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Debt Maturity Structure and the 1997 Asian Financial Crisis

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Abstract

The paper investigates the effects of firm-specific and country-specific characteristics, and the 1997 Asian financial crisis on the debt maturity structure of firms in the Asia Pacific region. Given that the economies of the sample countries were at different stages of development and were affected by the 1997 Asian financial crisis by different degrees, the paper explores the effects of the crisis on debt maturity structure by grouping the sample countries according to the severity of the crisis. The results indicate that firms adjust their debt maturity structure to target level very quickly; the maturity structure decision of a firm is the product of both its own characteristics and the economic and institutional environment in which it operates. They also reveal that the crisis had significant effects on firm's debt maturity structure and their determinants.

JEL Classification: G32

Keywords: debt maturity structure; Asia Pacific region; financial crisis

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1. Introduction

The seminal work of Modigliani and Miller's (1958) and subsequent works of Kraus (1973) and Stiglitz (1974) suggest that debt maturity choice is irrelevant in efficient capital markets. However, Morris (1976) shows that even under similar restrictive assumptions, short-term debt can reduce shareholder's risk if there is uncertainty of future interest rates, since investors cannot easily diversify away inter-temporal risk. Consequently, debt maturity can affect firm's value. Subsequent theoretical literature on the role of debt maturity structure on firm value offers arguments in support of several hypotheses, from tax (Brick and Ravid, 1985 and 1991; Lewis, 1990) and liquidity risk hypotheses (Diamond, 1991), to moral hazard (Myers, 1977; Barnea et al., 1980; Hart and Moore, 1995) and signalling hypotheses (Flannery, 1986; Diamond, 1991 and 1993).

A host of empirical studies have assessed the validity of these hypotheses. The first generation of empirical evidence emerged as a by-product of the investigation of the determinants of corporate capital structure. More recent and direct empirical evidence on corporate debt maturity structure focuses mainly on firms operating in major developed markets (Barclay and Smith, 1995; Scherr and Hulburt, 2001).[1] On the strength of both theoretical and empirical results, it is now established that the choice of corporate debt maturity is one of the most important financing decisions, since an inappropriate choice can lead to inefficient liquidation. The difference in the cost of short- and long-term debt can also lead to variations in the determinants of optimal debt maturity choice and in firm's value, because of different incentive characteristics. Finally, an optimal decision of debt maturity mix can help to alleviate the agency problem.

Despite the wealth of literature, both the theoretical predictions and the empirical evidence on the debt maturity decision of firms are mixed. Studies have identified the effects of firm-specific variables on debt maturity structure, but little is known about whether, to what extent and how the observed differences in corporate governance and institutional environment may affect the debt maturity choice of firms.[2] In addition, most studies analyse the experience of firms under 'normal' market conditions, but little is understood about how firms make their financial decisions when market conditions are far from 'normal'. This paper aims to further address these issues and contribute to two new and important dimensions of the literature. Firstly, it investigates the potential effects of economic conditions, corporate governance and institutional set-up on the debt maturity structure of firms in both emerging and more developed economies in the Pacific Basin region. Secondly, it provides the first evidence on the effects of the 1997 Asian financial crisis on the determinants of corporate debt

[1] An exception to this is Demirguc-Kunt and Maksimovic (1999), who analyse the choice of debt maturity structure in 30 countries, and show that there are many similarities in the determinants of firms' debt maturity choice across developed and developing markets.

[2] Exceptions include Demirguc-Kunt and Maksimovic (1999), Fan et al. (2004) and Antoniou et al. (2006).

maturity choice of firms operating in the region. An improved understanding of these issues should help both financial markets and companies to identify the sources of financial risk, and how to manage it, in different and changing economic and institutional conditions.

The selection of the four sample countries, namely Thailand, Malaysia, Singapore and Australia, is based on three important considerations. First, the 1997 Asian crisis affected the chosen countries by different degrees. While the crisis started in Thailand and Malaysia and deeply affected these countries, Singapore averted the worse effects and recovered quickly. Australia, although in the same region, was untouched by the crisis. Therefore, an investigation of the effects of the crisis on the corporate debt maturity structure of these nations offers a comprehensive picture of how different degrees of variation in macroeconomic conditions may affect firm level's decisions. Second, firms in these countries operate under different legal, corporate governance and economic settings, and thus the effects of these different environments can be directly addressed.[3] Third, this study extends the current international evidence on corporate financial decisions in general and the sparse literature on the experience of firms from this region in particular.[4]

To achieve the above objectives the paper investigates: (i) firm-specific and country-specific determinants of corporate debt maturity structure in the Asia Pacific region; (ii) whether, and how, the Asian financial crisis of 1997 affected the corporate debt maturity choice of firms; and (iii) whether the determinants of corporate debt maturity structure are different across countries at different stages of economic and financial development.

2. Economic and Institutional Environment

Different economic conditions, corporate governance and institutional environments influence the relationship between managers, shareholders and creditors, as well as investors' behaviour. This may offer some explanations for the different patterns on financing behaviour observed across countries and regions. The indicators of economic and legal environment in the sample countries summarised in table 1 show that there are variations across countries, such as higher corruption levels and lower presence of information intermediaries in the less developed relative to the more developed countries in the sample. There are also variations in the size of banking and capital markets in relation to the country's GDP, and in the level of legal protection of creditors and shareholders. Finally, the

[3] For instance, in the two more developed markets in the sample, i.e. Singapore and Australia, publicly issued financial instruments are an important source of external finance, while the two emerging markets, i.e. Thailand and Malaysia, are characterized by greater reliance on banks and other financial intermediaries to provide most of the external funds to business.

[4] See Deesomsak et al. (2004) for a study of the determinants of capital structure for firms in the same sample countries and for references to other empirical investigations in this region.

ownership structure of firms in this region tends to be highly concentrated leading to higher agency cost of debt.[5] It is expected that this disparity in corporate governance and institutional environment would affect the relevance of the different potential determinants of debt maturity structure, and contribute to explaining variations across sample countries.

[Insert Table 1]

Firm's financing decisions may also be affected by unforeseeable economic events, such as the Asian financial crisis of July 1997. The effects of this crisis on individual countries varied considerably and showed the vulnerability of the less developed economies in the region. The crisis originated in Thailand and Malaysia and quickly spread throughout the region. Singapore successfully averted the worst effects of the crisis and recovered quickly (Cha and Oh, 2000; Chowdhry and Goyal, 2000), while evidence suggests that Australia was not really affected (Grenville, 1999). This is not surprising, because Australia had deeper and more mature financial markets as a consequence of the financial deregulation of the 1980s, and was not subject to the fatal combination of large volatile capital flows and fragile domestic financial sector that characterised many East Asian countries.

The evidence suggests that in the period preceding the Asian crisis asymmetric information problems worsened, and the deterioration of balance sheets eventually led to the crisis (Mishkin, 1999). Financial markets were no longer able to allocate funds efficiently. Firms became more concerned about their debt exposure and creditors more stringent on their lending. According to Chowdhry and Goyal (2000) the crisis was mainly caused by moral hazard problems and a self-fulfilling run on liquidity, due to the maturity and liquidity mismatch between deposits and loans. In a highly uncertain and volatile environment, financial analysts' opinions became paramount to financing decision-making, and this may have partly contributed to the different impact of the crisis across the affected countries. The 1997 Asian crisis emphasised the importance of a carefully chosen maturity-mix of debt to firms and their lenders. It also highlighted the inefficiency of the corporate governance, legal and institutional environment in this region, and the consequences of unsound lending decisions and lack of transparency. It is therefore reasonable to expect that this economy-wide event may have had a significant impact on the debt maturity decision of firms.

3. Corporate Debt Maturity and Hypothesis Development

3.1. Corporate Debt Maturity Hypotheses

The main hypotheses identified by the literature on debt maturity structure include: moral hazard, taxation, signalling, and liquidity risk.[6] The *moral hazard hypothesis* emphasizes the role of

[5] See Deesomsak et al. (2004) for a more detailed discussion of corporate governance and institutional environments in the same sample countries compared to the US and UK.

[6] See Ravid (1996) for an extensive survey of the theoretical studies on corporate debt maturity structure.

short-term debt in reducing agency problems, such as under-investment and asset substitution. Myers (1977) and Barnea et al. (1980) suggest that firms can control the under-investment problem by shortening the effective maturity of their debt, since when short-term debt matures before growth options are exercised there is an opportunity for firms to re-contract and for debt to be re-priced, so that gains from new investment do not accrue to debtholders. In addition, Barnea et al. (1980) propose that short-term debt can mitigate the adverse risk incentives of debt financing, or the asset substitution problem, because short-term debt is less sensitive to risk shifting. Thus, short-term debt reduces shareholders' incentives to engage in high-risk projects. Within the *tax hypothesis* framework, Brick and Ravid (1985) and Lewis (1990) propose an irrelevance theorem and identify the conditions under which taxation can affect debt maturity. Kane et al. (1985) establish that the net benefit of tax, after allowing for the cost of bankruptcy, tends to be very small and thus not sufficient to offset the amortized transaction or floatation costs. In this context, firms should lengthen debt maturity only if the tax advantage is higher than the amortized floatation costs.

The *signalling* and the *liquidity risk hypotheses* were developed by Flannery (1986) and Diamond (1991). When there is asymmetric information between lenders and firms, and in particular managers have better or timelier information about firm's value than investors, the nature of equilibrium is determined by transaction or floatation costs. The market cannot distinguish between good and bad quality firms and a separating equilibrium ensues. Flannery (1986) argues that firms with the private information that they are relatively high quality prefer short-term debt to avoid paying a market premium on long-term debt that is too high for their quality, since it reflects the average probability of default. On the contrary, those with the private information that they are low quality prefer long-term debt, because the market premium on long-term debt reflects a probability of default that is lower than their own. Thus, the prediction is that debt maturity is inversely related to firm's quality. Similarly, Diamond (1991) assumes that firms have private information about their credit quality, but a firm will also consider its liquidity risk, defined as the risk of being unable to repay debts because of the deterioration in financial or economic conditions. It is thus suggested that firms trade off the benefits of short-term debt in improving credit quality rating against their liquidity risk.

3.2. Firm-Specific Determinants of Debt Maturity Structure

One of the most significant differences across empirical studies on debt maturity is the formulation of the dependent variable, i.e. the measurement of debt maturity. Most studies consider some form of debt ratio, but they differ in whether book or market values are used, and also in the definition of long-term debt. In general, previous empirical studies have followed two alternative approaches: (i) the incremental approach, which uses the maturity of bond issuance to proxy debt maturity (Guedes and Opler, 1996; Stohs and Mauer, 1996; Esho et al., 2002); or (ii) the balance-sheet

approach, which uses either the percentage of a firm's total debt that matures after a certain period (Barclay and Smith, 1995; Demirguc-Kunt and Maksimovic, 1999; Barclay et al., 2003; Antoniou et al., 2006), or the weighted-average maturity of a firm's liability (Stohs and Mauer, 1996; Scherr and Hulburt, 2001). This paper follows the balance-sheet approach and defines *debt maturity* (MAT) as the proportion of long-term debt to total debt, where long-term debt includes debt of more than one-year maturity.[7]

Based on the hypotheses discussed in the previous section, the firm-specific explanatory variables investigated in the paper include leverage, firm size, growth opportunities, earnings volatility, liquidity, profitability, share price performance, asset maturity and firm's quality. Table 2, Panel A, summarizes the relationship postulated by different theories between firm-specific variables and debt maturity, and specifies the proxy measures used. The liquidity risk hypothesis predicts that a firm lengthens its debt maturity as *leverage* (LEV) increases in order to offset the higher probability of a liquidity crisis, and thus delay exposure to bankruptcy risk (Stohs and Mauer, 1996). Therefore, leverage is expected to be positively correlated with debt maturity. On the other hand, Myers (1977) suggests that the agency cost of under-investment can be mitigated by reducing leverage, or by shortening debt maturity. If firms reduce debt to mitigate the under-investment problem, there is less need to shorten their debt maturity. Therefore, the moral hazard hypothesis predicts a negative relationship between leverage and debt maturity.

[Insert Table 2]

Both the moral hazard and the signalling hypotheses predict a positive relationship between *firm size* (SIZE) and debt maturity. According to moral hazard, smaller firms are more likely to experience conflicts between shareholders and debtholders, leading to problems such as risk shifting, asset substitution and claim dilution. In addition, the signalling role of debt is more important in smaller firms, as smaller firms might communicate less information to outsiders leading to more informational asymmetries because of economies of scale in information production and distribution. This prediction is further strengthened by a number of other factors. Firstly, managers of small firms are more likely to hold a substantial amount of equity in the firms they manage, and thus will tend to be more risk seeking than managers of larger firms. Secondly, since small firms tend to have more growth options and thus higher agency costs than large firms, debtholders will tend to reduce the risk of lending to smaller firms by restricting the length of debt maturity. Finally, large firms tend to issue more long-term debt because of easier access to capital markets, while smaller firms rely more heavily on bank debt (Titman and Wessels, 1988; Demirguc-Kunt and Maksimovic, 1999). Therefore, a positive relationship is predicted between debt maturity and firm size.

[7] Ozkan (2000) finds some evidence of definition sensitivity. Our choice is restricted by data availability.

Growth opportunity (GROW) is expected to be inversely related to long-term debt. The agency cost of debt is likely to be higher for high growth firms, as new investment can increase risk, and informational asymmetries also tend to increase with growth opportunities. Myers (1977) suggests that agency related under-investment problems can be mitigated by issuing short-term debt that expires before the growth options are exercised. Issuing short-term debt also signals quality to the market (Flannery, 1986) and avoids the high information costs that come with long-term debt. However, the liquidity risk hypothesis predicts a positive relationship because firms can reduce the probability of inefficient liquidation of their risky growth opportunities by issuing long-term debt. Kane et al. (1985) and Sarkar (1999) argue that there is an inverse relationship between the optimal debt maturity and *earnings volatility* (VOL). Firms with low earnings volatility prefer longer debt maturity to avoid frequent re-balancing of their capital structure. On the contrary, firms with higher business risk are prone to higher agency costs, and thus they have an incentive to shorten debt maturity to lower agency costs. Therefore, a negative relationship between long-term debt and *liquidity* (LIQ) is expected. This is supported by Myers and Rajan's (1998) argument that excessive liquidity reduces manager's ability to commit credibly to investment. Managers can manipulate liquid assets in favour of shareholders and against debtholders' interest. High liquidity thus reduces the firm's fund raising capacity and shortens the maturity of available debts. In addition, non-depreciating liquid assets, such as inventory, do not support long-term debt.

Profitability (PROF) is expected to be positively related to debt maturity, because profitable firms have higher taxable income, and thus receive greater tax benefits from long-term debt. Scherr and Hulburt (2001) propose that taxability can influence firms' debt maturity because choosing long-term debt over short-term debt can create a tax timing option to repurchase and re-issue debt. Antoniou et al. (2006) link the positive relationship between *share price performance* (SPP) and debt maturity structure to the signalling power of debt. For instance, if managers perceive that a drop in share price fails to reflect the 'true' (but unknown) value of the firm, they have a motivation to send a credible signal to the market. This can be done by issuing short-term debt, as it confirms that managers are prepared to be closely monitored and frequently assessed by lenders. Similarly, firms with favourable information tend to avoid long-term debt and issue short-term debt instead, because they hope to negotiate more favourable terms later. The relationship between *asset maturity* (AMAT) and debt maturity is expected to be positive, as firms tend to match the maturity structure of assets and liabilities to reduce the agency costs of debt (Myers, 1977).

The signalling hypothesis predicts a negative relationship between *firm quality* (QUA) and debt maturity. High quality firms tend to issue more short-term debt (Mitchell, 1991), while low quality firms do not mimic the behaviour of high quality firms because they cannot afford the high transaction costs of rolling over short-term debt. However, when considering liquidity risk, a non-monotonic

relationship is expected (Diamond, 1991). Although short-term debt carries high liquidity risk, high quality firms will prefer short-term debt because liquidity risk is less relevant to them. On the contrary, liquidity risk is crucial for medium quality firms, as a liquidity crisis can lead to credit rationing, or even liquidation. Thus medium quality firms tend to issue longer-term debt in order to prevent the exposure to liquidity risk. Similarly, low quality firms would ideally like to use longer-term debt to prevent liquidity risk, but they may be unable to do so due to rationing from lenders. Consequently, low quality firms are normally forced to issue short-term debt. Overall, the liquidity risk hypothesis predicts that low and high quality firms tend to borrow short-term, while long-term debt is preferred by medium quality firms.

Finally, several studies (Ozkan, 2000; Antoniou et al., 2006) show that firms tend to set a *target debt maturity ratio*. If any deviation from the target occurs, the speed at which firms adjust their debt maturity structure towards the target depends on the costs of adjustment versus the costs of remaining off the target. The presence of a target ratio is tested in the paper by incorporating the one-period lagged debt maturity in a partial adjustment model.

3.3 Country-Specific Determinants of Debt Maturity Structure

A limited number of recent studies have documented that corporate financing decisions are determined not only by firm-specific characteristics, but also by country-specific factors such as economic conditions, corporate governance and institutional environment (Demirguc-Kunt and Maksimovic, 1999; Booth et al., 2001; Fan et al., 2004; Deesomsak et al., 2004; Antoniou et al., 2006). Different market conditions can influence firm's borrowing decisions by affecting the absolute level of long- and short-term debt and by creating incentives for firms to alter the maturity mix of debt (Demirguc-Kunt and Maksimovic, 1999). The country-specific explanatory variables used in the paper are classified into two groups: (i) market-wide determinants, which include economic development, bank development, stock market development, term structure of interest rates, and inflation; and (ii) legal and corporate governance determinants, which include quality of legal enforcement, legal protection, ownership concentration, and information intermediary activity.[8] Table 2, Panel B and C, summarizes the relationship postulated by different theories between the variables in these two groups of country-specific determinants and debt maturity, and specifies the proxy measure used for each variable.

[8] These factors are consistent with Fan et al. (2004) and Demirguc-Kunt and Maksimovic (1999). As suggested by Demirguc-Kunt and Maksimovic (1999), significant changes in a country's legal system are infrequent, and indicators of the institutional environment, such as creditor rights and shareholder rights, are relatively stable over time. Therefore the indicators used in the paper are from previous studies as listed in Table 1.

With respect to market-wide determinants, Fan et al. (2004) suggest that firms in developing countries tend to use far less long-term debt than firms in developed countries. In order to test for this, *a developing economy dummy variable* (EDEV) is used, which might also capture an element of financial development not included in other institutional variables. *Bank development* (BKDEV) is expected to be inversely related to debt maturity, because short-term debt enables banks to use their comparative advantage in monitoring lenders (Fan et al., 2004). On the contrary, s*tock market development* (MKDEV) is expected to be positively related to debt maturity. Grossman (1976) shows that market prices partially transmit information from the more informed to the less informed investors, making lending to quoted firms less risky. Thus, an active stock market may increase firms' ability to obtain long-term debt. However, there is also an incentive for firms in countries with developed stock markets to switch from long-term debt to equity, as the additional liquidity of the stock market encourages risk taking behaviour from well-informed investors (Demirguc-Kunt and Maksimovic, 1999). This could lead stock market development to be negatively related to debt maturity because firms may want to use more short-term debt to reduce agency costs.

The tax hypothesis predicts that firms should employ more long-term debt when the *term structure of interest rates* (TERM) slopes upward. Brick and Ravid (1985) show that different time patterns of interest payments can affect the choice of debt maturity of firms. They suggest that firms lengthen their debt maturity when the term structure is upward sloping, because the tax-shield value of long-term debt is higher and because the interest tax shield of debt is accelerated by increasing the proportion of debt payments.[9] Thus, issuing long-term debt can increase firm's value. On the contrary, market timing theory predicts a negative relationship.[10] Graham and Harvey (2001) find that the interest yield curve appears to influence the maturity of new debt. When short-term interest rates are low in comparison to long-term interest rates, or when the term structure of interest rates is high, firms prefer to issue short-term debt while they are waiting for long-term interest rates to decline in future. This behaviour is also consistent with the optimistic behaviour of managers discussed by Baker et al. (2005). Finally, there is some evidence that an increase in *inflation* (INF) tends to reduce the use of long-term debt by both large and small firms (Demirguc-Kunt and Maksimovic, 1999), since debt contracts are generally based on nominal terms and thus high inflation may increase the interest rate risk faced by firms.

Among the legal and governance determinants, the quality of legal enforcement is measured by the *level of corruption* (CORR), which is expected to be negatively related to corporate debt maturity. When the legal system has less integrity, or is inefficient, debt is used more than equity, and short-

[9] See also Ravid (1996). Long-term debt pays more interest in early periods and less interest in later periods than short-term debt.

[10] Baker et al. (2005) summarize empirical studies on debt market timing and term structure of interest rates.

term debt more than long-term debt, since a shorter maturity limits the firm's opportunity to expropriate creditors (Fan et al., 2004). C*reditor rights* (CRR) and *shareholder rights* (SHR) indexes are used to measure legal protection. Diamond (1991) argues that lenders who engage in monitoring have incentive to lend short-term. Demirguc-Kunt and Maksimovic (1999) also suggest that strong creditor rights increase the incentive of banks to monitor firms. Shareholders' protection, on the contrary, decreases the agency cost of debt. Consequently, in countries with strong shareholder rights, firms should need less short-term debt to mitigate agency problems. Therefore, creditor rights are expected to be negatively related to debt maturity, while a positive relationship between shareholder rights and debt maturity is expected. When *ownership concentration* (OWN) is high, the interests of shareholders and managers align, leading to higher agency costs of debt. Therefore, the moral hazard hypothesis predicts that firms in countries with high ownership concentration should issue more short-term debt in order to mitigate agency problems. This leads to the expectation of a negative relationship between ownership concentration and debt maturity. Finally, the institutions that collect and disseminate information, such as auditors, may play a significant role in influencing debt maturity. Evidence shows that good quality external auditors are used more by firms with severe agency problems, since auditors enhance the credibility of public information by certifying the firm's accounts. Thus, their presence should diminish the role of short-term debt in mitigating information problems and lead to a positive relationship between *information intermediary activity* (AUD) and debt maturity.

4. Data and Methodology

4.1 Data

The sample comprises of a panel of all firms in Thailand, Malaysia, Singapore and Australia, listed in the national stock exchanges for the period 1993-2001. Only financial firms and firms with missing observations during the sample period are excluded.[11] Firm's financial data are obtained from Datastream. The final sample consists of 1,726 observations for Thai firms; 2,493 for Malaysian firms; 1,164 for Singaporean firms; and 809 for Australian firms (see Appendix A for further details of sample composition). Because of the requirement of the Generalised Method of Moments (GMM) methodology employed in the paper, that firms with less than three consecutive observations are excluded, fewer observations are actually used when estimating by GMM.

Table 3 presents the averages of the variables used to measure debt maturity, firm-specific and market-wide determinants. These averages are calculated over both the full sample period, and the pre and post-crisis sub-periods from the pooled time-series cross-sectional dataset. Countries are

[11] Financial firms are excluded as their financial structure is affected by sector-specific factors, such as capital requirements.

combined by how severely they were hit by the crisis. As mentioned earlier, the two countries least affected by the crisis in the sample are Australia and Singapore, which are also classified as developed economies, while the most affected countries are Malaysia and Thailand, also classified as developing economies. The figures in table 3 present initial evidence that there were significant differences over the sample period in debt maturity pattern and both firm-specific and market-wide determinants between the two country groupings. Firms in developed economies have more long-term debts than firms in developing economies. Furthermore, the financial crisis had several significant effects on most factors, and not surprisingly more so in the countries most affected by the crisis. Overall, the crisis led firms in this region to issue higher debt on average, as equity issues became problematic in unstable markets. Growth opportunity, share price performance and the quality of the firms decreased significantly after the crisis, while asset maturity increased. Profitability changed significantly after the crisis in the countries most affected. Market-wide factors also changed considerably after the crisis. For both country groupings, bank's assets became larger relative to GDP. Stock markets were most severely hit in the countries most affected. In both country groupings, short-term interest rates increased relative to long-term rates, and inflation decreased after the crisis. Volatility in earnings and the liquidity of firms operating in any of the countries were affected significantly by the crisis.

[Insert Table 3]

Figure 1 shows a comparison of debt maturity across sample countries during the sample period. Differences in debt maturity patterns appear to be linked to the level of economic development. For example, Australian firms had a considerably higher proportion of long-term debt, while Thai and Malaysian firms made more use of short-term debt. These observations are consistent with a number of studies that show that during the sample period Asian firms tended to be highly levered, with a high proportion of short-term debt, and that this contributed to the severity of the 1997 Asian crisis (Bleakley and Cowan, 2004; Schmukler and Vesperoni, 2006). Figure 1 also shows that, although the debt maturity structure of the sample countries was fairly stable over the sample period, after the 1997 crisis debt maturity continued to increase in the two more developed economies of Australia and Singapore. The evidence in Table 3 and Figure 1 motivates further analysis of the changes in the determinants of debt maturity structure after the Asian crisis. It also highlights important differences between the sample countries.

[Insert Figure 1]

4.2 Methodology

To examine the role of the firm-specific determinants of debt maturity, equation (1) is firstly estimated on unbalanced panel data using Ordinary Least Square (OLS). The individual firm's debt maturity structure is modelled as a function of *k* firm-specific factors for each country:

$$Y_{i,t} = \alpha_0 + \sum_{k=1}^{N} \gamma_k FF_{k,i,t} + \alpha_t + \mu_{i,t} \qquad (1)$$

where, $Y_{i,t}$ is firm's i debt maturity at time t, measured at the accounting year-end; $FF_{k,i,t}$ is a vector of k firm i's firm-specific factors; α_0 is a constant; and α_t captures firm-invariant time-specific effects, and it is the same for all firms at a given point in time but varies through time.[12] The inclusion of α_t helps control for both observable and unobservable aggregate effects.

To test for the existence of a target optimal debt maturity structure, lagged debt maturity is included in the model and a partial adjustment model (Ozkan, 2000; Antoniou et al., 2006) is adopted. If the firms had a target debt maturity ratio, then the coefficient of the one-period lagged debt maturity would be between 0 and 1. If the cost of diverging from the target is higher than the cost of adjustment, then the speed of adjustment (1–coefficient of the lagged debt maturity) is expected to be faster.[13]

$$Y_{i,t} = \alpha_0 + \beta_1 Y_{i,t-1} + \sum_{k=1}^{N} \gamma_k FF_{k,i,t} + \alpha_i + \alpha_t + \mu_{i,t} \qquad (2)$$

Following the same notation as in equation (1), $Y_{i,t}$ is firm's i debt maturity at time t; $Y_{i,t-1}$ is the same variable lagged one period; $FF_{k,i,t}$ is a vector of k firm i's firm-specific factors; α_i and α_t represent time-invariant unobservable firm-specific effects and time-specific effects which are common to all firms at a time but vary through the time; and the disturbance term $\mu_{i,t}$ is time-varying and serially uncorrelated with mean zero and variance σ^2. Hsiao (1985) suggests that the OLS estimation of this equation gives biased coefficients, due to the correlation between $\mu_{i,t}$ and other variables, especially $Y_{i,t-1}$. Therefore, the suitability of estimation techniques using alternative methods, such as OLS-first difference, Generalized Method of Moments (GMM) in the first differences (GMM-DIF) as suggested by Arellano and Bond (1991), and system GMM (GMM-SYS) as suggested by Arellano and Bover (1995), is explored to control for endogeneity, heteroscedasticity and measurement error problems. Wherever appropriate, we apply the more efficient two-step GMM estimator and firms with less than three consecutive time series observations are dropped. In order to have a valid set of instruments, there should be no higher-order serial correlation and this is confirmed by the Sargan test.

It is unlikely that all explanatory variables are strictly exogenous, because shocks that affect debt maturity structure may also affect other firm-specific factors. Therefore, the dependent variable is

[12] All model specifications (with the exception of the dynamic model) include industry dummies to control for industry effects, but their coefficients are generally insignificant and thus not reported here.

[13] A detailed discussion of speed of adjustment model in financial decisions can be found in Antoniou et al. (2006 and 2007).

treated as endogenous and the explanatory variables as weakly exogenous. Time dummies are included in all models. Industry dummies are included only in OLS equations in levels. As shown in Antoniou et al. (2006), GMM-SYS is the most appropriate method to estimate equation (2). However, due to data limitation, this estimation method can only be applied to the full sample, and for testing the effects of firm-specific characteristics. In other cases, OLS is used.

To test whether differences in economic conditions between countries have any effect on corporate debt maturity structure, the data for the four sample countries are subsequently pooled to create one panel. Equation (1) is then augmented with country dummies, taking the value of 1 for Thailand (THDUM), Malaysia (MLDUM) and Singapore (SPDUM), and 0 otherwise. In addition, equation (1) is also re-estimated with OLS by replacing country dummies with the market-wide and legal and governance variables identified in Section 3.3 above, one at a time. Since the role of market-wide determinants may vary depending on how severely the crisis hit different countries, and thus estimating across all countries may be misleading as effects may cancel out, the data for the four sample countries are subsequently divided into two groups: countries least affected and countries most affected by the Asian crisis. Equation (1) is then augmented again with market-wide factors, one at a time over the whole sample period. Finally, to further investigate the possible effects of the 1997 Asian crisis, equation (1) augmented by the market-wide determinants is re-estimated with OLS over two sub-sample periods, the pre-crisis period between 1993 and 1996, and the post-crisis period between 1998 and 2001.[14] Wald-statistics are estimated to test for any statistically significant change in the role of the identified variables as a consequence of the financial crisis.

5. Empirical Results

5.1 Firm-specific effects on debt maturity by country over the full sample period

Table 4 presents the estimates of equation (1) for each country over the full sample period. As anticipated, l*everage*[15] is found to be positively related to debt maturity, in line with previous studies such as Barclay and Smith (1995).[16] The positive relationship supports the liquidity risk argument that

[14] The crisis started in mid-July 1997. Therefore the data for 1997 are excluded from the sub-samples.

[15] Various measures of leverage have been used in the literature. Due to data restrictions, the paper defines leverage as the ratio of total debt to total capital, following Rajan and Zingales (1995). To examine the sensitivity of the results to this definition, equation (1) was also estimated with leverage redefined as the ratio of total debt to total assets for Malaysia, Thailand and Singapore. The (unreported) results were statistically similar to those discussed in the paper.

[16] Leverage could be significantly correlated with other variables in the model. Barclay et al. (2003) point out that the regression coefficients can be potentially biased and inconsistent when both leverage and investment opportunities are included in the regression as independent variables. Thus, alternative formulations were

higher leverage encourages firms to avoid short-term debt. It also implies that leverage and debt maturity are used as strategic complements to reduce the under-investment problem, as suggested by Barclay et al. (2003). Similarly, the coefficients of *firm size* are uniformly positive and significant across sample countries in line with Barclay and Smith (1995) and Stohs and Mauer (1996). This confirms the agency hypothesis that small firms are prone to higher agency costs of debt and thus tend to shorten their debt maturity to reduce these costs. The findings also give support to the signalling hypothesis, which stipulates that small firms have higher levels of asymmetric information, and thus they are more motivated to use short-term debt to signal their quality to the market. On the contrary, *growth opportunity* appears to have no influence in determining the debt maturity structure of firms in the sample countries, except for the positive and significant relationship found for Thai firms that contradicts the agency theory prediction, but is in line with the liquidity risk hypothesis.[17] Debt maturity may not be used to reduce the under-investment problem, because firms in the sample countries, especially in Malaysia and Singapore, have highly concentrated ownership and a close relationship with their banks.

[Insert Table 4]

The evidence on *earnings volatility* is mixed across countries, having a negative effect on debt maturity in Thailand and Singapore, but no effect in Malaysia and Australia. This result, in line with other empirical studies (Guedes and Opler, 1996), supports the bankruptcy cost argument of Kane et al. (1985) and implies that high bankruptcy costs in Thailand and Singapore drive firms to issue shorter-term debt when their earnings volatility is high. *Liquidity* is positively related to debt maturity in all countries, consistent with the findings of Antoniou et al. (2006) for German firms. This suggests that firms in this region choose to issue more long-term debt when they are more liquid to avoid cash shortages and to lower their probability of bankruptcy. Mixed results are found for the relationship between *profitability* and debt maturity. The relationship is positive and significant for Thailand and Malaysia supporting the tax hypothesis that highly profitable firms minimize their tax liability by choosing longer-term debt. However, the relationship is negative and significant for Australian firms. This could be partly due to the higher cost of issuing long-term debt in Australia, which has a market-based financial system. Mixed results are also found for the relationship between *share price performance* and debt maturity. Positive and significant relationships are observed for Singapore and Australia, supporting the signalling hypothesis that firms whose shares are perceived to under-perform tend to issue shorter-term debt to signal their quality to the market, while firms whose shares are

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estimated excluding leverage from the model. The (unreported) estimates were similar to those presented in the paper, confirming that the results are robust and appear not to be affected by this potential problem.

[17] Esho et al. (2002) obtain similar results for Australian firms. Deesomsak et al. (2004) find that growth opportunity has also no significant effect on the capital structure decision of Malaysian and Australian firms.

perceived to over-perform issue longer-term debt to exploit the market mis-pricing. However, no significant relationship is found for Thailand and Malaysia. This discrepancy can be due to the fact that in countries with more developed financial markets information and signalling play a more fundamental role in share price formation than in countries with less developed and thus less efficient markets. Strong support is found for the maturity-matching hypothesis, as *asset maturity* is positively related to debt maturity in Thailand, Malaysia and Singapore. The insignificant relationship found in Australia lends support to Guedes and Opler (1996) that matching maturity of assets and liabilities is not a universal practice. The effect of *firm quality* on debt maturity is mixed among sample countries, with only a significant negative effect found among Thai firms, consistent with other studies (Guedes and Opler, 1996). This finding gives little support to the signalling hypothesis and may also reflect the preference of financial markets to provide short-term debt to quality firms.[18]

In summary, the findings presented in Table 4 show that some determinants are more powerful and consistent than others in explaining the choice of debt maturity of firms operating in the Asia Pacific region.[19] Overall, the findings lend support to the liquidity risk hypothesis, and the signalling hypothesis, but provide mixed support for the moral hazard hypothesis.[20] Although small firms use short-term debt to mitigate the agency cost of debt and almost all firms try to match the maturity of assets and liabilities, the relationship between growth opportunity and debt maturity is mixed, leading to only moderate support for the agency hypothesis. Furthermore, the results show considerable variation in the importance of the determinants of debt maturity across sample countries, motivating further investigation into the effects of country-specific variables.

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[18] As Altman's Z-score may be correlated to other firm-specific variables, equation (1) was also re-estimated using abnormal earnings as a proxy of firm quality. Following Barclay and Smith (1995), abnormal earnings were defined as (Earnings per share$_{t+1}$ – Earnings per share$_t$)/ Share price$_t$. The (unreported) findings were statistically consistent with the results presented in the paper.

[19] Further tests were also conducted to ensure the robustness of the results. Equation (1) was re-estimated on cross-sectional data following Rajan and Zingales (1995), since cross-sectional analysis preserves the dispersion across firms and eliminates the serial correlation problem in residuals, which may tend to inflate the t-statistics of the coefficients estimated in pooled and fixed effects regressions. Furthermore, Equation (1) was also re-estimated using fixed company effects, where the firm-specific time-series mean for each variable is subtracted from each observation. A fixed effects regression is used as an alternative method for dealing with the problem of serially correlated errors. The main difference between pooled and fixed effects regressions is that the fixed effects model allows for firm-specific regression intercepts (Stohs and Mauer, 1996). The results from both the cross-sectional and fixed company effects estimations are statistically consistent with the results presented in the paper, and are available from the authors on request.

[20] These hypotheses/arguments are not mutually exclusive. They can have multiple and offsetting effects on a firm's debt maturity choice.

5.2. Debt Maturity Dynamics

Table 5 presents the estimates of equation (2) using OLS in levels, OLS-first difference, GMM-DIF and GMM-SYS methodologies. In line with the findings of Ozkan (2000), the results show biased estimates from the OLS specification, indicating the presence of firm-specific effects. There is evidence of upward bias on the coefficient of the lagged debt maturity in the OLS level specification and downward bias in the OLS first-difference. Also the GMM-DIF estimates result in larger variances than those from GMM-SYS. In line with Antoniou et al. (2006), the findings confirm that GMM-SYS is the most appropriate technique, and thus the following comments are based on the GMM-SYS findings for Model-4 in Table 5.

[Insert Table 5]

For all sample countries, AR(1) suggests a negative first-order serial correlation, while AR(2) suggests the absence of second-order serial correlation, satisfying the assumption of no higher-order serial correlation. All Wald statistics of joint significance of the regressors (Wald Test 1) are significant. Sargan test indicates that the instruments used are valid and not correlated with the error term. The coefficients of lagged debt maturity are positive. The estimates suggest that firms in this region have a target optimal debt maturity structure, and they adjust to their targets relatively fast. Australian firms have the highest adjustment speed (0.69), while the adjustment process is relatively costly and slow for Malaysian firms (0.47). With regard to other firm-specific variables, the results do not vary much from those in Table 4 discussed in the previous section, except for the role of asset maturity that becomes insignificant. In summary, large, highly levered, highly liquid and highly profitable firms prefer to use long-term as opposed to short-term debt.

5.3 Country-specific effects on debt maturity over the full sample period

Table 6, Panel A, presents the results of estimating equation (1) with the inclusion of country dummies and market-wide factors as discussed in Section 3.3, using panel data that combine all firms across all sample countries over the whole sample period. The coefficients of the firm-specific variables are consistent with the ones presented in the previous section. All *country dummies* coefficients are highly significant, showing that country-specific factors play a part in the debt maturity choice of firms in this region. To investigate this finding further, country dummies are replaced with several country-specific factors. *Economic development* is found to have a highly significant and negative effect, implying that firms in developing countries tend to issue less long-term debt, a result that contradicts the findings of Fan et al. (2004). On the contrary, the significantly negative coefficient of *bank development* supports Fan et al.'s (2004) argument about the monitoring role of banks. The *term structure of interest rates* is also negatively related to debt maturity, lending support to the market timing hypothesis.

[Insert Table 6]

Table 6, Panel B, presents the results of estimating equation (1) with the inclusion of legal and corporate governance determinants. As predicted and in line with Fan et al. (2004) and Demirguc-Kunt and Maksimovic (1999), the *corruption level* is negatively associated with debt maturity, implying a positive relationship between legal enforcement and debt maturity, and supporting the monitoring function of short-term debt. *Legal protection* is also found to be a significant factor in determining firm's debt maturity choice. In line with Demirguc-Kunt and Maksimovic (1999), firms in countries with superior *creditor rights* use relatively more short-term debt, implying that the ability of firms to use short-term debt is higher when creditors are better protected, as banks have more incentives to monitor borrowers. On the contrary, firms in countries with higher *shareholder rights* use more long-term debt since the agency cost of debt is lower and thus the need to use short-term loans to mitigate agency problems is reduced. *Ownership concentration* has a negative and significant relationship with debt maturity, in support of the moral hazard hypothesis. Finally, consistent with Fan and Wong's (2002), a positive relationship is found between the *market share of the big-5 auditors* and debt maturity, highlighting the important role of auditors in facilitating the transmission of information.

Since the findings in Table 6 reflect the aggregate effects across all sample countries, the estimated coefficients may hide the conflicting country-specific influence that some determinants may have on debt maturity. In particular, given that the sample countries were at different stages of economic development and were hit by the crisis by different degrees, some of the true market-wide effects may have been washed out when estimated over the full set of countries. It is an important question whether the identified market-wide determinants had a different impact on the countries in our sample depending upon their stage of development and vulnerability to the crisis. Table 7 presents the findings from estimating equation (1) augmented by market-wide factors for the pooled panels of the two groups of countries, least and most affected by the crisis, as defined in Section 4.1. The negative and significant coefficient of *bank development* for the sample of least affected countries supports the findings of Fan et al. (2004) that in developed economies banks are able to take full advantage of their monitoring power and act as information providers to other creditors. Thus, the larger the banking sector, the more firms are encouraged to issue short-term debt. On the contrary, in less developed countries (most affected by the crisis) a positive and significant relationship shows that a larger banking sector leads to more long-term debts, consistent with Demirguc-Kunt and Maksimovic's (1999) argument that in developing countries with weaker legal systems, a larger banking sector is associated with longer-maturity debt, as creditor's rights are strengthen by the size of the banking sector. In addition, the closer relationship between firms and their banks in developing

countries, and the lack of an efficient equity market, may also encourage banks to grant relatively more long-term debt.

[Insert Table 7]

The findings in table 7 also reveal an opposite pattern in the relationships between *stock market development* and the *term structure of interest rates* and debt maturity between the two groups of countries. In the countries least affected by the crisis, where stock markets are relatively more developed and firms can more easily raise equity finance, firms are found to hold relatively shorter maturity debt. The reverse is true for firms in the most affected countries, where stock markets are less developed. Consistent with the tax hypothesis, firms in the countries most affected by the crisis employ more long-term debt when the term structure of interest rates has a positive slope. On the other hand, the market timing hypothesis dominates the effect in the least affected countries, in line with the findings of Guedes and Opler (1996).[21] This latter finding shows some evidence of less than fully rational behaviour of managers (optimism) as discussed in Baker et al. (2005), namely that managers time their debt maturity choice by issuing short-term debt when the term spread is high, in order to wait for the expected decline of long-term rates. Finally, in line with Demirguc-Kunt and Maksimovic's (1999), high *inflation* is negatively related to the use of long-term debt in the countries most affected by the crisis.

In summary, the results confirm that market-wide determinants are as important as firm-specific characteristics in determining debt maturity structure. These market-wide determinants not only influence the maturity of firm's borrowing, but they also appear to have different effects depending on the country's economic development. As the most developed countries in the sample coincide with the countries least affected by the Asian crisis, it is interesting to further investigate whether the role of firm-specific and market-wide determinants changed as a direct result of the crisis.

5.4 The effects of the 1997 Asian crisis

Table 8 presents the results relating to firm-specific and market-wide determinants over the pre- and post-crisis periods for the two country groupings identified. Firstly, the Asian crisis appears to have had different effects between the country groups on the relationship between debt maturity and leverage, earnings volatility, profitability and asset maturity. *Leverage* was positively related to debt maturity in both the pre- and post-crisis periods. However, the role of long-term debt in offsetting the higher liquidity risk and in delaying the exposure to bankruptcy reduced substantially after the crisis

[21] Previous studies (e.g. Antoniou et al., 2006) also find mixed effects of the term structure of interest rates on debt maturity. Barclay and Smith (1995) show that this result may depend on the methodology applied. They find a negative and significant relationship when panel data are used in pooled OLS and fixed effects, but an insignificant relationship when cross-sectional data are used.

especially in the countries least affected by the crisis. *Earnings volatility* played no role in the most affected countries in either pre- or post-crisis periods, whereas it became a significant negative factor in the least affected countries after the crisis. This negative relationship implies a stronger agency effect in the more developed markets and it is consistent with several studies of developed markets (Guedes and Opler, 1996; Ozkan, 2002). On the contrary, the relationship between *profitability* and debt maturity in the most affected countries became significantly positive in the post-crisis period, implying that the financial crisis might have raised the firm's awareness of tax effects. While the crisis had no impact on the role of *asset maturity* in the most affected countries, the relationship between debt maturity and asset maturity became significantly positive after the crisis for the least affected countries, implying that maturity matching became important only after the crisis.

Secondly, the crisis appears to have had similar effects on the relationship between debt maturity and liquidity and share price performance in both country groupings, regardless of how severely they were hit by the crisis. Although before the crisis *liquidity* played no role, after the crisis it became a significant positive factor in determining debt maturity. This implies that after the crisis firms with higher levels of liquidity chose to issue long-term debt to avoid cash shortages. *Share price performance* became insignificant after the crisis, as stock market uncertainty increased in both country groupings. Thirdly, the results also reveal that the financial crisis did not alter the effects of *firm size*, *growth opportunity* and *firm quality*, in line with previous evidence on the pre- and post-crisis effects of these variables on leverage in the same sample countries (Deesomsak et al., 2004).

[Insert Table 8]

In relation to the market-wide determinants, all coefficients are highly significant in both country groupings in the pre and post-crisis periods, and the direction of the effects is in line with the findings for the whole sample period presented in Table 7. Thus, overall the crisis did not alter the contrasting effects of market-wide determinants observed earlier. However, it significantly changed the size of their impact, especially in the less developed countries. The coefficient of *inflation* is the only one that changes sign after the crisis and becomes positive for both country groupings. This may explain why inflation appeared insignificant in the previous aggregate analysis of the whole sample period, as significant negative and positive effects cancelled each other out. Over the pre-crisis period higher inflation appears to have been associated with reduced long-term debt to minimise the interest rate risk, consistent with Demirguc-Kunt and Maksimovic (1999).

6. Conclusions

The paper investigates the potential effects of firm-specific as well as country-specific characteristics, such as economic conditions, corporate governance and institutional set-up, on the debt

maturity structure of firms. It also provides the first evidence on the effects of the 1997 Asian financial crisis on the determinants of corporate debt maturity choice of firms operating in the region. Several conclusions emerge. First, firms in this region do have a target debt maturity structure. They move towards their target relatively quickly implying that the cost of being in disequilibrium, relative to the costs of moving towards the target, is high. Second, the debt maturity structure of firms in the Asia Pacific region is strongly related to a number of firm-specific and market-wide factors, as well as the country's corporate governance, and the legal and institutional environment. These findings are consistent with a number of previous empirical studies, and offer further evidence for the Asia Pacific region. Third, the evidence supports the view that the debt maturity structure decision can affect the cost of external finance and plays an important role in alleviating some capital market imperfections. In particular, firms with high leverage and growth opportunity use long-term debt to offset the higher probability of a liquidity crisis and to reduce their exposure to bankruptcy risk. The evidence also shows that firms with high information asymmetry and good news to reveal can signal to the market by opting for short-term debt. In addition, small firms and firms with high earnings volatility can reduce their agency cost by using short-term debt. Therefore, the findings provide strong support to the liquidity risk hypothesis and the signalling hypothesis, and mixed evidence in support of the moral hazard hypothesis.

Fourth, the results show that the debt maturity structure decision can also help to alleviate the shortcomings of the legal and corporate governance systems. For example, in countries with low legal protection and monitoring, short-term debt is preferred to mitigate information problem. Short-term debt is also found to reduce the agency costs of firms with low shareholder's protection or with high ownership concentration. Market-wide factors are also found to influence the maturity of firm's debt, and this effect depends on the country's economic development. For example, in developed economies banks can take full advantage of their monitoring power and act as information providers to other creditors. In less developed economies, the closer relationship between firms and their banks, in the absence of efficient capital markets, can encourage banks to grant relatively longer-term debt.

Fifth, the Asian financial crisis of 1997 appears to have had several significant effects on both the firm-specific and market-wide determinants of debt maturity structure, especially in Thailand and Malaysia where the crisis originated. However, even in the countries least affected by the crisis, the debt maturity decision of firms was affected. More specifically, the relationship between debt maturity structure and many of its determinants changed significantly after the crisis, both in size and/or direction. For example, profitable firms seem to have been more concerned about their tax expenses after the crisis. Similarly, banks became more cautious in offering long-term debt to high-levered firms. This forced firms to issue more short-term debt, also reducing the information asymmetry between insiders and outside investors, especially in the countries most affected by the crisis. Finally,

the crisis forced managers to recognise the importance of an appropriate debt maturity structure for their firms, in terms of both reducing funding costs and liquidity constraints, and improving the information flow to outside investors and thus agency problems.

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Figure 1
Average debt maturity ratios (long-term debt / total debt) in the sample countries: 1993 - 2001

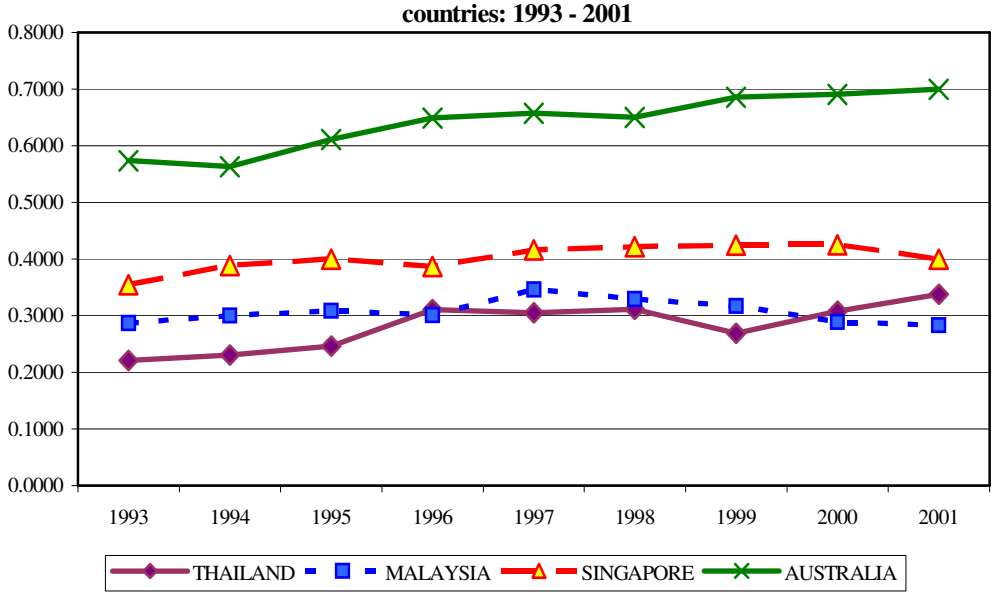

Table 1: Major indicators of economic condition, corporate governance and institutional environment in the sample countries.

	Thailand	Malaysia	Singapore	Australia	Definitions	Source
Economic Condition						
Bank Development	5.0553	5.5927	8.0553	1.0101	The ratio of bank assets to GDP	Datastream
Stock Market Development	2.0826	5.1284	5.4856	0.8061	The ratio of market capitalization to GDP	Datastream
Economic Development	Developing	Developing	Developed	Developed	Indicates whether the country is classified as developed or developing according to the World Bank classification based on countries' gross national income levels.	Fan et al. (2004)
Term Structure of Interest Rates	-0.1981	-1.8475	-2.7007	-16.4418	Government Bond Yield (long-term) – Lending Rate (Monthly)	Datastream
Inflation	4.58	3.41	5.70	1.74	Changes in Consumer Price Index (quarterly)	Datastream
Rule of Law and Legal Protection						
Corruption	6.95	4.9	0.87	1.45	This index ranges from 0 to 10. Larger value indicates more severe corruption	Fan et al. (2004)
Creditor Rights	3	4	4	1	This index aggregates different creditor rights. It ranges from 0 to 4 and is formed by adding 1 when (1) the country imposes restrictions, such as creditors' consent or minimum dividends to file for reorganization; (2) secured creditors are able to gain possession of their security once the reorganization petition has been approved (no automatic stay); (3) secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm; and (4) the debtor does not retain the administration of its property pending the resolution of the reorganization.	La Porta et al. (1998)
Shareholder Rights	2	4	4	4	This index aggregates the shareholder rights. It ranges from 0 to 6 and is formed by adding 1 when (1) the country allows shareholders to mail their proxy vote to the firm (2) shareholders are not required to deposit their shares prior to the general shareholders' meeting, (3) cumulative voting or proportional representation of minorities in the board of directors is allowed, (4) an opposed minorities mechanism is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10% (the sample median), or (6) shareholders have pre-emptive rights that can be waived only by a shareholders' vote.	La Porta et al. (1998)
Ownership Concentration	0.47	0.54	0.49	0.28	Ownership by the 3 largest shareholders of 10 largest non-financial domestic firms	La Porta et al. (1998)
Big-5 Auditors' Market Share	0.58	0.66	0.99	0.89	The share of assets of listed companies audited by the big-five auditors	Fan et al. (2004)

Table 2 : Expected relation between debt maturity structure and firm-specific and country-specific determinants.

Panel A : Firm-Specific Determinants

Determinants	Measurement	Positive	Negative	Mostly found / Expected relation
Leverage (LEV)	Debt to total capital = Total debt / (Total debt + MV of equity + BV of preference share)	Liquidity risk hypothesis	Moral hazard hypothesis	Positive
Firm Size (SIZE)	Natural Logarithm of assets	Moral hazard hypothesis Signalling hypothesis Access to the market, transaction cost	Liquidity risk hypothesis	Positive
Growth Opportunity (GROW)	(Total assets – Book value of equity + Market value of equity) / Total assets	Liquidity risk hypothesis	Moral hazard hypothesis Signalling hypothesis	Negative
Earnings Volatility (VOL)	Absolute value of $\{[(EBIT_t - EBIT_{t-1})] / EBIT_{t-1}\}$ - average of $\{[(EBIT_t - EBIT_{t-1})] / EBIT_{t-1}\}$	Liquidity risk hypothesis	Moral hazard hypothesis Bankruptcy cost	Negative
Liquidity (LIQ)	Current assets/ Current liabilities	-	Capacity	Negative
Profitability (PROF)	Earnings before interest, tax and depreciation/ Total assets	Tax hypothesis	-	Positive
Share Price Performance (SPP)	Changes in share prices	Signalling hypothesis Market timing theory	Optimistic behaviour	Positive
Asset Maturity (AMAT)	Total fixed assets / Total assets	Moral hazard hypothesis Liquidity, financial distress, cash flow	Priority of claim	Positive
Firm Quality (QUA)	Altman's Z-score	-	Signalling hypothesis Moral hazard hypothesis Liquidity risk hypothesis (non-monotonic)	Negative / Non-monotonic

Panel B : Market-Wide Determinants

Determinants	Measurement	Positive	Negative	Mostly found / Expected relation
Economy Development (EDEV)	Dummy equal to 1 for developing economy and 0 otherwise	-	Maturity of the market	Negative
Bank Development (BKDEV)	Bank assets / GDP	Creditor rights	Monitoring system	Negative
Stock market development (MKDEV)	Market capitalization / GDP	Information	Other sources of finance	Positive
Term Structure of Interest Rates (TERM)	Government Bond Yield (long-term) – Lending Rate	Tax Hypothesis	Market timing theory Optimistic behaviour	Positive
Inflation (INF)	Changes in consumer price index	-	Uncertainty	Negative

Panel C : Legal and Governance Determinants

Determinants	Measurement	Positive	Negative	Mostly found / Expected relation
Quality of Legal Enforcement (CORR)	Corruption level (See Table 1)	-	Moral hazard hypothesis	Negative
Legal protection (CRR and SHR)	Creditor rights (See Table 1) Shareholder rights (See Table 1)	- Moral hazard hypothesis	Monitoring System -	Negative Positive
Ownership Concentration (OWN)	Ownership by the 3 largest shareholders of 10 largest non-financial domestic firms (See Table 1)	-	Moral hazard hypothesis	Negative
The presence of information intermediaries (AUD)	The share of assets of listed companies audited by the big-five auditors (See Table 1)	Moral hazard hypothesis	-	Positive

Table 3: Averages of firm-specific and market-wide variables.

Variable	Countries Least Affected by the Crisis			Countries Most Affected by the Crisis		
	Full Sample (1993 - 2001)	Pre-Crisis (1993 - 1996)	Post-Crisis (1998 - 2001)	Full Sample (1993 - 2001)	Pre-Crisis (1993 - 1996)	Post-Crisis (1998 - 2001)
MAT	0.5162	0.4903	0.5290 ***	0.3000 ***	0.2801	0.3044 ***
t-statistics			(-2.6283)	(27.7018)		(-2.7814)
LEV	0.2146	0.1685	0.2478 ***	0.3342 ***	0.1930	0.4247 ***
t-statistics			(-10.5588)	(-22.8519)		(-34.1152)
SIZE	12.1741	12.1175	12.2026	13.2509 ***	13.2692	13.2202
t-statistics			(-1.1857)	(-27.4032)		(0.9552)
GROW	-2.9056	-4.3510	-2.3118 *	1.7701 ***	2.4793	1.2652 ***
t-statistics			(-1.7544)	(-9.2846)		(16.6497)
VOL	3.4567	3.6560	3.2256	2.8833	2.7336	3.0501
t-statistics			(0.6078)	(1.6085)		(-0.8973)
LIQ	2.3815	2.4432	2.3598	1.7119 ***	1.7495	1.6901
t-statistics			(0.4531)	(7.5631)		(0.8461)
PROF	0.0789	0.0713	0.0789	0.0811	0.1274	0.0496 ***
t-statistics			(-0.4834)	(-0.3513)		(17.2047)
SPP	-0.0344	0.1201	-0.1101 ***	-0.1349 ***	0.0716	-0.1222 ***
t-statistics			(10.8188)	(7.1901)		(11.3368)
AMAT	0.3431	0.3311	0.3502 **	0.3995 ***	0.3897	0.4068 ***
t-statistics			(-2.2973)	(-11.6291)		(-2.6642)
QUA	0.0505	1.1523	-0.4806 ***	4.3623 ***	7.3903	2.3712 ***
t-statistics			(3.6640)	(-16.6131)		(10.2228)
BKDEV	5.3197	4.7229	5.9479 ***	5.4288 **	4.7038	5.9828 ***
t-statistics			(-11.7609)	(-2.1736)		(-128.7655)
MKDEV	3.6686	3.7920	3.6902	4.1985 ***	5.3815	3.1652 ***
t-statistics			(1.3760)	(-13.2042)		(61.8787)
TERM	-8.0395	-9.1865	-6.8674 ***	-1.8880 ***	-1.7694	-1.7040 ***
t-statistics			(-11.3347)	(-63.0023)		(-2.9289)
INF	4.4598	7.7899	2.0238 ***	3.3465 ***	4.0405	2.4312 ***
t-statistics			(23.1601)	(9.2681)		(47.7391)

Debt maturity (MAT) is the proportion of long-term debt to total debt. Leverage (LEV) is the debt to capital ratio. Firm size (SIZE) is the natural logarithm of total assets. Growth opportunity (GROW) is the ratio of book value of total assets less book value of equity plus market value of equity to book value of total assets. Earnings volatility (VOL) is the absolute difference between annual percentage change in earnings before interest and taxes and the average of this change. Liquidity (LIQ) is the ratio of current assets to current liabilities. Profitability (PROF) is the ratios of earnings before interest, tax and depreciation to total assets. Share price performance (SPP) is the first difference of logs of annual share price. Asset Maturity (AMAT) is the ratio of total fixed assets to total assets. Firm quality (QUA) is Altman's Z-Score. Bank development (BKDEV) is the ratio of bank assets to GDP. Stock market development (MKDEV) is the ratio of market capitalization to GDP. Term structure of interest rates (TERM) is the differences between government bond yield and lending rate. Inflation (INF) is changes in consumer price index.

*, **, *** Significant at 10%, 5% and 1% level, respectively.

Table 4: Pooled time series and cross sectional analysis of firm-specific determinants by country: 1993 - 2001.

Equation	Thailand		Malaysia		Singapore		Australia	
Constant	-0.5640	***	-0.8712	***	-0.5361	***	-0.2086	
t-statistics	(-3.6100)		(-6.6400)		(-3.4400)		(-1.4100)	
LEV	0.2223	***	0.1086	**	0.2142	***	0.3598	***
t-statistics	(5.2700)		(2.3500)		(3.0500)		(4.0000)	
SIZE	0.0403	***	0.0718	***	0.0601	***	0.0546	***
t-statistics	(3.7000)		(9.6400)		(5.8300)		(4.8500)	
GROW	0.0587	***	0.0066		0.0147		0.0001	
t-statistics	(3.7800)		(1.2200)		(0.6290)		(0.1220)	
VOL	-0.0014	**	0.0002		-0.0017	***	0.0005	
t-statistics	(-2.3700)		(0.2940)		(-3.1100)		(0.8640)	
LIQ	0.0554	***	0.0280	***	0.0544	**	0.0126	*
t-statistics	(5.2500)		(3.1100)		(2.1800)		(1.8500)	
PROF	0.3574	***	0.1268	***	0.1289		-0.1081	***
t-statistics	(4.4700)		(4.4400)		(0.8980)		(-3.4200)	
SPP	-0.0074		0.0053		0.0274	**	0.0387	**
t-statistics	(-0.7180)		(0.8560)		(2.0400)		(2.2800)	
AMAT	0.2489	***	0.2218	***	0.2789	***	0.1096	
t-statistics	(4.0100)		(4.6800)		(4.0000)		(1.2800)	
QUA	-0.0277	***	-0.0007		-0.0095		0.0023	
t-statistics	(-4.7200)		(-1.0900)		(-1.3700)		(1.4100)	
R^2	0.2478		0.1794		0.2540		0.3019	
Adj R^2	0.2358		0.1701		0.2363		0.2769	
No. of obs.	1726		2493		1164		809	

$$Y_{i,t} = \alpha_0 + \sum_{k=1}^{N} \gamma_k FF_{k,i,t} + \alpha_t + \mu_{i,t} \qquad (1)$$

The t-statistics are the t-values adjusted for heteroscedasticity consistent standard errors. Industry and time dummies were included in the model in order to control for industry and time effects but no statistically significant effect was found. See Table 3 and Section 3 for the definition of the variables.
*, **, *** Significant at 10%, 5% and 1% level, respectively.

Table 5: Dynamic debt maturity structure by country: 1993 – 2001.

Equation	Thailand				Malaysia				Singapore				Australia			
	OLS-level	OLS-DIF	GMM-DIF	GMM-SYS	OLS-level	OLS-DIF	GMM-DIF	GMM-SYS	OLS-level	OLS-DIF	GMM-DIF	GMM-SYS	OLS-level	OLS-DIF	GMM-DIF	GMM-SYS
	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4
Constant	-0.2691***	0.0133	0.0369	-0.6217**	-0.2840***	-0.0274	-0.0046	-0.5366***	-0.2021*	-0.0069	-0.0167	-0.7261**	-0.0250	0.0424	0.0476	-0.2240
t-statistics	(-3.7100)	(0.8090)	(1.1900)	(-2.0800)	(-2.9700)	(-0.6240)	(-0.0977)	(-3.0000)	(-1.7200)	(-0.2390)	(-0.4000)	(-2.4600)	(-0.2780)	(1.5200)	(1.2700)	(-0.8770)
MAT_{t-1}	0.5927***	-0.2451***	0.3623***	0.4200***	0.6189***	-0.1889***	0.4012***	0.5273***	0.5552***	-0.2541***	0.1616**	0.3621***	0.5936***	-0.2852***	0.1178	0.3109***
t-statistics	(20.5000)	(-6.6300)	(4.000)	(6.7100)	(28.7000)	(-6.1200)	(6.1700)	(9.7600)	(15.0000)	(-6.8900)	(2.5400)	(5.3600)	(11.4000)	(-5.8800)	(1.4900)	(3.9500)
LEV	0.1590***	0.2692***	0.2547	0.1705**	0.0899***	0.0274	-0.2629	0.0694	0.0840	0.2275**	0.1479	0.2390**	0.2059***	0.3690**	0.2932	0.2679*
t-statistics	(5.3300)	(3.9100)	(1.3900)	(2.5300)	(3.5200)	(0.4430)	(-1.4500)	(1.3600)	(1.5300)	(2.2300)	(0.6010)	(2.4800)	(3.0500)	(2.4300)	(1.2600)	(1.8400)
SIZE	0.0143***	-0.0043	-0.0981	0.0445**	0.0267***	0.1127***	0.0799	0.0460***	0.0274***	-0.0066	0.0272	0.0650***	0.0163**	0.0358	0.1320	0.0387*
t-statistics	(3.1500)	(-0.2630)	(-1.1600)	(2.1400)	(6.0800)	(4.8600)	(1.4800)	(3.9800)	(3.8900)	(-0.1190)	(0.2590)	(2.9100)	(2.2100)	(0.6100)	(1.1700)	(1.8500)
GROW	0.0455***	-0.0090	0.0420	0.0014	0.0121**	0.0105	0.0194	0.0167**	-0.0083	-0.0420	0.0019	-0.0094	0.0003	-0.0003	-0.0017	0.0000
t-statistics	(3.0900)	(-0.3890)	(0.9270)	(0.0564)	(2.3100)	(1.0500)	(1.1400)	(2.1000)	(-0.4830)	(-1.4900)	(0.0253)	(-0.3450)	(0.4770)	(-0.1270)	(-0.4390)	(-0.0152)
VOL	-0.0013***	0.0003	0.0017***	0.0002	0.0006	-0.0004	0.0003	0.0015	-0.0008***	-0.0001	0.0001	-0.0008***	-0.0005	-0.0001	0.0006**	-0.0003
t-statistics	(-2.8700)	(0.4680)	(2.8500)	(0.1810)	(0.6920)	(-0.3760)	(0.1960)	(1.2200)	(-2.8500)	(-0.5150)	(0.4230)	(-2.6400)	(-0.9270)	(-0.3570)	(2.0200)	(-0.7320)
LIQ	0.0468***	0.0496***	0.0728**	0.0628***	0.0346***	0.0339***	0.0529***	0.0486***	0.0243	0.0387	0.1227**	0.0688*	0.0126***	0.0181*	0.0357*	0.0204***
t-statistics	(4.7900)	(2.6600)	(2.3100)	(3.7200)	(6.0000)	(2.6000)	(3.1600)	(4.0100)	(1.1400)	(1.1500)	(2.4700)	(1.6900)	(3.7800)	(1.8800)	(1.8700)	(3.4300)
PROF	0.2155***	0.0199	-0.0741	0.2082**	0.1390***	0.0394	0.0611	0.0936**	0.0567	-0.0569	0.1308	0.3524*	-0.0648	-0.1046	-0.2220	-0.0725
t-statistics	(3.5100)	(0.2680)	(-0.4040)	(2.0200)	(4.4800)	(1.4000)	(1.5400)	(2.0300)	(0.4000)	(-0.3300)	(0.5930)	(1.7600)	(-0.6800)	(-0.6130)	(-1.4900)	(-0.6520)
SPP	-0.0174*	-0.0282***	-0.0718***	-0.0437***	0.0039	0.0040	0.0182	-0.0015	-0.0007	-0.0101	0.0057	-0.0071	0.0389**	0.0269	0.0389	0.0515**
t-statistics	(-1.7700)	(-3.2300)	(-3.1100)	(-4.0100)	(0.5760)	(0.8470)	(1.6100)	(-0.2130)	(-0.0490)	(-0.7850)	(0.1970)	(-0.3840)	(2.2200)	(1.3700)	(0.9860)	(2.4400)
AMAT	0.1075***	-0.0489	0.1581	-0.0614	0.1040***	0.2235**	0.0587	0.1053	0.1060**	0.0475	0.2809	0.1242	0.0603	0.3274*	0.2794	0.1197
t-statistics	(3.0200)	(-0.5230)	(0.5370)	(-0.5170)	(3.7600)	(2.4700)	(0.2450)	(1.2100)	(2.0900)	(0.3640)	(0.6930)	(0.8560)	(1.0600)	(1.7600)	(0.7210)	(0.9910)
QUA	-0.0191***	-0.0053	-0.0239*	-0.0150	-0.0018**	-0.0007	-0.0002	-0.0015	-0.0014	0.0085	-0.0001	-0.0024	0.0018	0.0007	0.0000	0.0022
t-statistics	(-3.9900)	(-0.6140)	(-1.9200)	(-1.3800)	(-2.3200)	(-0.3660)	(-0.0957)	(-0.8710)	(-0.2400)	(0.6910)	(-0.0042)	(-0.2390)	(1.5200)	(0.4740)	(0.0058)	(1.1100)
AR (1)	-1.306	-2.409**	-5.602***	-5.959***	0.028	-3.266***	-6.198***	-6.628***	-0.466	-0.434	-4.032***	-4.793***	-1.229	-1.002	-2.575**	-0.3160***
AR (2)	1.129	-3.474***	0.225	0.794	1.730*	-2.754***	0.701	0.884	2.393**	-2.612***	-0.037	0.333	0.353	-1.538	0.490	1.110
Wald Test 1(df)	1595.00 (21)***	96.85 (10)***	51.79 (10)***	131.10 (10)***	2313.00 (21)***	93.08 (10)***	65.48 (10)***	227.90 (10)***	1204.00 (21)***	73.28 (10)***	19.52 (10)**	162.20 (10)***	844.60 (21)***	47.54 (10)***	41.93 (10)***	65.06 (10)***
Wald Test 2(df)	30.27 (7)***	8.61 (6)	9.51 (6)	18.83 (7)***	65.09 (8)***	25.32 (7)***	11.40 (7)	27.56 (8)***	10.98 (7)	8.82 (6)	4.20 (6)	16.24 (7)**	10.78 (8)	14.46 (7)**	7.39 (7)	13.60 (8)*
Wald Test 3(df)	16.60 (6)**	8.61 (6)	9.51 (6)	11.18 (6)*	18.99 (7)***	25.32 (7)***	11.40 (7)	8.06 (7)	6.97 (6)	8.82 (6)	4.20 (6)	9.68 (6)	10.72 (7)	14.46 (7)**	7.39 (7)	12.56 (7)*
Sargan Test (df)	-	-	66.71 (50)*	131.10 (119)	-	-	58.90 (60)	152.20 (149)	-	-	62.93 (50)	121.40 (129)	-	-	60.30 (60)	112.70 (139)
No. of Obs	1412	1157	1157	1412	1807	1384	1384	1807	889	711	711	889	597	468	468	597
No. of Firms	255	255	255	255	423	423	423	423	178	178	178	178	129	129	129	129

$$Y_{i,t} = \alpha_0 + \beta_1 Y_{i,t-1} + \sum_{k=1}^{N} \gamma_k FF_{k,i,t} + \alpha_i + \alpha_t + \mu_{i,t} \qquad (2)$$

See Table 3 and Section 3 for the definition of the variables. Firms with less than three year consecutive observations are excluded. Model-1 gives the OLS estimates in levels. Model-2 gives OLS estimates in the first difference. Model-3 gives GMM estimates in the first difference. Model-4 gives system GMM estimates. The t-statistics are the t-values adjusted for heteroscedasticity consistent standard errors. Six test statistics are reported. AR(1) and AR(2) are first and second order autocorrelation of residual, respectively; which are asymptotically distributed as N(0,1) under the null of no serial correlation. Wald Test 1 tests the joint significance of estimated coefficients; asymmptotically distributed as $\chi 2$(df) under the null of no relationship. Wald test 2 and 3 test the joint significance of time and dummies. Sargan Test is the test of over identifying restrictions, asymptotically as $\chi 2$(df) under null of instruments' validity. Time dummies are included in all models. Industry dummies are included only in model (1).

Table 6: Pooled time series and cross sectional analysis of firm- and country-specific determinants across all sample countries: 1993 - 2001.

Equation	Panel A : Alternative models that include firm-specific and market-wide determinants						Panel B : Alternative models that include firm-specific and legal and governance determinants				
	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6	Model-7	Model-8	Model-9	Model-10	Model-11
Constant	-0.3099 ***	-0.1879 ***	0.0228	-0.0739	-0.4249 ***	-0.0710	-0.2630 ***	0.1378 *	-0.8488 ***	0.3888 ***	-0.9190 ***
t-statistics	(-3.5600)	(-2.6600)	(0.3010)	(-0.8780)	(-6.2400)	(-0.9650)	(-3.4800)	(1.7500)	(-7.3400)	(4.5000)	(-9.8300)
LEV	0.1731 ***	0.0915 ***	0.0536 *	0.0364	0.0839 ***	0.0354	0.1290 ***	0.0480	0.1320 ***	0.0634 **	0.1000 ***
t-statistics	(6.1600)	(3.2300)	(1.7800)	(1.1800)	(2.9200)	(1.1600)	(4.4900)	(1.6200)	(4.3000)	(2.1900)	(3.4700)
SIZE	0.0571 ***	0.0456 ***	0.0296 ***	0.0326 ***	0.0371 ***	0.0323 ***	0.0556 ***	0.0277 ***	0.0551 ***	0.0302 ***	0.0501 ***
t-statistics	(9.6900)	(10.2000)	(6.8700)	(7.1400)	(8.7400)	(7.4200)	(10.6000)	(6.5400)	(9.1200)	(7.2600)	(10.4000)
GROW	-0.0006	-0.0010	-0.0011	-0.0018	0.0000	-0.0018	-0.0015	-0.0005	-0.0023 *	-0.0002	-0.0016
t-statistics	(-0.5120)	(-0.8800)	(-0.9550)	(-1.4400)	(-0.0380)	(-1.4400)	(-1.2100)	(-0.5000)	(-1.7100)	(-0.1640)	(-1.2400)
VOL	-0.0008 **	-0.0009 **	-0.0008 **	-0.0008 **	-0.0009 **	-0.0008 **	-0.0009 *	-0.0009 **	-0.0007 *	-0.0009 **	-0.0009 *
t-statistics	(-1.9600)	(-1.9900)	(-2.2800)	(-2.0800)	(-2.3700)	(-2.0800)	(-1.7700)	(-2.4000)	(-1.6600)	(-2.4200)	(-1.8300)
LIQ	0.0222 ***	0.0207 ***	0.0204 ***	0.0219 ***	0.0179 ***	0.0218 ***	0.0234 ***	0.0184 ***	0.0263 ***	0.0176 ***	0.0226 ***
t-statistics	(3.9200)	(3.8500)	(3.7200)	(3.8500)	(3.3200)	(3.8700)	(4.1300)	(3.4800)	(4.2900)	(3.3800)	(4.0500)
PROF	00358	0.0414	0.0576 *	0.0811 **	0.0146	0.0800 **	0.0629 *	0.0328	0.1052 ***	0.0162	0.0620 *
t-statistics	(1.1000)	(1.3200)	(1.8200)	(2.2800)	(0.5150)	(2.3100)	(1.8200)	(1.1300)	(2.6900)	(0.5800)	(1.8300)
SPP	0.0097 **	0.0156 ***	0.0184 ***	0.0218 ***	0.0176 ***	0.0224 ***	0.0148 ***	0.0176 ***	0.0178 ***	0.0153 ***	0.0167 ***
t-statistics	(1.9900)	(3.1200)	(3.6200)	(3.7200)	(3.5400)	(4.2400)	(2.9600)	(3.4800)	(3.4400)	(3.0600)	(3.2900)
AMAT	0.2137 ***	0.1719 ***	0.1311 ***	0.1244 ***	0.1667 ***	0.1243 ***	0.1913 ***	0.1345 ***	0.1784 ***	0.1476 ***	0.1752 ***
t-statistics	(6.6800)	(5.2000)	(3.7000)	(3.5100)	(4.9200)	(3.5100)	(5.8600)	(3.8100)	(5.2500)	(4.2700)	(5.3000)
QUA	0.0004	-0.0016	-0.0027 **	-0.0044 **	0.0003	-0.0044 ***	-0.0020 *	-0.0015	-0.0039 ***	-0.0004	-0.0026 **
t-statistics	(0.5700)	(-1.5700)	(-2.1600)	(-2.5500)	(0.3350)	(-2.6500)	(-1.8400)	(-1.5300)	(-2.6100)	(-0.5260)	(-2.0700)
THDUM	-0.5041 ***										
t-statistics	(-17.9000)										
MLDUM	-0.3504 ***										
t-statistics	(-14.9000)										
SPDUM	-0.2218 ***										
t-statistics	(-8.4000)										
EDEV		-0.2446 ***									
t-statistics		(-14.7000)									
BKDEV			-0.0232 ***								
t-statistics			(-5.1600)								
MKDEV				0.0008							
t-statistics				(0.1650)							
TERM					-0.0241 ***						
t-statistics					(-14.5000)						
INF						0.0009					
t-statistics						(0.8430)					
CORR							-0.0561 ***				
t-statistics							(-15.0000)				
CRR								-0.0718 ***			
t-statistics								(-8.0300)			
SHR									0.1149 ***		
t-statistics									(10.6000)		
OWN										-1.1820 ***	
t-statistics										(-12.0000)	
AUD											0.7215 ***
t-statistics											(13.7000)
R^2	0.2760	0.2273	0.1559	0.1403	0.2147	0.1403	0.2420	0.1720	0.1981	0.1978	0.2228
Adj. R^2	0.2723	0.2237	0.1520	0.1362	0.2110	0.1363	0.2385	0.1681	0.1943	0.1941	0.2192
No. of Obs.	6192	6192	6192	6192	6192	6192	6192	6192	6192	6192	6192

$$Y_{i,t} = \alpha_0 + \sum_{k=1}^{N} \gamma_k FF_{k,i,t} + \sum_{m=1}^{N} \beta_m CountrySpecific_{m,j,t} + \alpha_t + \mu_{i,t} \qquad (1)$$

Country-specific determinants replace country dummies one at a time. The t-statistics are the t-values adjusted for heteroscedasticity consistent standard errors. Industry and time dummies were included in the model in order to control for industry and time effects but no statistically significant effect was found. See Table 1 and 3 and Section 3 for the definition of the variables.

*, **, *** Significant at 10%, 5% and 1% level, respectively.

Table 7: Pooled time series and cross sectional analysis of firm-specific and market-wide determinants by country groupings : 1993 - 2001.

Equation	Alternative models that include firm-specific and market-wide determinants							
	Panel A : Countries Least Affected by the Crisis				Panel B : Countries Most Affected by the Crisis			
	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4
Constant	-0.2041 *	-0.2283 **	-0.6081 ***	-0.4095 ***	-1.0499 ***	-0.8244 ***	-0.3194 ***	-0.3484 ***
t-statistics	(-1.8300)	(-2.0500)	(-5.7900)	(-3.4900)	(-5.8300)	(-5.3500)	(-2.8900)	(-3.1200)
LEV	0.2687 ***	0.2476 ***	0.2355 ***	0.1681 ***	0.1353 ***	0.1686 ***	0.1231 ***	0.1154 ***
t-statistics	(5.1900)	(4.7800)	(4.5700)	(3.0100)	(4.1300)	(5.0600)	(3.7500)	(3.5200)
SIZE	0.0541 ***	0.0560 ***	0.0576 ***	0.0641 ***	0.0457 ***	0.0513 ***	0.0401 ***	0.0388 ***
t-statistics	(7.5100)	(7.8200)	(8.1000)	(8.1700)	(7.5700)	(7.3600)	(7.5000)	(7.4200)
GROW	-00003	-0.0003	-0.0003	-0.0013	0.0112 *	0.0080	0.0090	0.0086
t-statistics	(-0.2760)	(-0.3440)	(-0.3630)	(-1.0900)	(1.8700)	(1.4900)	(1.5100)	(1.4500)
VOL	-0.0005	-0.0005	-0.0005	-0.0008	-0.0006	-0.0007	-0.0005	-0.0006
t-statistics	(-1.1400)	(-1.0800)	(-1.0900)	(-1.1400)	(-1.0300)	(-1.0900)	(-0.8420)	(-1.0300)
LIQ	0.0181 **	0.0181 **	0.0177 **	0.0213 ***	0.0259 ***	0.0285 ***	0.0251 ***	0.0248 ***
t-statistics	(2.4800)	(2.4400)	(2.3600)	(2.6300)	(3.5900)	(3.8100)	(3.6400)	(3.6000)
PROF	-00940 ***	-0.0939 ***	-0.0932 ***	-0.0265	0.1292 ***	0.1502 ***	0.1229 ***	0.1121 ***
t-statistics	(-2.8300)	(-2.8900)	(-2.8100)	(-0.6590)	(4.4400)	(5.0000)	(4.1900)	(3.8700)
SPP	0.0355 ***	0.0508 ***	0.0330 ***	0.0471 ***	0.0083	-0.0131 **	-0.0028	0.0035
t-statistics	(3.2800)	(4.5400)	(3.0300)	(4.0200)	(1.5700)	(-2.1100)	(-0.4820)	(0.6470)
AMAT	0.1946 ***	0.1915 ***	0.1936 ***	0.1542 ***	0.1961 ***	0.2137 ***	0.1828 ***	0.1818 ***
t-statistics	(3.7800)	(3.7200)	(3.7400)	(2.6900)	(4.9900)	(5.4800)	(4.6200)	(4.5800)
QUA	0.0023	0.0019	0.0020	-0.0041 **	-0.0012	-0.0015 *	-0.0013	-0.0013
t-statistics	(1.4900)	(1.2300)	(1.3100)	(-2.2500)	(-1.5900)	(-1.7000)	(-1.6100)	(-1.6200)
BKDEV	-0.0375 ***				0.1188 ***			
t-statistics	(-9.3900)				(5.3500)			
MKDEV		-0.0562 ***				0.0402 ***		
t-statistics		(-9.0800)				(6.4000)		
TERM			-0.0203 ***				0.0346 ***	
t-statistics			(-8.8200)				(4.4300)	
INF				-0.0008				-0.0115 ***
t-statistics				(-0.5240)				(-2.9400)
R^2	0.3334	0.3257	0.3255	0.2534	0.1540	0.1692	0.1466	0.1433
Adj. R^2	0.3235	0.3157	0.3154	0.2422	0.1481	0.1634	0.1407	0.1374
No. of Obs.	1973	1973	1973	1973	4219	4219	4219	4219

$$Y_{i,t} = \alpha_0 + \sum_{k=1}^{N} \gamma_k FF_{k,i,t} + \sum_{m=1}^{N} \beta_m Market - Wide_{m,j,t} + \alpha_t + \mu_{i,t} \quad (1)$$

Market-wide determinants replace country dummies one at a time. The t-statistics are the t-values adjusted for heteroscedasticity consistent standard errors. Industry and time dummies were included in the model in order to control for industry and time effects but no statistically significant effect was found. See Table 1 and 3 and Section 3 for the definition of the variables.

*, **, *** Significant at 10%, 5% and 1% level, respectively.

Table 8: Pooled time series and cross sectional analysis of firm-specific and market-wide determinants by country groupings: pre- and post-crisis.

Equation	Alternative models that include firm-specific and market-wide determinants															
	Panel A : Countries Least Affected by the Crisis								Panel B : Countries Most Affected by the Crisis							
	Model-1		Model-2		Model-3		Model-4		Model-1		Model-2		Model-3		Model-4	
	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis
Constant	-0.4345***	-0.0966	-0.4547***	-0.1290	-0.7568***	-0.4629***	-0.5652***	-0.3940***	-1.2788***	-1.2677***	-0.5882***	-0.7615***	-0.2793*	-0.3414***	-0.3184**	-0.7332***
t-statistics	(-2.8500)	(-0.7670)	(-3.0200)	(-1.0300)	(-5.3600)	(-3.9700)	(-3.7200)	(-3.1400)	(-3.3300)	(-6.5100)	(-3.0300)	(-6.7200)	(-1.8900)	(-4.2800)	(-2.0600)	(-6.6700)
LEV	0.5412***	0.1854***	0.5371***	0.1763***	0.5381***	0.1756***	0.5390***	0.0832	0.2083***	0.1274***	0.2212***	0.1510***	0.1610**	0.1108***	0.2109***	0.1258***
t-statistics	(4.6400)	(3.1400)	(4.6100)	(2.9900)	(4.6100)	(2.9800)	(4.7200)	(1.3600)	(2.9100)	(3.5300)	(3.0200)	(4.1400)	(2.3500)	(3.1100)	(3.0400)	(3.5500)
Wald Test		<36.2574>***		<37.3417>***		<37.9178>***		<55.4039>***		<5.0125>**		<3.7031>*		<1.9866>		<5.7682>**
SIZE	0.0701***	0.0536***	0.0706***	0.0538***	0.0711***	0.0540***	0.0734***	0.0617***	0.0410***	0.0499***	0.0421***	0.0566***	0.0394***	0.0416***	0.0429***	0.0453***
t-statistics	(6.4800)	(6.3600)	(6.5700)	(6.3900)	(6.5800)	(6.4200)	(6.4600)	(7.1500)	(4.1600)	(8.3000)	(4.1100)	(8.2400)	(4.1600)	(7.7900)	(4.2000)	(8.0700)
Wald Test		<3.8473>**		<3.9926>**		<4.1347>**		<1.8458>		<2.2036>		<4.4591>**		<0.1724>		<0.1959>
GROW	-0.0017**	-0.0002	-0.0017**	-0.0002	-0.0017**	-0.0002	-0.0023**	-0.0014	0.0060	0.0069	0.0057	0.0057	0.0051	0.0069	0.0049	0.0080
t-statistics	(-2.2400)	(-0.1220)	(-2.2300)	(-0.1120)	(-2.2300)	(-0.1030)	(-2.5300)	(-0.7220)	(0.8770)	(0.8780)	(0.8140)	(0.7390)	(0.6750)	(0.8570)	(0.6880)	(0.9900)
Wald Test		<0.7607>		<0.7872>		<0.8188>		<0.2072>		<0.7717>		<0.5463>		<0.7341>		<0.9808>
VOL	0.0010	-0.0016***	0.0010	-0.0015***	0.0010	-0.0015***	0.0008	-0.0019***	0.0005	-0.0010	0.0006	-0.0010	0.0008	-0.0009	0.0008	-0.0009
t-statistics	(1.4200)	(-2.6900)	(1.4000)	(-2.6800)	(1.4700)	(-2.6700)	(1.0800)	(-3.1000)	(0.4660)	(-0.9910)	(0.5380)	(-0.9930)	(0.7330)	(-0.9130)	(0.7320)	(-0.9080)
Wald Test		<7.2333>***		<7.1867>***		<7.1300>***		<9.6005>***		<0.9816>		<0.9853>		<0.8330>		<0.8242>
LIQ	0.0099	0.0277***	0.0102	0.0282***	0.0100	0.0273***	0.0122	0.0298***	0.0187	0.0264***	0.0197	0.0280***	0.0166	0.0252***	0.0193	0.0252***
t-statistics	(1.2400)	(3.8700)	(1.2600)	(3.9700)	(1.2500)	(3.8600)	(1.4500)	(3.9000)	(1.1400)	(3.8300)	(1.1900)	(3.9800)	(1.0500)	(3.8200)	(1.1900)	(3.8500)
Wald Test		<14.9628>***		<15.7635>***		<14.9081>***		<15.1951>***		<14.6693>***		<15.8793>***		<14.6250>***		<14.8423>***
PROF	-0.1575***	-0.0738	-0.1538***	-0.0812	-0.1556***	-0.0806	-0.1175***	0.0136	-0.1986	0.1403***	-0.1764	0.1581***	-0.2506	0.1388***	-0.1895	0.1439***
t-statistics	(-5.3000)	(-0.9150)	(-5.0400)	(-1.0100)	(-5.0700)	(-0.9980)	(-2.8000)	(0.1560)	(-1.2800)	(3.8400)	(-1.1300)	(4.1700)	(-1.5900)	(3.7900)	(-1.2200)	(4.0000)
Wald Test		<1.0787>		<0.8194>		<0.8659>		<2.2749>		<14.7733>***		<17.4249>***		<14.3704>***		<16.0084>***
SPP	0.0639*	0.0157	0.0739*	0.0321**	0.0666*	0.0141	0.0703*	0.0112	0.0438**	0.0006	0.0342*	-0.0100	0.0687***	-0.0123	0.0546***	0.0041
t-statistics	(1.6800)	(1.2000)	(1.9200)	(2.3900)	(1.7400)	(1.0700)	(1.8300)	(0.7830)	(2.2000)	(0.0852)	(1.6700)	(-1.2900)	(3.4400)	(-1.4100)	(2.9000)	(0.5330)
Wald Test		<13.5884>***		<9.6664>***		<15.8179>***		<17.2043>***		<34.0127>***		<32.4277>***		<86.4760>***		<43.5409>***
AMAT	0.1117	0.2433***	0.1102	0.2422***	0.1120	0.2465***	0.0859	0.2078***	0.2166***	0.1953***	0.2222***	0.2074***	0.2055***	0.1755***	0.2204***	0.1869***
t-statistics	(1.3100)	(4.0200)	(1.2900)	(3.9900)	(1.3000)	(4.0500)	(0.9410)	(3.2800)	(3.2800)	(4.8700)	(3.3500)	(5.2100)	(3.1700)	(4.2900)	(3.3800)	(4.6400)
Wald Test		<16.1455>***		<15.9151>***		<16.4239>***		<10.7776>***		<0.2811>		<0.1390>		<0.5362>		<0.6937>
QUA	0.0027	0.0017	0.0024	0.0012	0.0024	0.0018	-0.0023	-0.0031*	-0.0006	-0.0021	-0.0006	-0.0022	-0.0005	-0.0023	-0.0006	-0.0019
t-statistics	(1.1200)	(0.9890)	(0.9400)	(0.7300)	(0.9610)	(1.0200)	(-0.7040)	(-1.7000)	(-0.6400)	(-0.9090)	(-0.6650)	(-0.9620)	(-0.6270)	(-0.9960)	(-0.6670)	(-0.8340)
Wald Test		<0.9789>		<0.5327>		<1.0477>		<28.8767>*		<0.8268>		<0.9260>		<0.9921>		<0.6949>
BKDEV	-0.0431***	-0.0352***							0.1858***	0.1178***						
t-statistics	(-5.9300)	(-8.8100)							(2.7900)	(5.2100)						
Wald Test		<3.3674>*								<9.0569>***						
MKDEV			-0.0498***	-0.0576***							0.0250***	0.0478***				
t-statistics			(-5.4800)	(-8.2500)							(2.7500)	(6.2700)				
Wald Test				<1.2744>								<8.9428>***				
TERM					-0.0159***	-0.0240***							0.0429***	0.0230**		
t-statistics					(-5.5600)	(-8.1200)							(3.0700)	(2.2600)		
Wald Test						<7.5096>***								<3.8724>**		
INF							-0.0034**	0.0410***							-0.0354***	0.0543***
t-statistics							(-2.2100)	(5.0100)							(-3.8500)	(5.2300)
Wald Test								<29.4336>***								<74.4934>***
R^2	0.3671	0.3364	0.3600	0.3318	0.3615	0.3370	0.3051	0.2714	0.1562	0.1756	0.1575	0.1888	0.1539	0.1615	0.1634	0.1727
Adj. R^2	0.3368	0.3232	0.3294	0.3185	0.3309	0.3238	0.2719	0.2569	0.1350	0.1683	0.1364	0.1815	0.1327	0.1540	0.1424	0.1653
No. of Obs.	527	1232	527	1232	527	1232	527	1232	983	2712	983	2712	983	2712	983	2712

$$Y_{i,t} = \alpha_0 + \sum_{k=1}^{N} \gamma_k FF_{k,i,t} + \sum_{m=1}^{N} \beta_m Market - Wide_{m,j,t} + \alpha_t + \mu_{i,t} \qquad (1)$$

Market-wide determinants replace country dummies one at a time. The t-statistics are the t-values adjusted for heteroscedasticity consistent standard errors. Industry and time dummies were included in the model in order to control for industry and time effects but no statistically significant effect was found. See Table 1 and 3 and Section 3 for the definition of the variables. Wald test (chi-square distributed with 1 degree of freedom) is used to find whether the different of the coefficients between pre-crisis and post-crisis are statistically significant or not.

*, **, *** Significant at 10%, 5% and 1% level, respectively.

Appendix A: The structure of panel data

The panel data are constructed as followed. The sample includes all non-financial firms traded in the national stock exchanges for the period 1993 to 2001. Firms with missing observations during the sample period are excluded. The panel data set is unbalanced as there are more observations for some firms than for others. In dynamic modelling, we also exclude firms with less than three consecutive observations. The total numbers of observations are 1,726 for Thai firms; 2,493 for Malaysian firms; 1,164 for Singaporean firms and 809 for Australian firms.

(a) Number of firms having n continuous observations

n (years)	Thailand	Malaysia	Singapore	Australia
1	2	53	28	12
2	8	63	24	20
3	8	96	32	31
4	31	77	26	33
5	32	73	11	16
6	40	57	30	8
7	40	90	16	8
8	104	31	64	4
9	0	7	0	32
Total	265	547	231	164

(b) Number of observations in each year

Years	Thailand	Malaysia	Singapore	Australia
1993	0	12	0	51
1994	135	57	80	55
1995	173	173	99	55
1996	208	225	123	64
1997	229	295	132	82
1998	251	345	146	104
1999	247	424	174	126
2000	246	465	192	134
2001	237	497	218	138
Total	1726	2493	1164	809

(c) Number of firms in each industry group

Industry	Thailand	Malaysia	Singapore	Australia
1	18	41	9	4
2	30	146	27	13
3	11	31	35	3
4	5	38	42	6
5	28	28	23	26
6	43	64	9	11
7	48	32	12	3
8	7	8	13	8
9	10	29	5	43
10	8	16	4	9
11	18	47	18	7
12	39	67	34	31
Total	265	547	231	164

(d) Number of observations in each industry group

Industry	Thailand	Malaysia	Singapore	Australia
1	115	208	42	33
2	183	675	117	56
3	71	135	153	7
4	29	144	230	33
5	163	138	130	98
6	296	323	59	48
7	347	123	56	17
8	40	36	37	27
9	61	138	20	255
10	50	62	16	29
11	110	194	103	38
12	261	317	201	168
Total	1726	2493	1164	809