[4] , and Harrison and McMillan (2003) and Harrison et al. (2004) show that FDI flows positively affected firm-level financing constraints as domestically-owned firms were demonstrably less dependent on internally generated funds to finance investment when FDI increased. While it is still the case that international syndicated bank loans provide the lion's share of funding from abroad, c.f. Eichengreen and Mody (1998), the inflow of other forms of capital, and the development of financial markets improves growth and investment in emerging countries (Demirguc-Kunt and Maksimovic (1998), Rajan and Zingales (1998), and Love (2003)). However, these benefits have been hindered to a degree by two factors: the relative underdevelopment of financial markets, particularly bond markets in East Asia, and the sensitivity of capital to macroeconomic shocks and the jumps in associated premia e.g. 1997 Asian crisis.

BIS (2005) discusses the limitations that a small domestic bond market imposes on the East Asian economies, with an evaluation of the prospects for future development. It is optimistic that larger bond markets will emerge as firms became larger and seek unsecured, longer-dated financial arrangements that improve corporate credit structure, competition and growth; in general, financial liberalization and globalization of finance are expected to bring domestic financial market development (c.f Shaw (1973), Stultz (1999), Henry (2000), Stiglitz (2000) and Kaminsky and Schmukler (2002)). However, at present Eichengreen et al. (2006) show, using data on individual corporate bonds issued on both domestic and foreign markets in Asia and Latin America, that while Asian bond markets are larger and better capitalized, and the maturity of Asian bonds is longer than Latin American markets, Latin American bond markets are more liquid by most measures, and they have had more success in attracting foreign investor participation. Both markets are relatively underdeveloped, but initiatives such as the Pan Asian Bond Index Fund (PAIF), the Fund of Bond Funds (FoBF) and the Asian Bond Market Initiative (ABMI) proposal brought by the ASEAN+3 Finance Ministers are already resulting in a deeper sovereign bond market and a number of initiatives to create a more integrated regional bond markets for corporate as well as sovereign bonds. In this paper and Eichengreen et al. (2006) we make reference to international placements, which necessarily excludes placements in local currency. The main reason to consider international placements only is that bonds denominated in hard currencies avoid distortions to premia arising from currency risk. A potential downside of considering only international placements is that we do not capture the full picture on Asian emerging markets since fewer corporates can issue bonds denominated in hard currency, but, we believe it is essential to avoid the distortion that currency risk introduces if we are to make a fair comparison with US bond issues, see Domowitz et al. (1998).

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3 The evidence that exists is mainly used to investigate *equity* premia not bond market premia.

4 We note that the focus of this study is on equity and bond flows to nine Latin American countries and nine Asian countries recorded in the *US Treasury's International Capital Reports* (TIC) data for portfolio flows. The authors state that the data are aggregated by type of capital flow e.g bonds (corporates), equities and US government bonds (p.446) but in reality the corporate bonds are likely to be a small component, and our interest in the paper lies in the comparison between their equity flow results and our corporate bond findings.

Capital flows have been noted as a consequence of macroeconomic and firm-level weakness following the work of Calvo (1998). Hale (2007a) shows that macroeconomic conditions have a large influence on the composition of bond versus loan finance in emerging markets, and particularly so for corporate borrowers in contrast to sovereigns. Following a capital outflow Arteta and Hale (in press) show a direct influence on corporate borrowing sector-by-sector, and particularly when sovereign debt renegotiations ensue.

In this paper we ask whether and how international currency denominated bonds in Asian markets differ from the much larger and more developed US market, particularly in the relationship between the spread of corporate and government bond yields and firm-specific characteristics. This is therefore a firm-level study of the response of premia in emerging and developed bond markets that takes full account of the heterogeneity of firms, as previous studies have done when considering the external finance premium for bank loans, and the influence of adverse credit supply shocks. Two figures illustrate the relevance of these points to the understanding of bond market premia.

Figure 1 shows the average credit spread between corporate and government bonds of the same maturity issued by US and Asian firms in their respective bond markets. The most notable feature of the figures, one for the US and the other for emerging Asia, is the sharp response to adverse economic events. Thus the increase in the spread at the onset of the US recession/credit crunch and the 1997-98 Asian crisis can be easily observed. During this period the average credit spread widened for both countries, but substantially more so for Asian firms since the spread was up to 25 times higher than the corresponding US bond spread. While the average spread increased during the crisis it is also clear that in the financial turbulence that followed during the Brazilian crisis in 1998 and the Russian default in 1999, it remained at elevated levels before returning to pre-crisis values until 2004. Likewise, although much smaller in scale, the US spread was persistently above the pre-crunch/recession level until 2004.

Figure 2 tells another story. It illustrates the variation in corporate spreads over time across firms in our sample, broken down by percentiles. The variation in the spreads in the US was similar irrespective of whether the firm was in the 70th, 50th or 30th percentile of the distribution with respect to the spreads. For Asian firms, the deviation was substantial, and firms in the 70th percentile of the distribution faced much higher spreads than those in the 50th or 30th percentiles. For the firms with median and lower tail there was little variation over time in the spreads, but for firms in the 70th percentile, spreads increased by up to 100 percent during and after the crisis. This serves to illustrate the heterogeneity in the spreads.

We add to the literature in two important ways to give greater information on these points. First, we compare how the external premium responds to firm-level balance sheet information to explore the degree of heterogeneity between firms on the basis of creditworthiness. We do this for firms in the US and emerging Asian bond markets, recognizing that on average East Asian firms operating in Hong Kong, China, Korea and Thailand are smaller, predominantly bank financed and have lower coverage ratios which may mean a higher proportion are likely to be financially constrained in some financial markets, see Harrison et al. (2004). We explicitly recognize that some firms are relatively more constrained and this is likely to be a critical determinant of their external finance premium and its response to firm-level indicators of creditworthiness. However, the categorization of firms into constrained and unconstrained categories is controversial (c.f. discussion in Fazzari et al. (1988, 2000), Kaplan and

Zingales (1997, 2000), Cleary (1999) among others). Therefore in a separate table of results we use three different selection criteria to identify constrained and unconstrained firms following Fazzari et al. (1988, 2000), Gertler and Gilchrist (1994), Carpenter et al. (1994), Kaplan and Zingales (1997, 2000) and Holod and Peek (2007) to avoid mistaken conclusions on the basis of only one classification scheme. Finally, we incorporate firms with both investment grade and speculative grade ratings, where previous studies mainly restricted their attention to investment grade bonds, neglecting the effects of the high yield bonds. This is particularly beneficial since firms with high yield bond issues are more likely to be characterized by adverse financial attributes and weak balance sheets, allowing us to investigate the external finance premium for firms more likely to be financially constrained.

Second, we examine the excess sensitivity of the premium to financial variables in the 2001-02 recession/credit crunch episode for US firms, and during the 1997-98 crisis for the Asian firms. These two major episodes within our sample both brought about the shortage of credit on the supply side. Kwan (2002) documents that commercial paper and bank loans declined considerably in relation to previous years in the US, and the recession that followed in 2001 also appears to have had a noticeable effect on access to credit for US firms.[5] In emerging economies Eichengreen et al. (2001) shows this resulted in a sustained rise in bond spreads after the first half of 1997, and a persistent drop in volumes.

The rest of the paper is organized as follows. Section two offers a brief summary of the theoretical basis for the external finance premium, section three discusses the data, the methodology for determining financially constrained firms and downturns, and the estimation technology. Sections four and five present the empirical evidence and report some robustness checks. Section six concludes.

2. Theoretical Background

The influential paper by Bernanke et al. (1999) (BGG, hereafter) provides the theoretical basis for our paper. The BGG model incorporates the costly-state verification (CSV) debt contracting problem into an otherwise standard dynamic new Keynesian general equilibrium model. In the model there are three agents: households, entrepreneurs, and retailers. Entrepreneurs, who are assumed to be risk-neutral and have finite horizons, acquire physical capital K at a price Q at the end of period t, for use in production in period t+1. At the end of period t entrepreneur j has available net worth N_{t+1}^{j} and finances capital with internal funds supplemented by external borrowing from a financial intermediary.

$$B_{t+1}^{j} = Q_t K_{t+1}^{j} - N_{t+1}^{j} \tag{2.1}$$

Ex ante, the expected revenue from the investment project is given by $R_{t+1}^{k} Q_t K_{t+1}^{j}$, where R_{t+1}^{k} is the aggregate gross rate of return on capital investment. The realized revenue in the next period is given by $\omega^{j} R_{t+1}^{k} Q_t K_{t+1}^{j}$, where ω^{j} is a productivity disturbance which is i.i.d. across firms and time.

[5] There is evidence that real variables such as investment and inventory activity responded to the availability of cash flow during this period, since the literature shows significantly different coefficient values for low growth and high growth (Gertler and Gilchrist (1994)), and for credit crunch and non-credit crunch years (Kashyap et al. (1993)). As Vermeulen (2002) notes, citing Gertler and Gilchrist (1993, 1994), the effects of financial constraints and downturns are more likely to affect small firms than large firms and indeed firms that are weaker on other criteria c.f Bougheas et al. (2006).

Adopting the CSV approach, an agency problem arises because intermediaries cannot observe ω^j and need to pay an auditing cost if they wish to observe the outcome. The financial contract is a standard debt contract including the following bankruptcy clause:

If $\omega^j \geq \bar{\omega}^j$ the entrepreneur pays off the loan in full from revenues and keeps the residual. The lender receives $\bar{\omega}^j R^k_{t+1} Q_t K^j_{t+1} = Z^j_{t+1} B^j_{t+1}$, where Z^j_{t+1} is the non-default loan rate.

If $\omega^j < \bar{\omega}^j$ the firm defaults on its loan. The lender pays an auditing cost μ and receives what is found, namely $(1-\mu)\bar{\omega}^j R^k_{t+1} Q_t K^j_{t+1}$. A defaulting entrepreneur receives nothing.

It is reasonable to assume that the lender will issue the loan only if the expected gross return to the entrepreneur equals the lender's opportunity cost of lending. Because the loan risk is perfectly diversifiable, the relevant opportunity cost to the lender is the riskless rate R_{t+1}. Consequently, the lender's expected return is a function of $\bar{\omega}^j$, the default trigger. Higher levels of $\bar{\omega}^j$ raise the non-default pay off to the lender, but also raise the probability of default $(F(\bar{\omega}))$.

The BGG model is concerned with the entrepreneur's problem of demand for capital. In this model the cost of finance depends on the financial health of firms and is negatively associated with the level of internal funds (net worth, N_{t+1}) relative to total financing requirements. Let $s = E[\frac{R^k_{t+1}}{R}]$ be expected discounted return on capital.[6] Then

$$E_t[R^k_{t+1}] = s[\frac{N_t}{Q_t K_{t+1}}]R_{t+1} \tag{2.2}$$

The above equation shows how the firm's return on capital depends inversely on the share of the firm's capital investment financed by its own net worth. If the firm can self finance its investment projects, there is no need for external financing and the equilibrium return to capital is equal to the risk-free rate. In this case the external finance premium is zero. Similarly, if the firm needs to borrow, the required return on capital will be higher reflecting expected agency costs faced by the financial intermediary, and the premium will reflect this. Thus, the initial financial position of the entrepreneur becomes a key determinant of the cost of external finance.

The role of the financial accelerator mechanism in the model can be seen from the equation below and from the definition of aggregate entrepreneurial net worth:

$$N_{t+1} = \gamma V_{t+1} + W^e_{t+1} \tag{2.3}$$

BGG assume that entrepreneurs supplement their income by working in the general labor market. Equation (2.3) indicates that the aggregate net worth is the sum of the entrepreneurial equity (V_{t+1}) and the entrepreneurial wage W^e_{t+1}. Entrepreneurial equity equals earnings from capital employed from t to t+1 minus the loan repayment.

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6 As BGG suggest, the ratio of the cost of finance to the risk-free rate may be equally well interpreted as the external finance premium.

$$V_{t+1} = R^k_{t+1} Q_t K_{t+1} - (R_{t+1} + EFP_t)(Q_t K_{t+1} - N_t) \tag{2.4}$$

with

$$EFP_t = \frac{\mu \int_0^{\bar{\omega}} \omega R^k_{t+1} Q_t K_{t+1} dF(\omega)}{Q_t K_{t+1} - N_t} \tag{2.5}$$

where EFP_t is the ratio of default costs to the amount borrowed and reflects the premium for external finance.

Equation (2.4) shows that net worth would be affected by unexpected changes in the return on capital, changes in the price of capital, in leverage and in default costs. These changes in net worth will in turn affect the spread between the contractual rate on a loan or bond and the risk-free rate. For a highly leveraged firm, a shock to project returns will have a higher impact on internal funds (and finance premia) compared to a firm that has low leverage. To the extent that a borrower's net worth is procyclical, the external finance premium will be countercyclical enhancing swings in borrowing and fluctuations of macroeconomic variables will be magnified and propagated through the economy. The model therefore provides theoretical grounding for the intuition that firms with worse balance sheets tend to face higher external finance premia and tend to be more vulnerable to adverse economic shocks.

3. Data, Classification Methodologies, and Estimation Method

3.1 Data

The data for this paper are drawn from several sources, including Bondware, Bloomberg, Datastream and Thomson Financial Primark.

We use Bondware to identify all corporate bonds issued in international markets. This database contains information about the issue dates, denomination, currency and the maturity in the bonds measured. We are also able to identify the type of the coupon (i.e. zero coupon, fixed and floating). All bonds issued in hard currency in China, Hong Kong, Korea and Thailand were included in the sample.

We use Bloomberg to match all bonds issued internationally with the corresponding bond yields for the period 1995 to 2005. Bloomberg also contains data on the duration of each bond issue and its market value. The matching of the bonds with corporate yield was made feasible using bond tickers. For the US sample we rely on Datastream to record the annual average of daily observations on bond yields for the period 1995 to 2005. The analysis includes the universe of domestic corporate US dollar denominated bonds with Datastream coverage. Our data contains the benchmark Treasury yields from Datastream for maturities of 3, 5, 7, 10, and 30 years. For each corporate bond that matures at time t, a government bond that has the same maturity is used to provide the risk-free rate, and in those cases where there is no corresponding government bond, the equivalent government bond is constructed and its yield estimated using a simple linear interpolation method. For the Asian data we focus only on firms with bond issues in hard currencies and in particular dollar denominated bonds. This will help us to avoid any

currency risk which is associated with sovereign bonds and will make our results comparable with the US sample (following Chuhan et al. (1998), Durbin and Ng (2005) and Peter and Grandes (2005) as examples of best practice).[7]

Balance sheet data for firms in Hong Kong, China, Korea and Thailand were taken from the Thomson Financial Primark database.[8] For the US we have linked market prices of their outstanding securities to Datastream's balance sheet statements. Following normal selection criteria used in the literature, we excluded companies that did not have complete records on our explanatory variables and firm-years with negative sales and profits. To control for the potential influence of outliers, we excluded observations in the 0.5 percent from upper and lower tails of the distribution of the regression variables.

Our combined sample contains data for 2729 bonds issued by 652 US firms and 149 bonds issued by 58 Asian firms that actively traded between 1995 and 2005 in a variety of sectors including manufacturing, utilities, resources, services and financials.[9] The panel has an unbalanced structure with the number of observations on each firm varying between three and eleven. Our sample presents two characteristics that make it especially appealing for our analysis. It includes firms with investment grade and high yield bonds, and this is helpful since firms with high yield bond issues are more likely to be characterized by adverse financial attributes and weak balance sheet. The sample also spans a wide range of sectors of the US and Asian economies. This is useful since Bernanke et al. (1996) suggested the importance of financially constrained firms is generally greater in sectors other than manufacturing.

Our dependent variable measures the external finance premium on corporate bonds using the spread between corporate bond yields and Treasury bond yields. To calculate an overall firm-specific corporate bond yield, we averaged the yields on the firm's outstanding bonds, using the product of market values of bonds and their effective durations as weights.[10] Thus,

$$YTM^{corp} = \frac{\sum_{i=1}^{N} y_i P_i D_i}{\sum_{i=1}^{N} P_i D_i} \tag{3.1}$$

where y_i is the yield to maturity on the ith bond, P_i and D_i are the market value and the duration of the ith bond respectively. The credit spread is the difference between yield to maturity for corporate and government bonds:

$$SPREAD = YTM_{t,T}^{corp} - YTM_{t,T}^{gov} \tag{3.2}$$

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7 For example, given a dollar-denominated Korean bond maturing in 10 years, we compute the corporate spread by subtracting the yield on a 10-year US Treasury bond.

8 We are grateful to the Hong Kong Institute for Monetary Research for providing the data for the Asian project.

9 Our sample includes both non-financial and financial firms. However, non-financial firms dominate in our dataset; for example, only 23% of the observations in the US sample correspond to financials, insurance, investment and real estate firms.

10 See Choi and Park (2002) for details on the approximation of a bond portfolio yield.

where $YTM_{t,T}^{corp}$ represents the yield to maturity at time t of a corporate bond that matures at time T and $YTM_{t,T}^{gov}$ the yield to maturity of a government bond with the same maturity. The plots of the average spread and the percentiles of the distribution are provided in Figures 1 and 2.

The indicators of firms' balance sheets are a central issue in this study and therefore we consider a set of financial variables previously employed in empirical studies. We introduce leverage (LEV) defined as total debt over total assets, as a measure of firms' indebtness. Vermeulen (2002) and Bougheas et al. (2006) argue that the higher the leverage, the weaker the balance sheet. We also include a profitability ratio (PROF), defined as earnings before interest and taxes relative to total assets, to measure a firm's ability to generate revenue. More profitable firms have a greater cushion for servicing debt and should pay lower spreads on their loans. Therefore we expect a negative relationship between this ratio and the external finance premium. Finally, in our study we seek to control for idiosyncratic probability of bankruptcy by including Z-scores. The Z-score (ZSCORE) measures the number of standard deviations below the mean by which profits would have to fall in order to eliminate the firm's equity. Hence it is an indicator of bankruptcy risk. Following Hale and Santos (in press), we calculate the Z-score as follows:

$$Z = \frac{1}{S_r}[\frac{1}{n}\sum_{j=1}^{n}\frac{2\tilde{\pi_j}}{A_j + A_{j-1}} + \frac{1}{n}\sum_{j=1}^{n}\frac{E_j + E_{j-1}}{A_j + A_{j-1}}] \tag{3.3}$$

where A is the firm's assets, E is its equity, $\tilde{\pi}$ is its profits and S_r is the estimated standard deviation of r, the firms' return on assets.[11] The higher the Z-score the lower the firm's risk, so we expect this variable to have a negative effect on the bond spread. Table 1 provides summary statistics of the variables used in our study. As expected, we observe that US firms are less leveraged, more profitable, less risky and have substantially lower credit spreads compared to Asian firms. These preliminary statistics show that US firms have healthier balance sheets compared to Asian firms. We now turn to the question of how to classify financially constrained versus unconstrained firms and recessions/credit crunches.

3.2 Classification Schemes

A large literature has considered the impact of financial constraints on investment in fixed capital, inventory investment, and employment and R&D activities (see Bond and Reenen (2006)). However, the nature of the results is somewhat dependent on the categorization process determining whether firms are financially "constrained" or "unconstrained" (see, e.g, Fazzari et al. (1988, 2000), Kaplan and Zingales (1997, 2000) and the discussion in Cleary (1999) and Holod and Peek (2007)). The scholarly literature has not settled on a particular strategy to identify financially "constrained" and "unconstrained" firms empirically, but the classification scheme can be critically important for the conclusions of these studies. Therefore, in this paper we use three different measures of financial constraints to ensure the robustness of our results, these are size, bank dependency and creditworthiness.

[11] We set n= 2 and lag the variables one year. The volatility of earnings growth S_r is computed using data for the five years preceding the sample, scaled by average assets for that period.

Size was employed as a criterion by Bougheas et al. (2006) and Greenaway et al. (2007) and is the key proxy for capital market access by manufacturing firms in Gertler and Gilchrist (1994) because small firms are more vulnerable to capital market imperfections and thus more likely to be financially constrained. Bank dependency, as measured by the ratio of short-term debt over total debt, has been used by Kashyap et al. (1993) because it is argued the more bank-dependent a firm is, the more likely it is to be affected by a tightening in monetary policy via the bank lending and balance sheet channels. Finally, we use the firm's coverage ratio, measured as earnings before interest and taxes over total debt, as a financial sample separation criterion. Interest coverage was used by Gertler and Gilchrist (1994) as an indicator of the extent to which financial constraints drive differences in inventory investment. We report results using all four classification schemes. We use a 30 percent cut-off point in keeping with the normal practice in the literature.[12] We also allow firms to transit between firm classes.[13]

3.3 Recession and Credit Crunch

We specify a time-period dummy variable to indicate that the firms faced recession, credit crunch or Asian crisis. Focusing on the US, the identification of downturns and out-of-downturns follows the Business Cycle Dating Committee of the National Bureau of Economic Research which determined that a trough in business activity occurred in the US economy in November 2001. The trough marked the end of the recession that began in March 2001 and the beginning of an expansion.[14] The credit crunch, when some firms were excluded from gaining access to credit lasted from 2001-2002, and was closely associated with the recession (Kwan (2002)). During the years 2001-2002 bad debts increased on bank loans, commercial paper issuance fell and default rates in the US bond market associated with most rating categories were at post-war highs. Similarly, for the Asian economies we specify a crisis dummy to capture the fact that the second half of 1997 saw the unprecedented collapse of the stock markets and currencies of five Asian countries – Thailand, Indonesia, Malaysia, the Philippines and South Korea with secondary effects through the rest of Asia. There is sharp evidence that this influenced adversely the ability of firms to access credit on the market.

3.4 Panel Estimation Technology

We employ panel data methods to test the hypothesis that firms with different characteristics face different external finance premia in the bond markets. Consider a standard static linear model of the following form:

$$y_{it} = X_{it}\beta + \lambda_t + \eta_i + \epsilon_{it} \tag{3.4}$$

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[12] Campello and Chen (2005) rank the sampled firms into constrained and unconstrained using 30 percent and 70 percent cut-off points respectively from the Fama-French portfolios.

[13] For this reason, our empirical analysis will focus on firm-years rather than simply firms. See Kaplan and Zingales (1997) and Greenaway et al. (2007) for a similar approach.

[14] For more details see the latest report of the Business Cycle Dating Committee of the National Bureau of Economic Research. July 17, 2003.

where i = 1,2,. . . , N refers to a cross section of units (firms in this study), t = 1,2,. . . , T refers to time period, and denote respectively the dependent variable and the vector of non-stochastic explanatory variables for the firm i and year t. λ_t represents firm-invariant time-specific effects, η_i is the time invariant unobservable firm specific effects and ϵ_{it} are the disturbance terms that vary with time and across firms. To control for cyclical factors originating from the business cycle we include time dummies in our regressions, we also incorporate country dummies to control for any country-based institutional differences.

Equation (3.4) confronts us with some econometric issues regarding the most appropriate estimation method.[15] Specifically, if the set of our explanatory variables is assumed to be strictly exogenous then the only problem with ordinary least squares (OLS) estimation is the presence of the firm-specific effects η_i. If these firm-specific effects are uncorrelated with X_{it} then the random effects estimator is unbiased and efficient. If on the other hand, the firm-specific effects are correlated with X_{it} but remain strictly exogenous then the random effects estimator will be biased, but the within-groups estimator will be unbiased. Finally, if we consider our explanatory variables to be endogenous, we will require an instrumental variable estimator to instrument variables that are correlated with the error term. In adopting the most appropriate econometric strategy we choose to apply static panel data estimators. The choice of a static instead of a dynamic approach is motivated by two important considerations. First, the Asian crisis occurs close to the beginning of our sample, and thus the dynamic GMM-procedure poses a problem for our study since the requirement for instruments and the use of first differences and lags of dependent variable would lead to a considerable loss of observations, including the recession period. This would substantially undermine the asymmetric effects of the financial accelerator, which are vitally important for this study. Second, our sample is relatively short and when applying dynamic panel data estimators to short samples one might be confronted with severe bias in the estimates. In short samples Mulkay et al. (2000) point out that static estimation procedure provides more precise estimates.[16]

Given that our sample is drawn from a large population it is more likely that firm-specific terms are distributed randomly across cross-section units, and therefore uncorrelated with X_{it} variables, thus we take a random effects approach to control for unobserved heterogeneity.[17] This choice is formally justified by using both the Hausman and Breusch Pagan Langrangian Multiplier tests. We report these tests at the foot of the tables of results. In all cases the Hausmann test does not reject the null of no correlation between the regressors and the individual effects, and the LM test rejects the null that the individual effect is zero.

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15 We would like to thank Steve Bond for his comments on the econometric modeling strategy adopted in this paper.

16 Nevertheless, when we applied a static GMM procedure to the US sample and we found that the results were very similar to the random effects estimates (results are available from the authors upon request). We conclude therefore that the extent of endogeneity is very limited in our sample.

17 Note that the above assumption closely relates to our decision on whether the sample can be considered as part of a larger population since we consider only firms that issue bonds not the universe of US and Asian firms. All estimations were carried out in STATA 10.

4. Results

In this section we report econometric estimates of the random effects model. We use interaction terms for the estimations to identify the asymmetric effects of the financial accelerator.[18] Unless otherwise specified the columns of each Table indicate the estimation results for different firm-years according to size (SIZE, column 1), bank dependency (BANK, column 2) and creditworthiness (COV, column 3).

4.1 External Finance Premium and Firm-specific Characteristics

An important assumption of the financial accelerator theory is that borrowers' net worth is inversely associated with the external finance premium and that firms with weak balance sheets are likely to be more vulnerable to real or economic shocks. Heterogeneity of firm characteristics is a fundamental feature of the relationship between the external premium and balance sheet variables. It has been noted by Vermeulen (2002), that "weak balance sheet" is a vague term that needs to be operationalized, and in this section we test whether an inverse relationship between balance sheet indicators and external finance premium holds for firms in the US and Asian bond market using two balance sheet indicators namely the leverage ratio (LEV) and the profitability ratio (PROF). In addition to the balance sheet indicators, we also include the Z-score as an indicator of the perceived risk of the firm. Initially, we estimate the empirical model without distinguishing between constrained and unconstrained firms.

Table 2 reports the estimates for the baseline model. The results, show that firms with high LEV face a higher external finance premium compared to those with low leverage. PROF has negative coefficients showing that the greater the profitability of the firms the lower the external premium. Finally, the Z-score variable has a negative coefficient implying that firms with high Z-score and therefore with lower bankruptcy risk, face a smaller premium. We conclude from the similarity of the sign and significance of balance sheet variables for the US and Asian firms that firms' financial health is important for the external finance premium irrespective of the degree of financial market development. The estimated coefficients on the balance sheet variables measure the average effect over all sectors, all size classes and all years with the correct sign as predicted by the financial accelerator theory, and suggest that balance sheet characteristics and the risk of bankruptcy are highly significant determinants of the bond market external finance premium. This confirms that there is a negative association between the external finance premium in the bond market and the firm's financial health.

[18] Using interaction terms allows us to avoid problems of endogenous variable selection; to gain degrees of freedom; and to take into account that firms can transit between groups. See Kaplan and Zingales (1997), Greenaway et al. (2007), and Vermeulen (2002) for a similar approach.

4.2 The Financial Accelerator and Financial Constraints

We now consider the impact of financial constraints on the response to balance sheet characteristics in Table 3. We use three different categorization methods for determining whether a firm is constrained or unconstrained based on size, bank dependency and creditworthiness. Our results are remarkably consistent across these categories and document an 'excess sensitivity' of financial variables for constrained Asian firms but not for their US counterparts. The upshot is that for firms with similar characteristics the premium is higher in Asia compared to the US.[19]

We observe that in the US, LEV has estimated coefficients that are positive and significant at the one percent level for both types of firms in all three categories, but the coefficients for constrained and unconstrained firms are not significantly different from each other. We conclude that the external finance premium in the US bond market rises for all types of firms with higher leverage. However, a completely different picture emerges for the Asian model. Specifically, we find that the leverage is highly significant only for firms which face binding financing constraints, while the point estimates for unconstrained firms are insignificant and quantitatively unimportant. This result implies that leverage is more acute for constrained Asian firms lending support to the financing constraints story.

Profitability measure, PROF, has a negative coefficient as predicted by the financial accelerator theory for all types of firms in the US and Asia. In absolute value the coefficients on profitability are higher for unconstrained firms but not statistically different from each other when we compare constrained and unconstrained firms in the US. For the Asian sample of firms we find significant differences between constrained and unconstrained firms. In fact, we report negative coefficients which are significant at the one percent level for constrained firms but the coefficients are insignificant for their unconstrained counterparts.

The risk of default, as measured by the Z-SCORE, is found to be significant for both types of firms but is not statistically different between constrained and unconstrained firms in the US. This finding lends support to the fact that the risk of bankruptcy is an important determinant of the external finance premium in the bond market and higher probabilities of default are associated with higher premia. For the Asian sample, Z-SCORE is always negative but significant only for firms that face binding financing constraints. We interpret this finding as a further evidence of the excess sensitivity story.

We conclude that our results show the external finance premium for the Asian bond market exhibits greater sensitivity to firm characteristics for those firms that are financially constrained than similarly defined firms in the US market. The external premium for bank loans moves countercyclically with balance sheet characteristics and the monetary policy stance, and is more sensitive for firms that are financially constrained as reported by Fazzari et al. (1988, 2000), Gertler and Gilchrist (1994), Kaplan and Zingales (1997, 2000) and Bougheas et al. (2006). We find similar results for the external premium on corporate bonds: the premium is more sensitive to balance sheet characteristics for constrained firms but this is dependent on the financial system under scrutiny.

[19] We make comparison with the US because it has a deep, liquid bond market in a highly market-oriented financial system – therefore it is a benchmark in the sense that it has a well functioning bond market with (presumably) fair-priced premia for firms with given characteristics issuing corporate bonds.

Two main implications can be highlighted from our results. First, balance sheet indicators appear to be very important in determining the credit spread both in the US and in Asia. Second, the impact of firm-specific characteristics on the external premium for corporate bonds differs for constrained and unconstrained firms when we consider the Asian sample, but not for the US sample. These results confirm that the balance sheet channel is operative through the bond market, supporting earlier evidence from the US and Europe in de Bondt (2004), Levin et al. (2004) and Campello and Chen (2005), but there is further evidence on the implications of the bond market underdevelopment in Asia. For example, Eichengreen and Luengnaruemitchai (2004), Eichengreen et al. (2006) and Hale (2007b) suggest that in East Asia the process of bond market development remains slow despite their attempts to harmonize the regulations and create an integrated regional bond market.[20] In this paper, we document for the first time that capital market imperfections play a significant role in the Asian debt finance in contrast to the US bond market where there is not evidence of a significantly different response to balance sheet characteristics for financially constrained firms. We argue that the greater sensitivity results from the greater information asymmetries in Asia between firms and the "arms-length" potential buyers of bonds, and this results to some degree from the smaller and less efficient operation of the bond market in the Asian region.[21] We suggest therefore that the underdevelopment in the Asian markets magnifies the impact of financial factors.

4.3 Responses to the Recession, Credit Crunch and Asian Crisis

To explore the response to firm-specific characteristics when the firms faced a recession/credit crunch we interact the explanatory variables with a recession/credit crunch dummy, D. Previous evidence suggests that there is significant difference in the response of real variables in periods of recession versus non-recession (c.f. Gertler and Gilchrist (1994), Vermeulen (2002) and Mody and Taylor (2004)). There is anecdotal evidence in Kwan (2002) that the credit crunch of 2001-2002 also influenced access to commercial paper and bank finance. As far as we are aware a comparison of the recession/credit crunch and the Asian crisis has not been explored for bond finance, and this section addresses this issue by examining the sensitivity of the external premium to balance sheet variables in the 2001-02 recession/credit crunch episode versus other times for the US firms, and for the 1997-98 crisis for the Asian firms. In other words, if the response in Asia is greater than in the US for constrained firms, this may be seen as another indication of severe information asymmetries. It is likely that greater asymmetries in the market can magnify the effects of financing constraints. Table 4 reports coefficients on variables interacted with the dummy variable D (recession/credit crunch) and interacted with 1-D (out of recession/credit crunch) for constrained and unconstrained firms.

Our results in Table 4 give a clear indication that there is a significantly different response in recessions/credit crunches with respect to financial variables in Asia but not in the US. Taking the US bond market, when the recession/credit crunch dummy is interacted with constrained and unconstrained

[20] It is a reasonable hypothesis to suggest that bond market development even if it is largely confined to the public sector debt market could be a spur to corporate bond issues. Lejot et al. (2008) make similar arguments.

[21] It should be noted that there is a range of financial development in Asia, and certainly Hong Kong is well developed compared to the other Asian countries in our paper. Nevertheless, there is some recognition in the region that the bond market is relatively underdeveloped and that corporate finance is primarily bank based, or for larger firms, equity based.

firms we are unable to observe any significant difference between recessions and out of recessions periods. On the other hand, when we look at the Asian case, we find that there is greater sensitivity to LEV, PROF and ZSCORE for constrained firms during the Asian crisis but insignificant results for other periods. In addition, our results show that where there is a significant difference in the response for constrained versus unconstrained firms the external finance premium is more sensitive to LEV, PROF and ZSCORE for constrained firms in the recession/credit crunch confirming earlier results in Table 3. This can be seen from the significant coefficients where the sudden stop dummy, D, is included in the interaction terms in Table 4. We conclude that the 1997-98 crisis had a considerable impact through the balance sheet on external finance premia in the Asian bond market, and could have operated alongside other channels to influence real variables.

5. Robustness

We have subjected our model to some degree of robustness testing already by using three different measures of financial constraint, which results in findings that are very similar for all three measures. In this section we provide a robustness analysis of our results by considering the potential selection bias problem.

5.1 Panel Attrition and Selectivity Bias

One feature of our data that could influence biases and inconsistencies in the regression estimates is its unbalanced structure since the number of observations on each firm varies between three and eleven. In this paper we perform an Added-Variable procedure (or Quasi- Hausman test) as suggested by Verbeek and Nijman (1992) by constructing an artificial variable that tests for attrition bias. The results for the balance sheet indicators and credit spread are shown in Table 5.

We re-estimate our specifications with the random effects method including the artificial variable, Attrition, which takes a value of unity if the firm is observed for the full sample, and zero otherwise.[22] Under the null-hypothesis of non-selective response in our panel structure, the estimated coefficient for the Attrition is statistically insignificant and thus the estimated model is appropriate. Under the alternative hypothesis of sample selectivity, however, the coefficient is non-zero and static panel data models yield biased and inconsistent estimation results. The estimated coefficient of the attrition variable is negative but statistically insignificant in all the specifications (both the US and Asian) suggesting that our findings are not affected by biases resulting from endogenous panel data attrition. Additionally, the coefficients on the other variables are largely similar to those obtained in Table 3. We therefore conclude that this exercise confirms that sample selection is unlikely to introduce strong biases in our estimated coefficients.

[22] We define an indicator variable $response_{it}$ such as $response_{it} = 1$ if (y_{it}, x_{it}) is observed and 0 otherwise. Next, we construct the attrition variable as $attrition_i = \sum_{t=1}^{T} response_{it}$, indicating the total number of periods the $i\text{th}$ individual is observed, and include $attrition_i$ as additional regressor in our random effects model.

6. Conclusion

The external finance premium, as measured by the difference between the cost of internal and external funds, plays a key role in models of the financial accelerator. The vast majority of empirical studies on the external finance premium have focused on the margin between internal finance and bank borrowing or equities and relatively little attention has been given to corporate bonds. Even fewer have considered the differences between emerging market and developed country bond market premia. Our results based on data for the US and Asian bond markets during the period 1995-2005 suggest that firms with better financial health, as measured by balance sheet indicators, face a lower external finance premium. After separating firms into constrained and unconstrained categories using three different classification schemes we find firms that are credit constrained have higher premia than unconstrained firms in the Asian market, but similarly defined firms in the US show no significant differences. This implies that the premium on bond finance is higher in Asian markets for these types of firms, reflecting the risk characteristics associated with firms that are financially constrained. When we compare the effects of the recession/credit crunch episode in 2001-02 for the US firms and the Asian crisis in the 1997-98 for Asian firms, we find that the sensitivity of the premium is greater for constrained firms during the Asian crisis compared to other times, but there is no difference in the sensitivity of the premium for US firms in the recession/credit crunch. We conclude that the Asian crisis had a profound influence on the premium in the Asian bond market, which may also have been influential over the path of real variables. Our results complement recent studies (see Hirose et al. (2004); McCauley and Remolona (2004); Eichengreen and Luengnaruemitchai (2004) and Eichengreen et al. (2006)). We provide new evidence on the pervasive effects of firm-level heterogeneity, financing constraints and capital shortages on the external finance premium in the Asian bond markets.

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Table 1. Summary Statistics

Variable	Mean	St.Dev.	N
US			
$SPREAD_{it}$	1.21	1.89	2794
LEV_{it}	28.94	17.38	6693
$PROF_{it}$	8.46	7.12	6587
$ZSCORE_{it}$	39.7	2.00	5358
ASIA			
$SPREAD_{it}$	15.02	47.12	215
LEV_{it}	35.57	20.40	514
$PROF_{it}$	5.59	9.82	514
$ZSCORE_{it}$	39.6	3.02	396

Notes: The subscript i indexes firms, and the subscript t, time, where t = 1995-2005. $SPREAD_{it}$: The difference between corporate bond yields and government bond yields of the same maturity. LEV_{it}: Total debt to total assets. $PROF_{it}$: Earnings before interest and taxes relative to total assets. $ZSCORE_{it}$: An indicator of bankruptcy risk constructed along the lines of Hale and Santos (in press). See page 7 for the definition of $ZSCORE$ we use.

Table 2. The Baseline Model

	US	Asia
LEV_{it}	0.012***	0.230*
	(2.68)	(1.84)
$PROF_{it}$	-0.028***	-0.700***
	(-3.96)	(-3.09)
$ZSCORE_{it}$	-0.115***	-0.018*
	(-2.67)	(-1.81)
Constant	1.457***	22.010
	(4.23)	(1.10)
R^2	0.12	0.21
Hausman	3.49	1.70
LM	706.46***	119.74***

Notes: Robust z-statistics are reported in the round brackets. Time dummies and country dummies were included in the Asian specification. Time dummies and industry were included in the US model. The Hausman Test is distributed as a chi-squared distribution under the null of no correlation between the regressors and the individual effects. The Langrangian Multiplier Test (LM test) is distributed as chi-squared and the null is that the individual effect is zero. Numbers of firms and of observations are 635 and 2657, respectively in the US. Numbers of firms and of observations are 58 and 160, respectively in the Asian sample. *significant at 10 %; ** significant at 5 %; *** significant at 1 %.

Table 3. Balance Sheet Indicators and the Credit Spread

	US			ASIA	
	SIZE	BANK	COV	SIZE	BANK	COV
$LEV_{it} * Cons$	0.018***	0.009***	0.013***	0.005**	0.002*	0.007**
	(4.31)	(2.72)	(3.35)	(2.25)	(1.84)	(2.11)
$LEV_{it} * (1 - Cons)$	0.009***	0.018***	0.010***	-0.000	-0.003	0.000
	(2.62)	(4.56)	(2.91)	(-0.16)	(-1.39)	(0.73)
$PROF_{it} * Cons$	-0.040***	-0.031***	-0.035***	-0.017**	-0.008***	-0.024**
	(-4.48)	(-4.60)	(-3.03)	(-2.53)	(-3.30)	(-2.45)
$PROF_{it} * (1 - Cons)$	-0.025***	-0.024***	-0.017**	-0.004*	-0.004	-0.001
	(-3.85)	(-3.05)	(-2.17)	(-1.79)	(-0.88)	(-0.52)
$ZSCORE_{it} * Cons$	-0.100***	-0.097***	-0.093**	-0.028**	-0.023**	-0.035*
	(-2.84)	(-3.11)	(-2.50)	(-2.18)	(-2.24)	(-1.65)
$ZSCORE_{it} * (1 - Cons)$	-0.131***	-0.141***	-0.131***	-0.005	-0.006	-0.012
	(-4.18)	(-4.25)	(-4.25)	(-0.72)	(-0.36)	(-1.45)
Constant	1.544***	1.500***	1.419***	41.595**	39.724**	12.415
	(4.07)	(3.96)	(3.73)	(2.18)	(1.98)	(0.72)
R^2	0.13	0.12	0.12	0.24	0.21	0.22
Hausman	9.74	19.98	9.98	4.35	5.42	1.05
LM	678.66***	686.23***	672.94***	136.28***	68.17***	85.73***

Notes: The dummy variable CONS indicates in turn SMALL, BANK DEPENDENT, and RISKY firms. The Hausman Test is distributed as a chi-squared distribution under the null of no correlation between the regressors and the individual effects. The Langrangian Multiplier Test (LM test) is distributed as chi-squared and the null is that the individual effect is zero. Numbers of firms and of observations are 635 and 2657, respectively in the US. Numbers of firms and of observations are 58 and 160, respectively in the Asian sample. Also see notes to Table 2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4. The Financial Accelerator, and Recession/Credit Crunches

	US			ASIA		
	SIZE	BANK	COV	SIZE	BANK	COV
$LEV_{it} * Cons * D$	0.023***	0.007	0.012*	0.007***	0.005**	0.006
	(2.91)	(1.42)	(1.80)	(2.66)	(2.23)	(1.30)
$LEV_{it} * Cons * (1 - D)$	0.017***	0.011**	0.017**	0.004	0.000	0.005
	(3.07)	(2.53)	(2.50)	(1.37)	(0.44)	(1.17)
$LEV_{it} * (1 - Cons) * D$	(3.07)	(2.53)	(2.50)	0.001	0.002	0.001
	(1.67)	(3.35)	(2.74)	(0.88)	(1.02)	(0.62)
$LEV_{it} * (1 - Cons) * (1 - D)$	0.010**	0.016***	0.010**	-0.001	-0.005**	-0.001
	(2.39)	(2.81)	(2.31)	(-0.92)	(-2.23)	(-0.58)
$PROF_{it} * Cons * D$	-0.066***	-0.039***	-0.026	-0.021***	-0.024***	-0.031*
	(-2.70)	(-3.84)	(-1.36)	(-2.95)	(-3.63)	(-1.86)
$PROF_{it} * Cons * (1 - D)$	-0.024**	-0.025***	-0.028	-0.011	-0.004	-0.019
	(-2.05)	(-3.20)	(-1.36)	(-1.25)	(-1.55)	(-1.34)
$PROF_{it} * (1 - Cons) * D$	-0.024***	-0.018	-0.023**	-0.018***	-0.018***	-0.012
	(-3.07)	(-1.35)	(-2.02)	(-2.92)	(-3.03)	(-1.20)
$PROF_{it} * (1 - Cons) * (1 - D)$	-0.025***	-0.024**	-0.018**	-0.003	-0.004	0.000
	(-3.27)	(-2.34)	(-2.21)	(-1.27)	(-1.61)	(0.30)
$ZSCORE_{it} * Cons * D$	-0.061	-0.148***	-0.014	-0.067**	-0.022	-0.062
	(-0.92)	(-2.77)	(-0.24)	(-2.04)	(-1.11)	(-1.63)
$ZSCORE_{it} * Cons * (1 - D)$	-0.129***	-0.133***	-0.153**	-0.024*	-0.005	-0.020
	(-2.58)	(-2.83)	(-2.57)	(-1.90)	(-0.56)	(-0.62)
$ZSCORE_{it} * (1 - Cons) * D$	-0.115**	-0.043	-0.093*	0.004	-0.052**	0.005
	(-2.48)	(-0.88)	(-1.77)	(0.26)	(-2.48)	(0.66)
$ZSCORE_{it} * (1 - Cons) * (1 - D)$	-0.134***	-0.116***	-0.136***	-0.009	-0.024**	-0.010
	(-3.29)	(-2.81)	(-3.35)	(-1.40)	(-2.10)	(-1.31)
Constant	1.463***	1.409***	2.102***	13.168	8.084	1.287
	(4.20)	(4.04)	(5.85)	(0.74)	(0.45)	(0.080)
R^2	0.13	0.12	0.14	0.28	0.31	0.31
Hausman	15.98	17.33	10.78	5.16	5.42	10.07
LM	695.57***	688.52***	692.99***	135.59***	113.16***	89.88***

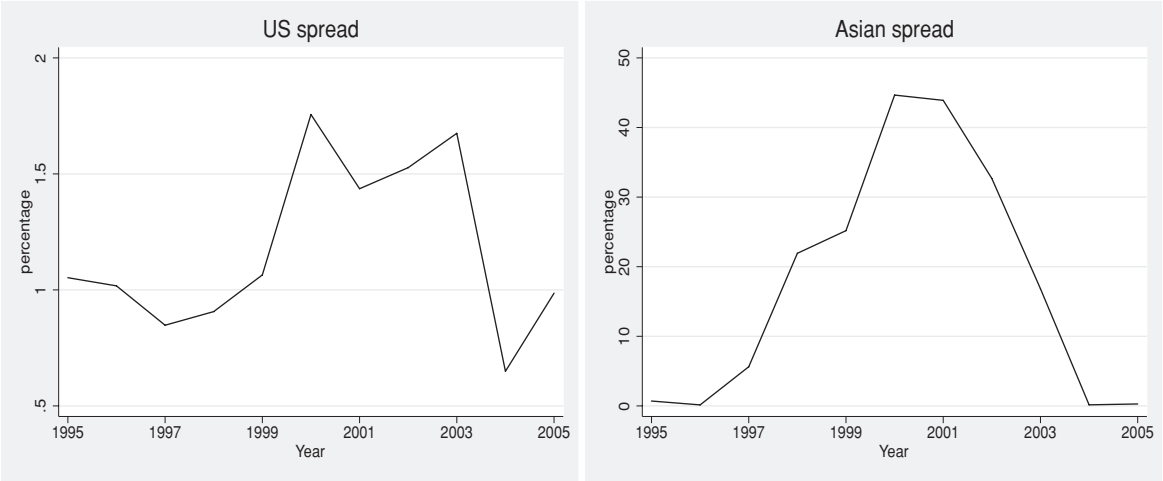
Notes: D is a dummy variable, which takes value 1 for the recession/credit crunch period, and 0 otherwise. The Hausman Test is distributed as a chi-squared distribution under the null of no correlation between the regressors and the individual effects. The Langrangian Multiplier Test (LM test) is distributed as chi-squared and the null is that the individual effect is zero. Numbers of firms and of observations are 635 and 2657, respectively in the US. Numbers of firms and of observations are 58 and 160, respectively in the Asian sample. Also see notes to Table 2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5. Selectivity Bias Test

	US			ASIA		
	SIZE	BANK	COV	SIZE	BANK	COV
$LEV_{it} * Cons$	0.018***	0.009**	0.013**	0.004**	0.002	0.006**
	(3.25)	(2.31)	(2.34)	(2.14)	(1.50)	(2.00)
$LEV_{it} * (1 - Cons)$	0.009**	0.018***	0.010**	-0.000	-0.003	0.000
	(2.24)	(3.43)	(2.47)	(-0.52)	(-1.39)	(0.46)
$PROF_{it} * Cons$	-0.040***	-0.031***	-0.035**	-0.017***	-0.008***	-0.023**
	(-3.29)	(-4.11)	(-2.38)	(-2.58)	(-3.22)	(-2.45)
$PROF_{it} * (1 - Cons)$	-0.025***	-0.024***	-0.017**	-0.004*	-0.004	-0.001
	(-3.92)	(-2.76)	(-2.17)	(-1.72)	(-0.88)	(-0.52)
$ZSCORE_{it} * Cons$	-0.101**	-0.097**	-0.093*	-0.027**	-0.023**	-0.034
	(-2.06)	(-2.43)	(-1.81)	(-2.14)	(-2.17)	(-1.59)
$ZSCORE_{it} * (1 - Cons)$	-0.131***	-0.141***	-0.132***	-0.005	-0.007	-0.011
	(-3.27)	(-3.18)	(-3.25)	(-0.68)	(-0.39)	(-1.44)
Attrition	-0.186	-0.145	-0.171	-8.408	-7.909	-4.163
	(-0.21)	(-0.16)	(-0.20)	(-1.19)	(-0.87)	(-0.65)
Constant	1.545***	1.500***	1.419***	47.210**	44.547**	15.513
	(4.68)	(4.53)	(4.28)	(2.48)	(2.14)	(0.88)
R^2	0.13	0.12	0.12	0.24	0.15	0.21

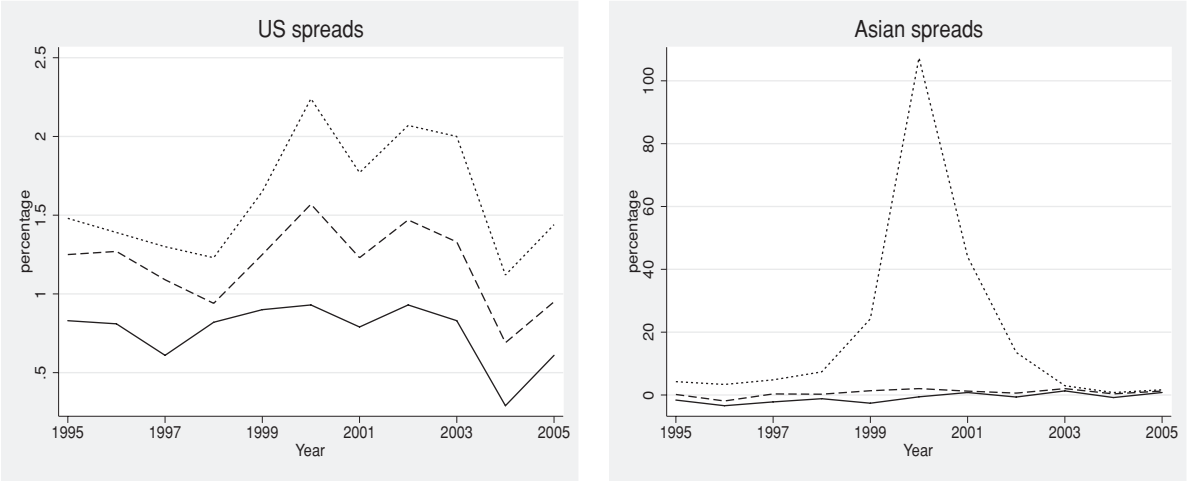
Notes: *Attrition* is a binary artificial variable taking the value one if the individual is observed over the entire period (balanced sample) and zero otherwise. Statistically insignificant coefficients suggest that the model is not affected by attrition bias. Numbers of firms and of observations are 635 and 2657, respectively in the US. Numbers of firms and of observations are 58 and 160, respectively in the Asian sample. *significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 1. The Average Spread



Notes: The credit spread is the difference between corporate bond yields and government bond yields of the same maturity.

Figure 2. Percentiles of Distribution of Spreads



Notes: Percentiles from top to bottom are 70th, 50th, 30th. The the upper tail of the distribution refers to higher spreads.