DO EXTERNAL FUNDS YIELD LOWER RETURNS?

RECENT EVIDENCE FROM EAST ASIAN ECONOMIES

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Abstract: One of the central explanations of the recent Asian Crisis has been the problem of moral hazard as the source of over-investment and excessive external borrowing. There is however rather limited firm-level empirical evidence to characterise inefficient use of internal and external finances. Using a large firm-level panel data-set from four badly affected Asian countries, this paper compares the rates of return to various internal and external funds among firms with low and high debt financing (relative to equity) among financially constrained and other firms. Selectivity corrected estimates obtained from random effects panel data model do suggest evidence of significantly lower rates of return to long-term debt, even among firms relying more on debt relative to equity in our sample. There is also evidence that average effective interest rates often significantly exceeded the average returns to long-term debt in the sample countries in the pre-crisis period.

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1. Introduction

One of the central explanations of the Asian financial crisis of the late 1990s[1] has been the problem of moral hazard as the common source of over-investment and excessive external borrowing encouraged by various deep-rooted institutional deficiencies (e.g., Krugman, 1998c; Corsetti, Pesenti and Roubini, 1999a). There is however very little direct firm-level evidence on the inefficient use of firm financing, especially, external debt during the period leading to the crisis. Two important exceptions are Claessens *et al*. (2000) and Driffield and Pal (2001), both of whom employ the firm-level Worldscope database. Claessens *et al*. (2000) find some support for the argument that many firms in the worst affected countries namely, Indonesia, Korea, Malaysia and Thailand, had weak financial structure (e.g., relating to leverage ratio, share of short-term debt in total debt, ownership concentration) that left them vulnerable to an economic downturn. Driffield and Pal (2001) found more direct evidence of significant misallocation of capital in the region in terms of excess investment financed by cash flow in Indonesia while that by debt and equity in Korea, Malaysia and Thailand. In a further attempt to explore if this evidence of misallocation of available funds by firms[2] is supported by an analysis of rate of returns to internal and external funds, we shall in this paper directly compare the rates of return to various funds including that to long-term debt during the period leading to

[1] There is now a large and growing literature on the recent Asian crisis that can be classified into two categories. The first are relatively macro-level cross country studies, such as Broome and Morley (2004), Khalid and Kawai (2003), Kim et al (2001)[1], while the second are firm or industry specific studies for one country (for example, see Lee et al (2000), Lee et al (2002), Qin (2001) and Laeven (2002) respectively on corporate leverage, debt and financial constraints y in Korea; Green (2004) on Indonesia's investment behaviour, while Charongseneang and Manakit (2002) analyse the case of Thailand).

the crisis. Evidence of lower return to long-term debt (relative to its cost per unit), even when there is debt-funded overinvestment could in fact strengthen the validity of the moral hazard argument of bad loans. Even in the context of the wider literature, this could be important, as there are theoretical arguments suggesting that returns to external finances may be higher (Baumol et al. 1970) or lower (Jensen, 1986; De Meza and Webb, 1987). This has however not been tested for the East Asian firms in our sample. Baumol et al. (1970) studied the case of US firms and did not distinguish between firms with and without financial constraint; we however argue that it is important to do so, following Hubbard, (1998), especially in the Asian context where capital markets often operate under imperfect conditions. In fact our results based on random effects panel data models with selection for financial constraint do suggest that marginal returns to long-term debt could vary between firms with and without financial constraint and also that effective interest rates far exceeded the returns from long-term debt in our samples, offering further support to the hypothesis of bad loans.

The remainder of this paper is set out as follows. Section 2 discusses the theoretical and the applied literature on efficiency of investment in imperfect capital markets. This highlights some identification problems that we attempt to redress in our empirical analysis. Section 3 outlines the data that are employed in this analysis, while section 4 describes the random effects selection model used to determine the selectivity-corrected rates of return from various internal and external funds. Results are discussed in section 5 while section 6 concludes.

[2] It is important to note here that the present paper focuses on misallocation of funds by firms only and not that by the banks and other financial institutions (domestic and foreign) that has also played an important role in creating the crisis, often being indulged by the bail-out policy of the governments in these countries.

2. Efficiency and rates of return to internal and external funds

There is a now a growing literature on the financing of corporate investment in a world characterised by capital market imperfections (for a survey, see Schiantarelli, 1996). This section critically reviews the literature on the relative efficiency of investment financed by various internal and external sources in imperfect capital markets.

Under the Modigliani-Miller theorem (1958), internal and external funds are perfect substitutes, and firm investment decisions are independent of the source of finance. Thus all firms are assumed to have equal access to capital markets. Conventional representative firm models may apply to the mature companies with well-known prospects. However, financial factors appear to matter for other firms, especially in the short run. These disparities in the access to capital are generally rationalised in terms of problems of contract enforcement and informational asymmetries. Thus sources of financing are expected to influence firms' investment decisions under capital market imperfections. The Pecking Order hypothesis, for example, argues that the availability of internally generated funds determines the amount and type of external financing to be used. There is now a substantial literature that offers a micro-foundation of the link between a firm's financial structure and real investment in terms of transaction costs, tax advantages, agency problems, costs of financial distress and asymmetric information (see Driffield and Pal, 2001 for a survey of this literature).

Market imperfections also affect the rates of return to internal and external funds, reflecting various costs of market failure. One common argument in this respect emerges from the development of the managerial theories of the firm emphasizing that managerial interests may often diverge from those of the

shareholders. For example, managers who control large internal sources of finance are more likely to pursue their own goal of firm growth and invest in projects whose returns are lower than shareholders could obtain elsewhere. However, firms who raise funds externally are closely monitored by the financial markets and hence are more likely to act in shareholders' interests. The early analysis of Baumol, *et al* (1970) lends some support to this hypothesis: although retained earnings have positive rates of return, investment financed by equity issues earns significantly higher rates of return. These differences are argued to be consistent with the differentials in transaction costs since these costs are the highest for external equity and lowest for retained earnings.

However a firm's choice between debt and equity is not unambiguous. Relative to gross proceeds, the cost of a new share issue (including registration fees, taxes, selling and administrative expenses) can vary substantially by the size of the offering where the costs of small offerings can be high. The design of the corporate tax system has also attributed to a cost advantage to internal finance over external equity finance. King (1977) and Auerbach (1979) argued that shareholders benefit from externally financed projects only if marginal q exceeds unity while projects financed through retentions need only a q less than unity. Asymmetric information may generate further costs for external equity finance. For example, Myers and Majluf (1984) consider the impact of asymmetric information when new investors are less informed about the value of the firm than existing shareholders; the latter may give rise to the problem of under-investment. The firm will not carry out a project with a positive NPV if the under pricing of the new capital, caused by asymmetric information, is higher than the value of the project. In this case, firms will use a Pecking Order of funds where the least risky form of financing is preferred.

Debt finance, particularly, long-term debt, may create agency problems because of the limited liability of debt contracts. The latter may induce the firm managers to act against the interests of creditors and may lead to over investment in projects with negative NPV (e.g., see De Meza and Webb, 1987). Jensen (1986) suggests that conflicts of interest between shareholders and mangers over pay-out policies are severe when the organization produces substantial free cash flow. Thus firms may engage in projects with negative net present value (NPV) because managers may like to pursue growth. However, use of debt rather than equity could redress this problem of over investment by reducing the cash flow available for spending at the discretion of the managers. Debt creation, without retention of the proceeds of the issue, enables managers to effectively bond their promise to pay out future cash flows that cannot be accomplished by simple dividend increases. In doing so, they give shareholder recipients the right to take the firm into bankruptcy court if they do not maintain their promise to make the interest and principal payments. Hadlock (1998) extends this argument, suggesting that there are significant asymmetries within this framework related to insider holdings, such that firms with large insider holdings are far less prone to over investment. Hubbard *et al.* (1995) demonstrate that over investment is a feature of low-dividend firms.

Thus misallocation of capital is likely to occur under imperfect market conditions and may be reflected in the differential rates of return to various internal and external sources of finance. Even when equity or debt is used, agency problems may persist in these markets, which in turn would imply lower returns to external finances, contrasting the findings of Baumol et al. (1970) for the US firms. One can find additional moral hazard problems for the firms operating in the sample countries. The first one is that of "crony capitalism," where personal connections and political

patronage, rather than entrepreneurial abilities, determine who gets access to credit and other resources and on which terms (e.g., Krugman, 1998b). Others emphasize the role of industrial policy in providing (at least implicit) guarantees to investment projects in government-favoured industries, thus encouraging their managers to take excessive risk (e.g., Brittan, 1997). Still others argue that the large firms in the crisis-stricken countries, especially Korea, had taken excessive risks because they knew that the governments would be unwilling and/or unable to let them go bankrupt for fear of knock-on effects on the rest of the economy—the logic of so-called *too big to fail* (e.g., Yoo, 1997). While the role of variety of moral hazard problems on bad loans among the East Asian corporations in the recent Crisis has been highlighted in the literature, there is little effort to characterise the inefficient use of available finance, especially, external loans. We aim to fill in this gap of the literature and compare the rates of return to internal and external funds in these countries.

Secondly, and more importantly, the existing empirical studies in this respect including the early paper of Baumol et al. (1970), seem to ignore an important selection problem that may arise in analysing efficiency with which internal and external funds are used by the corporate sector. Firms that are performing well may find it easier to raise finance (especially in markets characterised by imperfections and/or asymmetric information), in the form of debt and/or equity, and will (one assumes) have greater levels of funds for new investment (see Hubbard, 1998 for a review). In other words, we need to distinguish between financially constrained and unconstrained firms while computing the rates of return; otherwise the uncorrected estimates of rates of return are likely to be biased.

There are various criteria commonly used to identify financially constrained firms for whom information and agency problems are more severe. These include

firm size (Gertler and Gilchrist, 1994), retention ratio (Fazzari, Hubbard and Petersen, 1988), dividend pay out ratio (Fazzari et al. 1988), debt-equity ratio (Agung, 2000) and one or more of the above. The basic problem with testing for financial constraints in the context of Q models is that average Q may be a very imprecise proxy for the shadow value of an additional unit of new capital. Whited (1992), Bond and Meghir (1994), Hubbard et al. (1995) use Euler equations for capital to infer about financing constraints from this. The latter avoids relying on measures of profitability based on firms' market value. However, this approach still requires certain assumptions, most notably that the tightness of the relevant constraints is more or less time invariant.

In the light of the available information, we have experimented with three possible indicators of a firm's financial constraint including retention ratio, debt-equity ratio as well as external finance as a share of capital. But we find that debt-equity ratio fits our sample best (for further discussion, see Section 2).[3] We shall subsequently adopt a two-stage approach to determine the rate of return on assets for firms over the period 1989-97. We first determine the variation in the degree of financial constraints[4] faced by a particular firm in a given year and then calculate the selectivity-corrected rates of return from various internal and external sources of finance among firms with and without constraint (using panel data technique). This will allow us to calculate the corrected (as opposed to uncorrected)[5] rates of return, especially to long-term debt.

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[3] Note that use of firm-level panel data also allows us to capture the variation in the financing constraint over time.

[4] We have experimented with three possible indicators of a firm's financial constraint including retention ratio, debt-equity ratio as well as external finance as a share of capital. But we find that debt-equity ratio fits our sample best; for further discussion, see Section 2. Use of panel data also allows us to capture variation of the constraint over time.

[5] Uncorrected rates of return are obtained by estimating single-step return on assets equation for all firms (without incorporating the financial constraint, if any).

3. Data and Methodology

3.1. Data

The data used here are described, and presented at length in Driffield and Pal (2001). Here we provide a brief synopsis: As already indicated, our analysis is based on the Worldscope data obtained from four south eastern Asian countries, namely, Indonesia, south Korea (hereafter Korea), Malaysia and Thailand, and covers the period 1989-97. We focus on the financing behaviour of listed non-financial firms (classified as industrial, utility and transportation in this data-set). This provides an unbalanced panel of over 5000 observations (see Table 1a):

Identifying over-investing firms requires an ex post indicator, as clearly this is not announced at the time. One measure that has been commonly used in this respect is Tobin's q (e.g., Lang, Stultz and Walking, 1991; Doukas, 1995). Conceptually marginal q is an indicator of a firm's optimum investment opportunities. However, given that marginal q is unobservable, researchers have used average q instead. If average $q < 1$, firms are identified to be over-investing. It should however be noted that our sample countries are at different levels of financial market development (e.g., see Demirguc-kunt and Maksimovic, 1995). As such stock market valuations across countries may be different. Hence the q ratio is used here merely as a relative measure within each country, rather than as an absolute measure across countries (the descriptive statistics for the q ratios for the countries are given in table A2). Subject to these clarifications, we find that the degree of over-investment varied among these

countries over the sample period. For example, while only about 35% of Indonesian firms were over investing, all the South Korean firms were found to be doing so according to this criterion.[6] Also a significant proportion of Malaysian (50%) and Thai firms (59%) were over investing in our sample. Thus there is evidence of misallocation of capital in our samples (see further discussion in Driffield and Pal, 2001) and the extent seems to vary among the sample countries.

In the rest of this paper we would like to examine how this misallocation of capital has been reflected in the rates of return to various internal and external funds. In doing so, we shall however analyse firms in different countries as separate entities. This is because these countries are characterised by distinctive institutions (historical/political/legal) as well as corporate/macroeconomic policies – thus there is no a priori reason to assume that same rules of the law have guided the firms in these countries. As such we refrain from pooling these samples.

3.2. Methodology

The central focus of this paper is to determine the efficiency of various internal and external funds. Efficiency is measured here by the rates of return (Π/K) to different types of funds[7], namely cash flow, retained earnings and reserves, long-term debt[8] and equity (all financing variables are expressed as share of capital (K) prevailing in the

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[6] Note however that Korean firms recovered fastest, thanks to the stringent restructuring programmes put in place both by the IMF as well as the Government. This is discussed in detail in Koo (2002) for Korea, and also Charongseneang and Manakit (2002) for Thailand.

[7] Besides pure returns to capital, one may also consider alternative measures of firm level efficiency, for example, total factor productivity. However, due to the poor quality of employment data within this data set, we do not have much confidence in any measures of total factor productivity that can be generated. As an alternative, we construct a measure of (average) capital productivity at the firm level, that is to say, firm's value added / capital stock and examine how it is related to various kinds of internal and external finance. The results from this specification are presented in Appendix table A1 and discussed in footnote 4.

[8] Note that our analysis focuses on long-term loans as this is more important for long-term investment of firms than short-term loans. It is also true in our sample that short-term and long-term loans move together; the latter generally holds not only in the cross-section of firms (see Table 1b), but also over time (see Figures 4a-4d).

beginning of the period). In our empirical work, the rate of return is defined as the ratio of earnings before interest and taxes to total assets of the firm. The underlying idea is that annual earnings before interest and taxes are generated from the levels of investment in the past period and that is why it captures the efficiency of investment funded by different internal and external sources.[9] The sources-of-finance variables (e.g., cash, retained earnings and reserves, new equity and long-term debt) are defined in the usual way (e.g., see Driffield and Pal, 2001) and expressed as share of capital in the beginning of the year. The capital stock is taken to be the value of plant and equipment (most important components of fixed assets of the firm) at the beginning of the year.

Following Baumol et al (1970), we estimate the basic reduced form equation of firm-level efficiency:

$$\frac{\Pi}{K} = \beta_0 + \beta_1 \frac{CASH}{K} + \beta_2 \frac{RERES}{K} + \beta_3 \frac{EQUITY}{K} + \beta_4 \frac{LTD}{K} \quad (1)$$

This is a standard rate of return function used in the literature. We standardise the relevant variables by dividing it by the capital stock prevailing in the beginning of the period because it allows us to reduce heteroscedasticity in the data (e.g., see Hall, 1991).

A Random Effects Model with Sample Selection

As indicated earlier, a simple model as represented by equation (1) would be subject to selection bias since different firms have different abilities to raise funds (internal

[9] In this respect these estimates of efficiency are expected to be symmetric to the estimates of investment (e.g., see Driffield and Pal, 2001). See further discussion in section 4.

and/or external). We therefore propose a model of selection, allowing for the fact that both demand and supply factors may affect the ability of firms to raise different types of internal and external finance. This employs a unique random effects model with sample selection (e.g., see Verbeek and Numan, 1992)[10]. First we use a univariate probit selection equation to determine if the i-th firm, i = 1,…., N is facing any financial constraint in period t = 1, …., T:

$$F^{*}_{it} = \alpha' X_{1it} + d_i + \varepsilon_{1it} \qquad (2)$$

The latent variable F_{it}^{*} represents the financial structure of the firm, and is observed along with X_{it} when the selection variable F_{it}= *1* if $F^{*}_{it} > 0$ and F_{it}= *0* otherwise.

We have experimented with different possible indicators of firm's financial constraint including retention ratio, debt-equity ratio and also debt plus equity (external finance) as a share of capital. We however had problems of getting reasonable sample size with retention ratio and also share of external finance for all cases. For example, there was very small number of firms with low retention in Indonesia and high retention in Thailand. Also when we used share of external finance as an indicator of financial constraint, it was noted that all Indonesian firms used some debt and/or equity while only a minority of firms in the other three sample countries used no external finance.[11] As a result in our final analysis, we have used debt-equity ratio to be the indicator of a firm's financial constraint. We also believe that the latter is particularly relevant in our attempt to identify the firms with bad loans (relative to equity). In particular, firms with more debt (relative to equity), i.e., those with debt-equity ratio greater than unity, are less constrained compared to those

[10] This is a complex type of panel data model estimated using Limdep 8.0. We are not aware of any application of this model in the corporate finance literature. The only application that we are aware of applies the model to the case of Swedish agricultural production (Heshmati, 1997).

[11] Only about 11-15% firms in each sample country did not use any external finance.

with low debt-equity ratio and the latter is likely to affect the rates of return to various funds under imperfect market conditions.

The choice of explanatory variables for such selection equation, employed in the literature, thus far appears to have been done on the basis of "letting the data speak". Rather, we rely simply on the well-understood determinants of firm performance taken from the industrial organisation literature, following Clarke, Davies and Waterson (1984) or Gale and Branch (1982). Thus, we employ output-capital ratio as a measure of firm level efficiency and firm size as an indicator of market power in determining whether a firm is financially constrained or not. Firm size may also influence the ability of firms to raise investment capital (also, see Gertler and Gilchrist, 1994). Our selection equation therefore employs the debt-equity ratio, modelled as a function of firm size (based on total sales) and output-capital ratio.

After selecting the firms with high debt-equity ratio (i.e., F_{it}=1), at the second stage we employ a random effects model to determine the rates of return (R_{it}) from various sources of internal and external funds (X_{2it}) among the selected firms. The general formulation of the rate of return equation is as follows:

$$R_{it} = \beta' X_{2it} + c_i + \varepsilon_{2it} \qquad (3)$$

where (R_{it}, X_{2it}) are observed only when $F_{it} = 1$.

Thus β' represents the marginal (rather than average) rate of return. ε_{2it} is assumed to be normally distributed with zero mean and a constant variance σ^2 and $Cov(\varepsilon_{1it}, \varepsilon_{2it}) = \rho$. For simplicity, c_i and d_i are assumed to be uncorrelated and normally distributed with zero mean and constant variances σ^2_c, σ^2_d respectively. We repeat the same procedure to determine the rates of return for financially constrained firms, i.e., if $F_{it} = 0$.

The contribution of the i-th group to the log-likelihood is:

$$LogL_i / \quad random \quad effects = \sum_{F_{it}=0} \log \Phi(-c_i - \alpha' x_{1it}) +$$

$$\sum_{F_{it}=1} \frac{-\log 2\pi}{2} - \log \sigma - \frac{(R_{it} - d_i - \beta' x_{2it})^2}{2\sigma^2} + \log \Phi \left[\frac{(d_i + \alpha' x_{1it}) + (\rho / \sigma)(R_{it} - d_i - \beta' x_{2it})}{\sqrt{1-\rho^2}} \right]$$

The joint likelihood function is the sum total of the contribution of each group likelihood function. We reparameterize the log-likelihood function and also isolate the two constant terms so that the slope vectors do not contain the constant terms. We maximise the log-likelihood function using Newton iteration and obtain the parameter estimates of αs, βs, σ[12] and ρ. Given the complex nature of the likelihood function, convergence may be difficult to obtain, especially if the sample size is small. All standard errors are adjusted for heteroscedasticity (White's correction).

In order to avoid the important endogeneity problem of sample selection, we use one-period lagged values of explanatory variables in both stages of regression. Inclusion of lagged explanatory variables, however, would mean that for each firm the first observation would be missing. It could also be noted here that we do not pool the firms of different sample countries together as the latter would assume firms in various countries would behave similarly. This would only be valid if firms are guided by similar rules of law; but these countries are rather distinctive in terms of historical developments, institutions as well as economic policies. We argue that differences in firm behaviour in the sample countries would reflect the differential characteristics of these countries in these respects.

[12] This would capture the significance of firm/industry-level unobserved heterogeneity in the rate of return equation. For example, unobserved heterogeneity would account for factors contributing to various agency costs, e.g., if firms were able to get loans from banks or if shareholders were unwilling to fund additional investment.

4. Results

Table 2 summarises the uncorrected *random effects* estimates of *rates of return* on various internal and external funds for all firms. The choice of the random effects model has been guided by the value of the Hausman test statistic. Table 3 summarises the selectivity-corrected estimates among firms with high debt-equity ratio while Table 4 does the same for those with low debt-equity ratio. In each case all the explanatory variables are one-period lagged values of the variables, which in turn implies that the first observation of each firm in all countries will have a missing value of these lagged variables. We have excluded these missing observations to obtain meaningful estimates in all cases. Total observations (with and without missing observations) are shown in each case in Table 2, Table 3 and Table 4.

4.1. Returns to internal and external finances

Table 2 shows that returns to external funds, namely long-term debt are significantly lower than those to some internal funds in the selected countries. Returns to equity too are significantly negative in Indonesia and Thailand. The only exception is Korea, which earns significantly positive returns on equity over this period. In contrast, returns to cash flow are significantly positive in all sample countries except Korea; Indonesian firms also earned a significantly positive returns to retained earnings and reserves. These results however change as we consider the selectivity corrected random effects estimates in these countries.

Table 3 and Table 4 show the selectivity corrected random effects estimates of returns on assets. In each case the standard deviation of the residual term in the rate of return equation is positive and significant. This captures the significance of unobserved firm-specific (time-invariant) heterogeneity in the determination of rates

of return. We also find a significantly negative correlation coefficient between the residual terms in the selection and the returns equations (except Malaysia when DE=1), suggesting the general trend that a higher debt-equity ratio is likely to be associated with a lower rate of return.

Generally larger firms have incurred higher debt, indicating their greater access to external finance in all sample countries. More efficient firms, i.e., firms with higher output-capital ratios, however have lower debt in Indonesia, but higher debt in Korea; the coefficient is insignificant in Malaysia and Thailand.

A comparison of estimates presented in Table 3 and Table 4 suggests some significant differences in rates of return estimates, especially with respect to returns to equity in Korea and Malaysia and returns to long-term debt in Korea, Malaysia and Thailand. We first consider the returns to internal and external finances *among financially unconstrained firms*, i.e., those with high debt-equity ratio. Returns to cash flow are positive and significant in all countries except Korea while those to retained earnings and reserves are positive in all countries except Thailand. Marginal returns to equity are however negative in all countries except Korea (where it is positive and significant) while those to long-term debt are negative (though these coefficients are insignificant in Malaysia and Thailand). Thus more efficient investments among these firms with high debt-equity ratio are those funded by internal sources rather than external funds; in particular, returns to long-term debt tend to be negative in all countries. The latter perhaps reflects the problem of deposit insurance leading to over-reliance on debt in many of these countries.[13]

Secondly, we consider the *financially constrained* firms*, i.e., those* with low debt equity ratio and find little difference in their financing behaviour. As before,

[13] Using Tobin's q as a measure of over-investment, Driffield and Pal (2001) find that all the Korean firms in our sample were over-investing during 1994 and 1997. Also see Appendix Table A1.

returns to cash flow are significant and positive for firms in all sample countries while those to retained earning are positive in Indonesia and negative in Thailand (these coefficients are positive, but insignificant in Korea and Malaysia). In addition, marginal returns to equity and long-term debt are persistently negative in most countries.

We conclude this section by comparing the uncorrected (Table 2) and corrected (Table 3 and Table 4) returns to long-term debt in our sample. It follows that the uncorrected estimates tend to over-emphasize the low returns to long-term debt in all the sample countries. Correcting for the likely selectivity bias however gives us a rather mixed picture; this is especially noted in the Korean case: rates of return to long-term debt are negative among firms with high leverage, but positive among firms with low leverage. The latter clearly documents the problem of bad loans in the country, especially among those who tend to rely more on long-term debt. Even otherwise, there is evidence of persistent misallocation of external funds, especially long-term loans, among firms in all the selected countries in our sample. These results reflect an obvious link to the likelihood of 'bailout' interventions by the governments in East Asia indulging in excessively risky borrowing and investments by firms.

4.2. Efficient use of long-term debt

Driffield & Pal (2001) demonstrate that capital market imperfections impact on investment levels in different ways among the East Asian countries. In particular, during the period leading up to the Asian Crisis firms in Thailand and Korea were engaged in over investment, primarily funded by external debt. Selectivity corrected estimates presented in section 3.1 do corroborate the persistence of misallocation of funds in these firms and highlight the low rates of returns to external finances in

general and long-term debt in particular. In this subsection, we directly focus on the issue of efficiency of long-term debt and compare average returns to and costs of long-term debt in our sample; if the cost of capital consistently exceeds the rates of return, then concerns would remain over the efficiency with which long-term debt is used.[14]

First, it is necessary to derive a measure of rate of return to long-term debt. In the absence of a better measure of return to long-term debt, we adopt the following procedure. In terms of the simplest relationship (1), marginal return to long-term debt (as a share of capital) is given by:

$$\hat{\beta}_4 = \frac{d(\Pi / K)}{d(LTD / K)}.$$

Using the estimate of β_4 in Table 2, one can obtain the predicted return to LTD (as a share of capital) as:

$$\mathrm{Re}turn_{it} = \hat{\beta}_4 . \frac{LTD_{it}}{K_{it}} .$$

In the absence of any better measure, predicted returns are compared with the average effective interest rate faced by an individual firm in a given year; effective interest rate is measured here as the total interest expenses as a ratio of total debt (both short-term and long-term debt). Given that interest rate is likely to increase with the length of the time period over which the payment is produced (Benninga and Wiener, 1998), effective interest rate measure used here really corresponds to the lower bound of the interest rate faced by the sample firms on long-term loan.

[14]The difficulty of attaining efficiency is likely to be higher for short-term (as compared to long-term) loan as firms do not have enough time to use it productively before the loan is due for repayment. The

Finally, we construct a measure of inefficiency as follows:

EFF = Effective interest rate - Predicted returns to LTD

The distribution of EFF is of some interest to us as it enables a comparison between the *predicted* returns to long term debt (as a ratio of total capital) and the effective interest rate. As indicated above, there are clearly limits to the extent to which one could use such a comparison to draw inferences on the efficient allocation of long-term debt, or determine the rent that is extracted from the capital market; the results are nevertheless instructive.

Figures 1a-1d present the distribution of the implied inefficiency of long-term debt for each of the countries. These figures illustrate the magnitudes of the measure of inefficiency of long-term debt across sample firms in these selected countries. In each case there are a significant number of observations with seemingly very high cost of capital, but allowing for this, the distributions of the efficiency of debt are very similar across the four countries. Malaysia and Korea have a large number of firms where the differential is very small, while the distributions for Thailand and Indonesia appear to be more normal. While in all cases there are large proportion of firms that have a significant deviation between returns and average costs of debt, the figures illustrate that in many cases this differential is exceptionally large. In all cases, the median differential is in the area of 10%, with relatively high proportions of firms having a significant difference between return to and cost of long term debt.

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upshot is that if efficiency does not hold good for the long-term loans, it is unlikely to hold for the

Similarly using estimates presented in Tables 2 & 3, we calculate the measure of EFF for firms with low/high debt (relative to equity); these distributions were rather similar to those shown in Figures 1a-1d.[15] The Korean case is however noteworthy where the marginal rates of return to long-term debt are different across the two groups. Distribution of EFF for the Korean firms with high and low debt-equity ratios are shown in Figures 2a and 2b. These figures illustrate that there are more firms in the low debt-equity category while the distributions across the two groups are very similar for the country. Both groups are essentially bi-modal, though crucially the low debt-equity firms have a large group with no deviation between cost and return (or in some cases marginal return exceeds average cost). This suggests that some firms are unable to raise capital, despite performing well, while others have excessive borrowing where the cost of capital exceeds the return.

Finally, we examine the nature of a variation in average EFF over time in these countries, as summarised in Figure 3. Clearly, average EFF fluctuated over this period and the nature of this fluctuation is somewhat country specific. The minimum average EFF was found in Thailand (just around 5) prior to 1991 while the corresponding minima were about 7 in Malaysia (1990), 7.5 in Korea (1990) and 10 in Indonesia (1989). There are however signs of widening divergence between costs of and return to LTD in Indonesia and Korea during 1996-97, in Malaysia during 1994-97 and in Thailand during 1994-96; the average measure of capital inefficiency (EFF) was 10 or higher in Indonesia (highest among the sample countries) and Thailand and around 8 in Korea and Malaysia in 1996, just before the crisis came to the surface in 1997.

Thus unlike Baumol et al. (1970), there is evidence that the returns to external

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short-term loan as well because of the inherent term structure.

finances in general and long-term debt in particular have been low (relative to the corresponding effective interest rate) among the sample East Asian firms in the pre-crisis period. These results perhaps highlight the role of national policies and institutions that created moral hazard by overprotecting the investors (see discussion in section 2) and could shed more light on some earlier results. For example, while Kim *et al* (2001) present an analysis of the contagion in the context of the underlying fundamentals of the economy, they do not discuss in detail the microeconomic explanations of the poor returns on investment. Equally, several authors, for example Koo (2002), Green (2004), Charongseneang and Manakit (2002) and Qin (2001) have suggested that the debt of firms was an important determinant of the depth of the crisis. The results presented here however extend this, illustrating that it was not simply debt, but debt linked to excessive (and inefficient investment) that was a major cause of the problem.

5. Conclusions

One of the central explanations of the recent Asian Crisis has been over-borrowing and misallocation of external loans. There is however rather limited and indirect empirical evidence in this respect. This paper thus takes a more direct approach to compare the rates of return to various internal and external funds (including that to long-term debt) in an attempt to explore the aspects of efficiency of corporate financing in four East Asian economies, namely, Indonesia, Korea, Malaysia and Thailand. In doing so, we also distinguish between financially constrained and unconstrained firms in term so low/high debt-equity ratio and employ a random

[15] That is why we do not show these histograms, which will be available upon request.

effects panel data model with sample selection to estimate the rates of return to various internal and external funds among firms with and without financial constraints. Selectivity corrected estimates do suggest evidence of significant misallocation especially with respect to long-term debt in our sample. This highlights an important omission in much of the literature that has sought to speculate on the strength of the recovery in South East Asia. Much of this literature presents analysis of government policy and restructuring, see for example Nasution (2002) on Indonesia, Koo (2002) on Korea, and offers some conjecture in the light of government policy initiatives. The work presented here however demonstrates the importance, not just of capital market liberalisation, but of the need for greater understanding of the moral hazard problem among the countries' financiers.

We also compare the average returns to and cost of long-term debt in an attempt to understand the nature of the misallocation in our sample. This analysis suggests that average effective interest rates were often much higher than the returns to long-term debt even among firms relying more on debt financing (relative to equity), thus confirming the case of bad loans, much of which can be attributed to the government bail-out intervention protecting the investors in these countries. Perhaps the latter could also explain why our results are different from those of Baumol et al (1970).

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TABLES

Table 1a. Panel data structure

	Indonesia	Korea	Malaysia	Thailand
Firms included	112	256	331	201
Observations	662	1535	1983	1130

Table 1b. Correlation between short-term and long-term loans

	Year					
Country	**1993**	**1994**	**1995**	**1996**	**1997**	**Overall**
Indonesia	-0.096	0.018	0.001	0.530**	0.016	0.141**
Korea	0.932**	0.742**	0.476**	0.882**	0.428**	0.563**
Malaysia	0.077	0.360**	0.095	0.823**	0.949**	0.747**
Thailand	0.952**	0.562**	0.725**	0.450**	0.517**	0.545**

Table 2. Uncorrected random effects estimates of returns on assets, All firms

	Indonesia	Korea	Malaysia	Thailand
Intercept	8.80 **	6.94 **	8.18 **	10.44 **
	(13.769)	(33.882)	(21.779)	(14.499)
Cash flow	8.26 *	-0.02	0.05 *	0.55 **
	(2.576)	(1.111)	(1.775)	(12.278)
Retained earnings and reserves	2.94 *	0.0002	0.01	-1.52
	(2.837)	(0.002)	(0.182)	(1.106)
Equity	-0.44	0.19 **	0.0003	-0.98 **
	(1.371)	(3.604)	(0.019)	(12.422)
Long-term debt	-1.28 **	-0.12 *	-0.32 **	0.28 *
	(4.056)	(2.439)	(4.115)	(2.522)
Observations	662	1535	1983	1142

Note: Number in the parenthesis is the corresponding t-statistic.

Table 3. Selectivity corrected random effects estimates of returns on assets (Firms without constraint on external debt)

Estimates of debt-equity ratio as an indicator of financial constraint Estimates (T-statistics)				
	Indonesia	Korea	Malaysia	Thailand
Intercept	0.0012 (0.006)	1.41 ** (27.231)	-1.38** (28.247)	-0.24 ** (4.876)
Firm size	0.007 ** (4.513)	0.002 ** (10.102)	0.006 ** (9.828)	0.03 ** (10.997)
Output –capital	-0.6 ** (3.474)	0.002 ** (2.985)	0.001 (0.953)	0.001 (0.633)
Estimates of return on assets among firms with high debt				
	Indonesia	Korea	Malaysia	Thailand
Intercept	9.18 ** (20.228)	7.13 ** (95.533)	5.28 ** (25.492)	8.13 ** (53.711)
Cashflow	1.01 ** (4.701)	-0.02 * (1.706)	0.08 * (1.890)	0.31 ** (6.463)
Retained earnings & reserves	2.6 ** (3.80)	0.24 (1.073)	2.04 * (2.829)	-1.40 ** (4.430)
Equity	-1.05 ** (4.434)	0.29 ** (6.314)	-0.13 ** (4.268)	-0.34 ** (3.211)
Long-term debt	-1.14** (6.626)	-0.14 ** (3.935)	-0.07 (0.655)	-0.07 (0.523)
Sigma	4.79 ** (32.178)	3.57 ** (275.00)	5.04 ** (82.480)	4.24 ** (75.388)
Rho	-0.95 ** (81.674)	-0.93 ** (92.068)	0.01 (0.274)	-0.23 ** (5.030)
Log-L	-890.5675	-3249.039	-1953.941	-1873.951
Selected 2nd stage sample observations	236	1099	414	469

Table 4. Selectivity corrected random effects estimates of ROA (Firms with constraint on external debt)

Estimates of debt-equity ratio as an indicator of financial constraint Estimates (T statistic)				
	Indonesia	Korea	Malaysia	Thailand
Intercept	-0.19 * (1.792)	-2.03 ** (27.029)	1.54 ** (36.431)	0.26 ** (5.129)
Firm size	0.007 ** (6.073)	-0.002 ** (11.947)	-0.004 ** (10.410)	-0.03 ** (12.465)
Output -capital	-0.43 ** (4.464)	-0.006 ** (7.064)	0.001 * (1.855)	-0.003 ** (3.837)
Estimates of return on assets among firms with low debt				
	Indonesia	Korea	Malaysia	Thailand
Intercept	8.9 ** (33.997)	10.86 ** (51.154)	8.45 ** (72.222)	0.14 ** (66.637)
Cashflow	1.12 ** (4.726)	2.97 ** (10.840)	0.09 ** (8.835)	0.01 ** 0.02 (8.014)
Retained earnings & reserves	4.18 ** (5.616)	0.57 (1.418)	0.004 (0.108)	-0.06 * (2.381)
Equity	-1.65 ** (6.284)	-0.87 ** (5.887)	-0.01 (1.133)	-0.013 ** (10.530)
Long-term debt	-1.05 ** (5.719)	0.15 * (1.988)	-0.18 ** (3.543)	-0.01 * (2.398)
Sigma	4.84 ** (48.270)	4.66 ** (67.951)	6.5 ** (168.885)	0.07 ** (61.686)**
Rho	-0.88 ** (44.117)	-0.87 ** (46.191)	-0.94 ** (134.328)	-0.94 ** (103.199)
Log-L	-898.5389	-1140.599	-4902.930	-94.9033
Selected 2nd stage sample observations	426	436	1569	673

Appendix

Table A1. Q ratios for the four countries

	Indonesia	Malaysia	Korea	Thailand
Mean	4.264065	3.334891	0.282629	1.690953
Standard deviation	23.53792	21.58816	0.145943	3.549635
Maximum	341.8254	604.2455	0.870608	66.10495
Minimum	0	0	0	0
Median	1.33981	1.00306	0.23942	0.985605
Number >1	527	998	0	468
Number <1	282	985	709	484

FIGURES

Figure 1 a. Distribution of EFF among firms in Indonesia

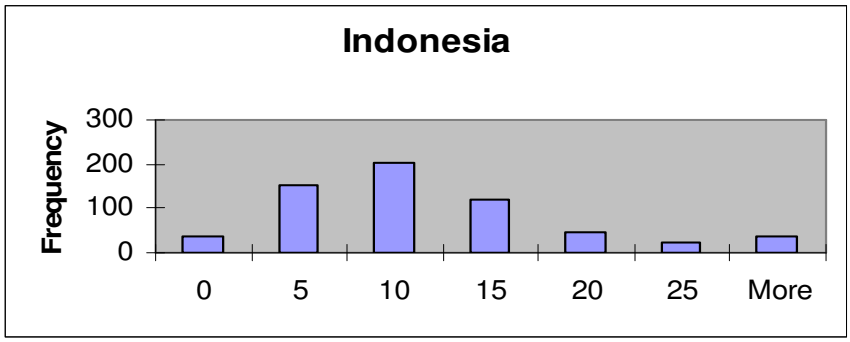

Figure 1 b. Distribution of EFF among firms in Korea

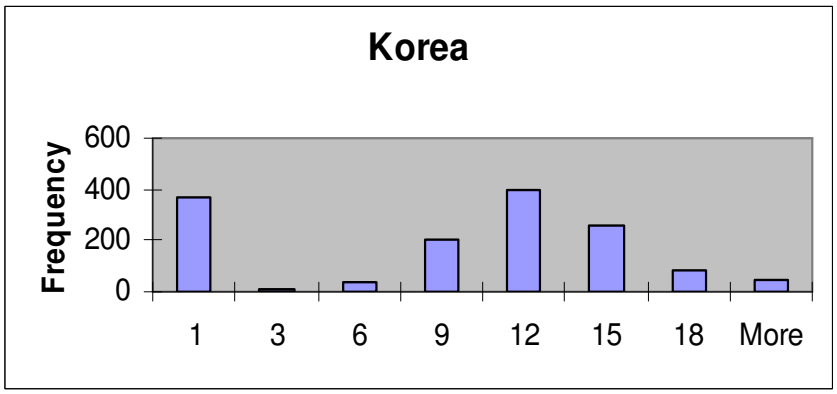

Figure 1 c. Distribution of EFF among firms in Malaysia

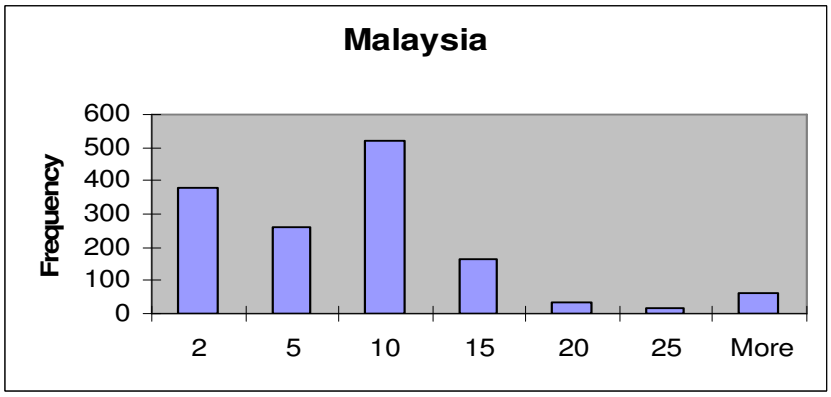

Figure 1 d. Distribution of EFF among firms in Thailand

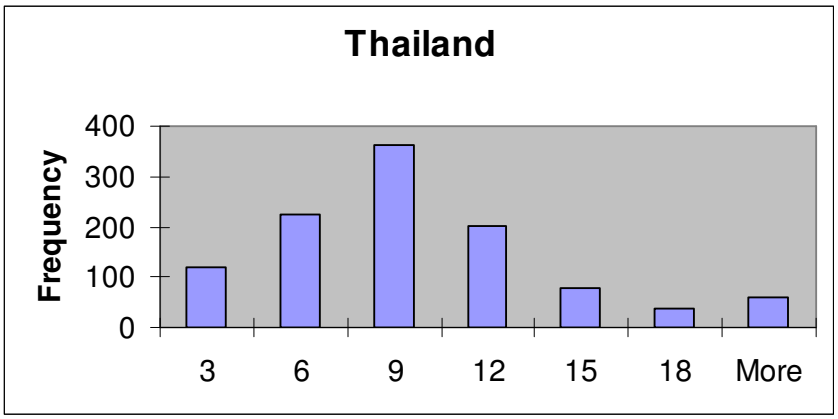

Figure 2a. Distribution of EFF among Korean firms with low debt

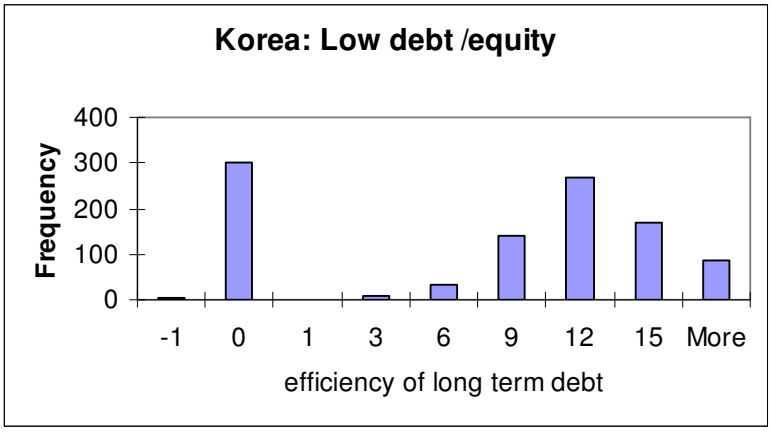

Figure 2b. Distribution of EFF among Korean firms with high debt

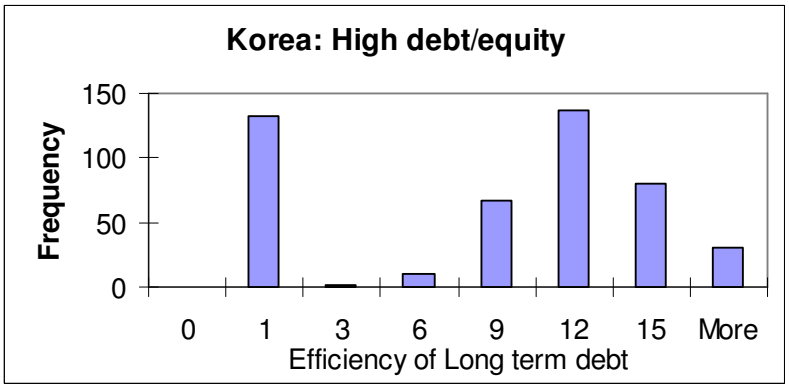

Figure 3. Distribution of Inefficiency EFF of long-term debt over time

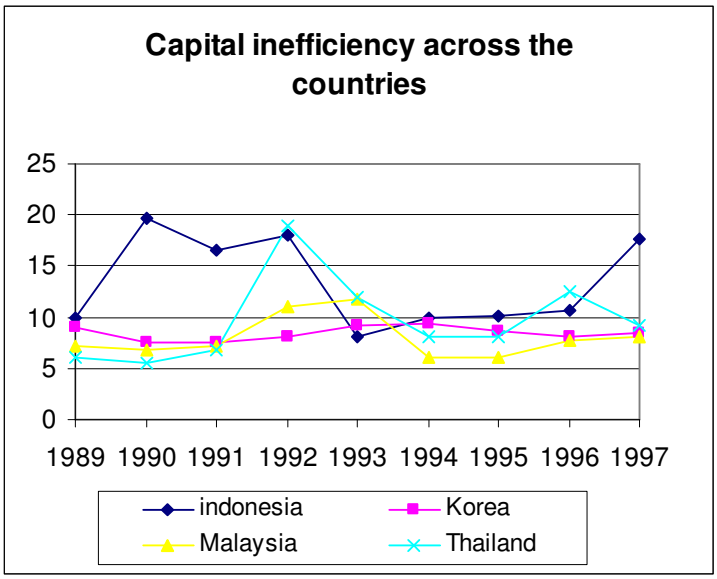

Table 4a: Short and long term debt ratios in Indonesia

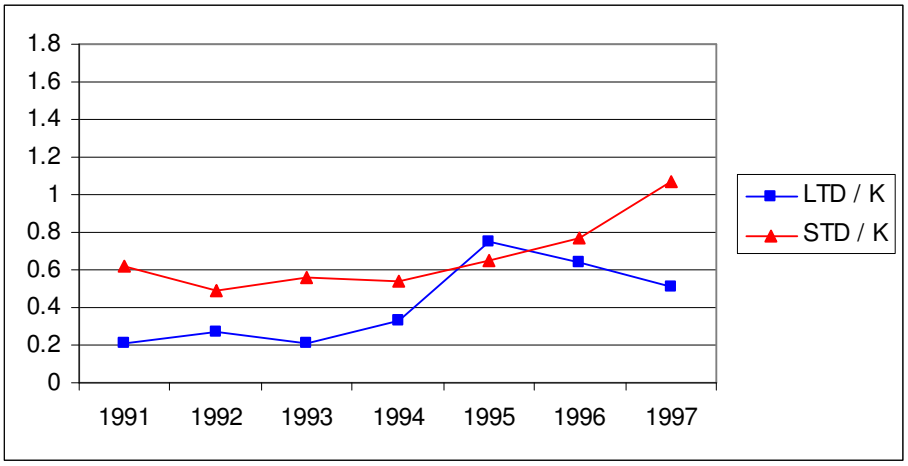

Table 4b: Short and long term debt ratios in Korea

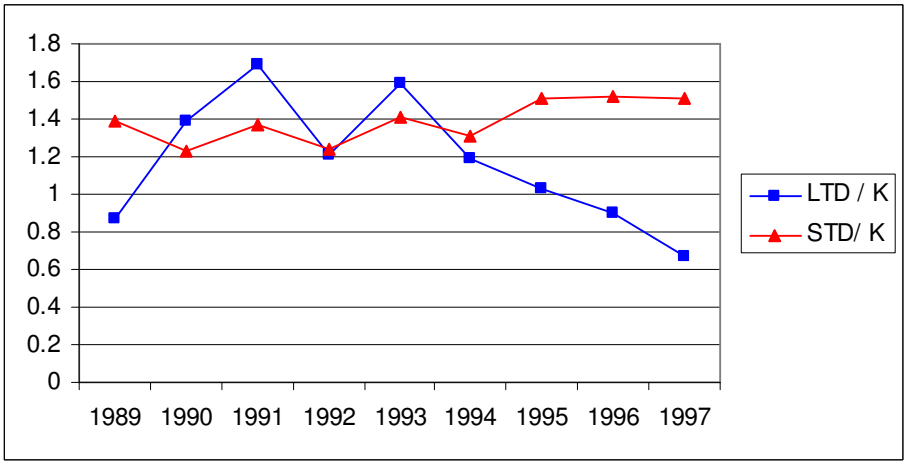

Table 4c: Short and long term debt ratios in Malaysia

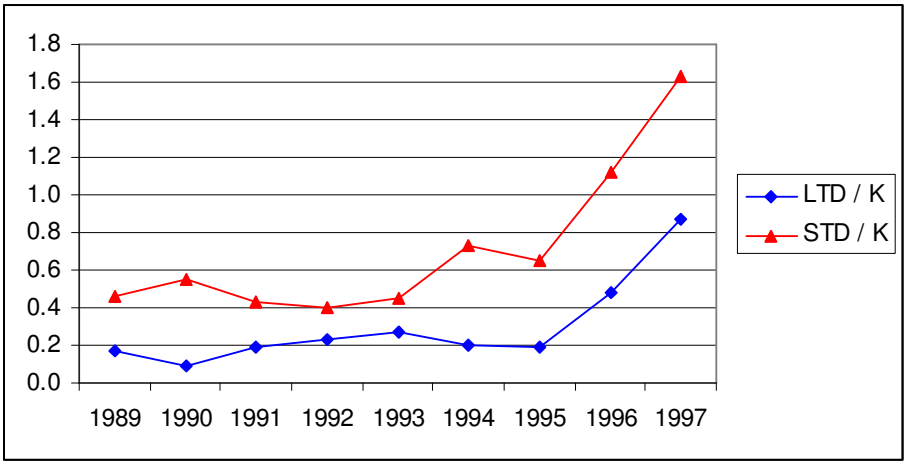

Table 4d: Short and long term debt ratios in Thailand