# DO EXTERNAL FUNDS YIELD LOWER RETURNS ?

# RECENT EVIDENCE FROM EAST ASIAN ECONOMIES

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Abstract

There is little micro-economic evidence of the macroeconomic argument of excessive borrowing and over-investment in East Asia before the crisis of 1997. Using firm-level panel data-set from four Asian countries, this paper examines the efficiency of internal and external funds and compares the rates of return to these funds. We obtain selectivity-corrected random effects estimates of rates of return to internal and external funds for firms with low and high debt. Both sets of estimates consistently suggest that marginal returns to debt and equity have been low in our sample. Also there are significant deviations between returns to debt and effective interest rates for a large number of firms in each country.

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## 1. Introduction

Following the recent Asian financial crisis of 1997-98, most macroeconomists identified 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 microeconomic evidence on the moral hazard argument reflected in the poor corporate performance and growth in these countries in the periods prior 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) suggested that firm-specific characteristics, both financial (e.g., leverage ratio, share of short-term debt in total debt, ownership concentration) and non-financial (e.g., sales margin, real sales growth), and idiosyncratic rather than aggregate shocks (instrumented by industry and country dummy variables) significantly affected the profit margins of firms in east Asia. Driffield and Pal (2001) examined the nature of corporate investment and found evidence of significant misallocation of capital in the region not only in terms of excess investment financed through cash flow in Indonesia, but also that through debt and equity in the cases of Korea, Malaysia and Thailand.

In an attempt to further examine the aspects of efficiency of internal and external funds prior to the crisis, the present paper directly compares the rates of return from various investment funds, with special reference to long-term debt. This is an important exercise because it would offer a micro-economic rationale, if any, of the common macro-economic argument of excessive borrowing and over-investment

in east Asia during the crisis period. Even in the context of the wider literature, this is a challenging task, 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) and has not yet been tested for the firms in east Asia. Furthermore, while Baumol et al. (1970) did not distinguish between firms with and without financial constraint, we argue that it is important to do so, especially in imperfect market conditions with information problems. Using unique random effects panel data models *with selection*, we determine the selectivity-corrected rates of return among firms with and without financial constraint and compare these rates of returns from various internal and external funds.

The remainder of this paper is set out as follows. Section 2 reviews the theoretical and the applied literature on efficiency of investment in imperfect, as opposed to perfect 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 Tobit 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. Efficiency and rates of return from 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 the fact 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 the 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 net present value (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 (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. Agency problems occur in both debt and equity markets, often leading to lower returns to external finance compared with retained earnings or investment funded through cash. The theoretical literature , contrasts with the findings of Baumol et al. (1970), though the applied literature that seeks to test the implications of these problems is relatively small. It is however an important issue for the East Asian firms because of the alleged problem of excessive bad loans leading to over-investment during the periods leading to the recent crisis of late 1997. It is in this context we shall compare returns to long-term debt with those to other sources of finance for the sample firms.

More importantly, the existing empirical studies 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 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. Thus uncorrected estimates of rate of return will 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.

As an alternative, we shall, in this paper, adopt a two-stage approach. We first determine the variation in the degree of financial constraints faced by a particular firm and then calculate the selectivity-corrected rates of return from various internal and external sources of finance among firms with and without constraint. This approach allows us to examine our central hypothesis i.e., if the corrected rates of return are higher for externally funded investments in our sample since managers are more closely monitored by financial markets.

## 2. Data and Econometric Modelling

### 2.1. 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 eastern Asian countries, namely, Indonesia, Korea, Malaysia and Thailand, and covers the period 1989-97. We focus on the investment 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, broken down as follows:

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

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 were at different stages of financial liberalisation and were implementing different macroeconomic policies. 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 A1). 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 Korean firms were found to be doing so according to this criterion. 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 sample (see further discussion in Driffield and Pal, 2001). In the rest of this paper we would like to examine how this misallocation of capital has affected the rates of return to various internal and external funds.

**2.2. Econometric Modelling**

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 ($\Pi$/K) to different types of funds, namely cash flow, retained earnings and reserves, long-term debt and equity (all financing variables are expressed as share of capital (K) prevailing in the beginning of the period). Thus, following Baumol et al (1970), we estimate the basic reduced form equation of firm-level efficiency:

$$\frac{\Pi}{K} = b_0 + b_1\frac{CASH}{K} + b_2\frac{RERES}{K} + b_3\frac{EQUITY}{K} + b_4\frac{LTD}{K} \quad (1)$$

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.[1] The underlying idea is that annual

[1] 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.

earnings before interest and taxes are generated from the levels of investment in the past period and that is why it would capture the efficiency of investment funded by different internal and external sources.[2] 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 at the beginning of the year while investment is the current value of capital expenditure that adds to the capital stock of the firm.

**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 and/or external). We therefore propose a model of selection, allowing for the fact that both demand and supply factors 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)[3]. First we use a univariate probit selection equation to determine if the ith 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.

[2] 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 3.

[3] This is a complex type of panel data model. 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).

We have experimented with different possible indicators of firm's financial constraint including retention ratio, debt-equity ratio and also debt plus equity (total 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 were 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.[4] As a result in our final analysis, we have used debt-equity ratio to be the indicator of a firm's financial constraint. In particular, it can be argued that firms with debt-equity ratio greater than unity (i.e., those with more debt) are less constrained than those with low debt-equity ratio, as they are able to raise more loans from the market.

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 is expected to 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.

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

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.

As such, $\beta'$ represents the marginal (rather than average) rate of return. $\varepsilon_{2it}$ is assumed to be normally distributed with zero mean and a constant variance $s^2$ and Cov($\varepsilon_{1it}$, $\varepsilon_{2it}$) = $r$. For simplicity, $c_i$ , $d_i$ are assumed to be uncorrelated and normally distributed with zero mean and constant variances $s^2_c$, $s^2_d$ respectively. One can repeat the same procedure to determine the rates of return for firms with $F_{it}$ = 0.

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

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

$$\sum_{F_{it}=1} \frac{-\log 2p}{2} - \log s - \frac{(R_{it} - d_i - b' x_{2it})^2}{2s^2} + \log \Phi \left[ \frac{(d_i + a' x_{1it}) + (r/s)(R_{it} - d_i - b' x_{2it})}{\sqrt{1 - r^2}} \right]$$

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 $\alpha$s, $\beta$s, $\sigma$[5] and $\rho$. Given the complex nature of the likelihood function, convergence may be difficult to obtain, especially if the sample size is small.

[5] This would capture the significance of unobserved heterogeneity in rate of return equation. In particular, unobsreved heterogeneity would include factors creating agency costs, e.g., firms were able to get loans from banks or if shareholders were unwilling to fund additional investment.

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. This highlights one of the advantages of these types of models over much of the earlier analysis, where results were beset by endogeneity problems. Inclusion of lagged explanatory variables, however, would mean that for each firm the first observation would be missing. We exclude these missing observation to obtain meaningful estimations.

## 3. Results

Table 1 summarises the uncorrected random effects estimates of rates of return on various internal and external funds for all firms. Table 2 summarises the selectivity-corrected estimates among firms with high debt-equity ratio while Table 3 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 get meaningful estimates in all cases. Total observations (with and without missing observations) are shown in each case in Table 1, Table 2 and Table 3.

### 3.1. Returns to internal and external finances

Table 1 shows that returns to external funds, namely long-term debt are significantly lower than those to some internal funds in all of the selected countries. Returns to equity too are significantly negative in Indonesia and Thailand. The only exception is Korea which earns a significantly positive returns to 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 2 and Table 3 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 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, i.e., have greater access to external finance in all sample countries. More efficient firms, i.e., firms with higher output-capital ratios have lower debt in Indonesia, but higher debt in Korea; the coefficient is insignificant in Malaysia and Thailand. Clearly there are some differences in estimates of returns to internal and external finances among firms with and without financial constraint. A comparison of estimates presented in Table 2 and Table 3 suggest 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 (the coefficient is insignificant in Korea). Considering external finances, returns to equity are 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 and/or equity finance. The latter perhaps reflects the problem of deposit insurance and over-reliance on debt leading to over investment in Korea and Thailand.[6]

Secondly, we consider the *firms who are financially constrained, i.e., those* with low debt equity ratio. In this case, 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 insignificant in Korea and Malaysia). Rates of return to both long-term debt and equity finances are significantly negative in Indonesia and Thailand; returns to equity in Korea and that to long term debt in Malaysia are still negative. Returns to debt in Korea is however positive and significant. In this respect it is worth highlighting the Korean case: rates of return to equity are significantly positive among firms with high leverage, but negative with those with low leverage; similarly, rates of return to long-term debt are negative among firms with high leverage, but positive among firms with low leverage. Taken together, these firm-level random effects estimates indicate the persistence of misallocation of external funds among both financially constrained and unconstrained firms in the periods leading to the crisis.

### 3.2. Efficiency and returns to 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,

[6] 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 for the distribution of q.

during the period leading up to the Asian Crisis firms in Thailand and Korea engaged in over investment, primarily funded by external debt. Results presented here also suggest that rates of returns to external finances, particularly to long term debt, are low. The point estimates presented in Tables 2 and 3 consistently suggest that the marginal return to long-term debt (LTD) has been negative in most cases (except for Korean firms with low debt-equity ratio). In order to further examine the issue of efficiency of investment funded by long term debt, it is necessary to compute and compare the marginal returns and marginal costs of long term debt. If the cost of capital consistently exceeds these rates of return, then concerns remain over the efficiency with which long term debt is used.

In order to do this, 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 :

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

Using the estimate of $\beta_4$ given in Table 1, one can obtain the predicted return to LTD (as a share of capital) as:

$$\text{Return to } LTD_{it} = \hat{b}_4 . \frac{LTD_{it}}{K_{it}}.$$

Average costs of long-term debt are measured by the effective interest rate faced by an individual firm in a given year, where the effective interest rate is measured as the total interest expenses as a ratio of total debt.

Finally, we construct a measure of (in)efficiency as follows:

EFF = Effective interest rate - Predicted return from LTD

and consider the distribution of EFF for all firms in the four sample countries. This enables a comparison between the *predicted* returns to long term debt (as a ratio of total capital) and the *average* cost of capital (i.e., effective interest rate). There are clearly limits to the extent to which one could use such a comparison to draw inferences concerning the overall profitability of firms, or determine the rent that is extracted from the capital market, but the results are nevertheless instructive. Figures 1a-1d present the distribution of the implied efficiency of long term debt for each of the countries.

These figures illustrate the magnitudes of the measure of (in)efficiency of long term debt across sample firms in these selected countries. In each cases 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.

Similar distributions were obtained when splitting the samples according to debt-equity ratios (corresponding to estimates in Tables 2 & 3).[7] However, unlike other cases, the Korean case is 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

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

figures illustrate that for Korea there are more firms in the low debt-equity category, but that the distributions across the two groups is very similar. 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 the majority have excessive levels of investment funded by debt where the cost of capital exceeds the return. This provides further evidence of misallocation of long term debt in Korea.

Finally, we examine if there was a deterioration in the efficiency of long-term debt just before the crisis. This is analysed using variation in the average EFF over time for each sample country and is summarised in Figures 3a -3d. A comparison of the distributions of average EFF over time among the sample countries, suggest that the distribution of average EFF varied in our samples. The highest average EFF (about 19) is found in Indonesia in 1990. The average EFF was around its highest in Korea (9.3) and Malaysia (12) around 1993 while in Thailand the peak (20) was reached some time around 1992. 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). However, just before the crisis in 1996 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.

Taken together, this analysis suggests that interest rates exceeded the corresponding rate of return to long term debt (sometimes the deviation was too high) for a large number of firms in all the sample countries, indicating significant deviations from efficiency of long term debt in the pre-1997 period.

Thus our results refutes the central hypothesis that the returns to external finances, especially to debt, are higher than those to internal finances in this sample of East Asian countries in the pre 1997 period. In fact, our results seem to suggest the opposite, especially with respect to debt-financed projects. The latter perhaps reflects the role of national policies and institutions that created moral hazard by overprotecting the investors.

These results also provide an obvious link to the moral hazard argument of the macro literature on the Asian crisis. In particular, Corsetti et al (1999a) demonstrate that the likelihood of "bailout" interventions by the governments in east Asia, can generate agency problems inducing excessively risky investment by firms. However, such bailouts are not sustainable in the presence of macro shocks, and as such, the over-investment exacerbates the size of a currency crisis.

## 5. Conclusions

This paper examines the aspects of efficiency of corporate financing in four south-east Asian economies, namely, Indonesia, Korea, Malaysia and Thailand and compares the rates of return to internal and external funds, with special reference to those to long term debt. In doing so, it employs a unique random effects panel data model with sample selection and estimate the selectivity corrected estimates of rates of return to various internal and external funds among firms with and without financial constraints. This allows us to examine if returns to external finances, especially debt, are higher in these economies, which in turn provides some indirect link to the general macroeconomic argument of excessive borrowing/over investment in these economies in the period leading to the crisis.

Results suggest significant evidence of misallocation especially with respect to external finances. We find that returns to long-term debt were significantly lower among Indonesian and Thai firms, irrespective of the debt-equity ratio while the problem was concentrated among Korean firms with high debt-equity ratio. There were also signs of misallocation of long-term debt among Malaysian firms with low leverage. These results were further confirmed in the analysis of efficiency of long term debt. We argue that the moral hazard problems in the capital markets played a significant part in inducing over-reliance on debt, which in turn was responsible for this low return to debt financing. Thus our results contrast those of Baumol et al (1970) in that returns to external finances (especially long term debt) are found to be lower, especially among firms relying heavily on external debt, in the period prior to the recent Asian crisis. This is further supported by the analysis of efficiency of long term debt, which seem to complement the moral hazard argument put forward by the macro-economic literature on the recent Asian crisis.

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# TABLES

**Table 1. Uncorrected random effects estimates of returns on assets**

| | 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) |
| No. of obs<br>Total | 662 | 1535 | 1983 | 1142 |
| Without missing observations | 550 | 1279 | 1652 | 941 |

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

**Table 2. Selectivity corrected random effects estimates of returns on assets among financially constrained firms**

| Estimates of DE as an indicator of financial constraint | | | | |
|---|---|---|---|---|
| | Indonesia | Korea | Malaysia | Thailand |
| Intercept | 0.0012<br>(0.006) | 1.41 **<br>(27.231) | -1.38**<br>(28.247) | -0.24 **<br>(4.876) |
| Firm size | 0.007 **<br>(4.513) | 0.002 **<br>(10.102) | 0.006 **<br>(9.828) | 0.03 **<br>(10.997) |
| Output –capital | -0.6 **<br>(3.474) | 0.002 **<br>(2.985) | 0.001<br>(0.953) | 0.001<br>(0.633) |
| Estimates of ROA among firms with DE=1, i.e., if debt-equity ratio > 1 | | | | |
| | Indonesia | Korea | Malaysia | Thailand |
| Intercept | 9.18 **<br>(20.228) | 7.13 **<br>(95.533) | 5.28 **<br>(25.492) | 8.13 **<br>(53.711) |
| Cashflow | 1.01 **<br>(4.701) | -0.02 *<br>(1.706) | 0.08 *<br>(1.890) | 0.31 **<br>(6.463) |
| Retained earnings & reserves | 2.6 **<br>(3.80) | 0.24<br>(1.073) | 2.04 *<br>(2.829) | -1.40 **<br>(4.430) |
| Equity | -1.05 **<br>(4.434) | 0.29 **<br>(6.314) | -0.13 **<br>(4.268) | -0.34 **<br>(3.211) |
| Long-term debt | -1.14**<br>(6.626) | -0.14 **<br>(3.935) | -0.07<br>(0.655) | -0.07<br>(0.523) |
| Sigma | 4.79 **<br>(32.178) | 3.57 **<br>(275.00) | 5.04 **<br>(82.480) | 4.24 **<br>(75.388) |
| Rho | -0.95 **<br>(81.674) | -0.93 **<br>(92.068) | 0.01<br>(0.274) | -0.23 **<br>(5.030) |
| Log-L | -890.5675 | -3249.039 | -1953.941 | -1873.951 |
| Selected sample | 236 | 1099 | 414 | 469 |

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

**Table 3. Selectivity corrected random effects estimates of ROA among financially unconstrained firms**

| Estimates of DE as an indicator of financial constraint | | | | |
|---|---|---|---|---|
| | Indonesia | Korea | Malaysia | Thailand |
| Intercept | -0.19 *<br>(1.792) | -2.03 **<br>(27.029) | 1.54 **<br>(36.431) | 0.26 **<br>(5.129) |
| Firm size | 0.007 **<br>(6.073) | -0.002 **<br>(11.947) | -0.004 **<br>(10.410) | -0.03 **<br>(12.465) |
| Output -capital | -0.43 **<br>(4.464) | -0.006 **<br>(7.064) | 0.001 *<br>(1.855) | -0.003 **<br>(3.837) |
| Estimates of ROA among firms with DE = 0, if debt-equity ratio <= 1 | | | | |
| | Indonesia | Korea | Malaysia | Thailand |
| Intercept | 8.9 **<br>(33.997) | 10.86 **<br>(51.154) | 8.45 **<br>(72.222) | 0.14 **<br>(66.637) |
| Cashflow | 1.12 **<br>(4.726) | 2.97 **<br>(10.840) | 0.09 **<br>(8.835) | 0.01 **<br>0.02 (8.014) |
| Retained earnings & reserves | 4.18 **<br>(5.616) | 0.57<br>(1.418) | 0.004<br>(0.108) | -0.06 *<br>(2.381) |
| Equity | -1.65 **<br>(6.284) | -0.87 **<br>(5.887) | -0.01<br>(1.133) | -0.013 **<br>(10.530) |
| Long-term debt | -1.05 **<br>(5.719) | 0.15 *<br>(1.988) | -0.18 **<br>(3.543) | -0.01 *<br>(2.398) |
| Sigma | 4.84 **<br>(48.270) | 4.66 **<br>(67.951) | 6.5 **<br>(168.885) | 0.07 **<br>(61.686)** |
| Rho | -0.88 **<br>(44.117) | -0.87 **<br>(46.191) | -0.94 **<br>(134.328) | -0.94 **<br>(103.199) |
| Log-L | -898.5389 | -1140.599 | -4902.930 | -94.9033 |
| Selected sample | 426 | 436 | 1569 | 673 |

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

**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**

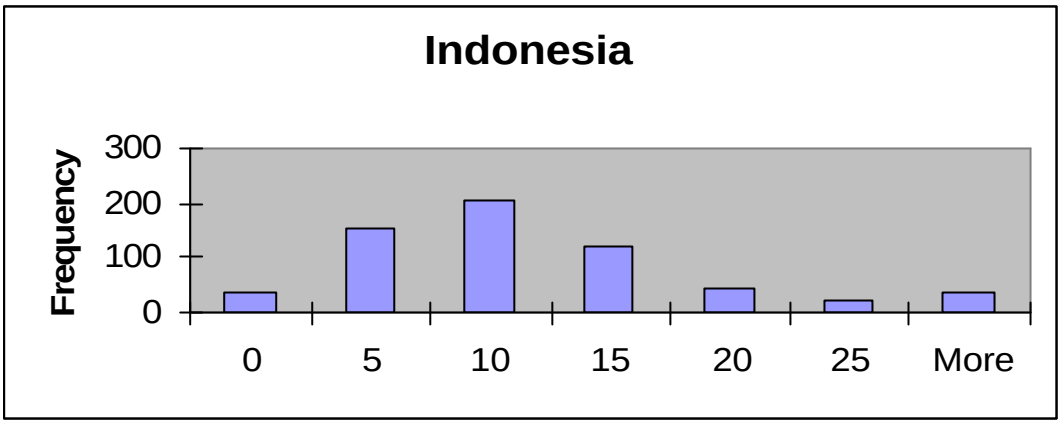


**Figure 1 b. Distribution of EFF among firms in Korea**

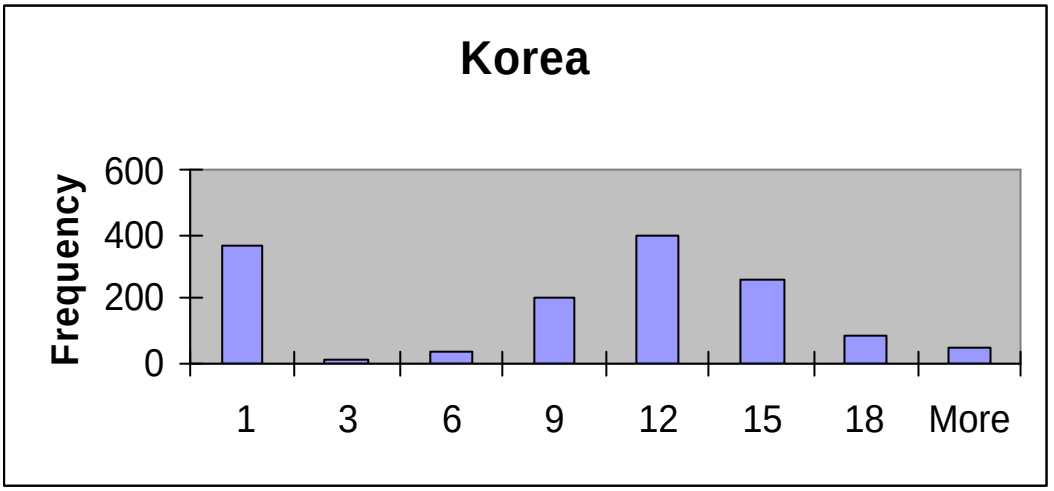


**Figure 1 c. Distribution of EFF among firms in Malaysia**

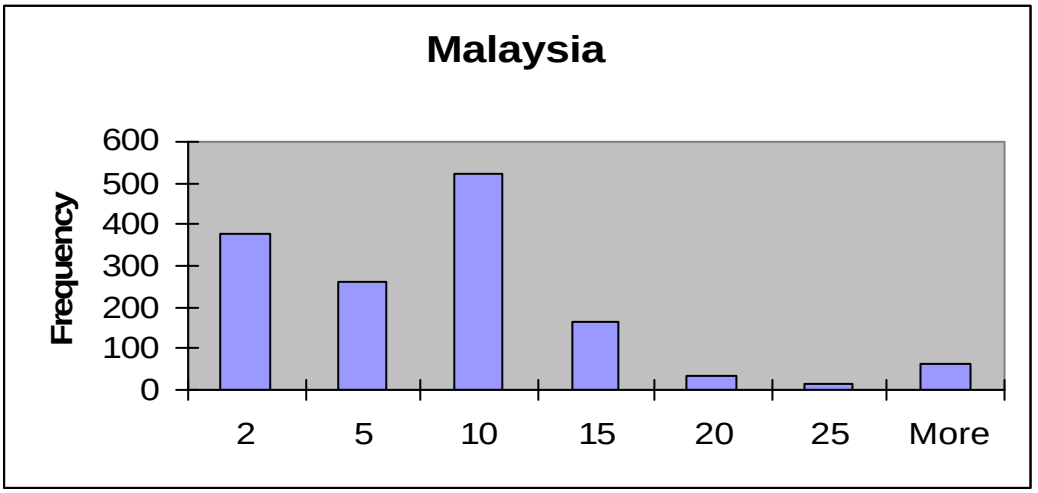

**Figure 1 d. Distribution of EFF among firms in Thailand**

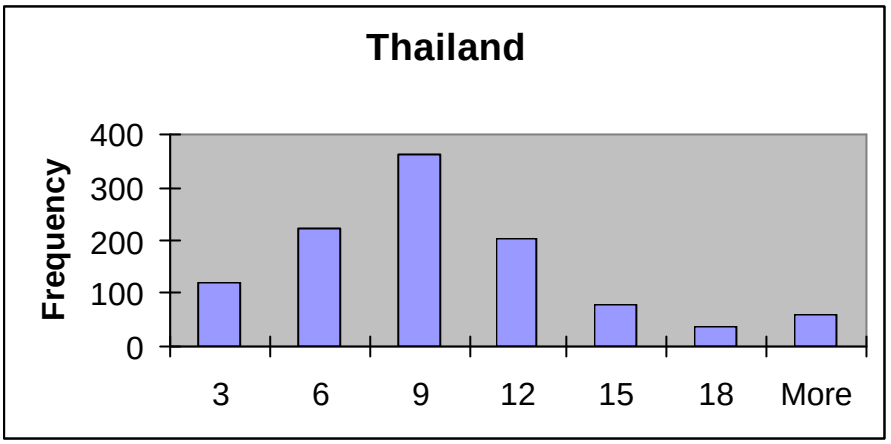


**Figure 2a. Distribution of EFF among Korean firms with low debt**

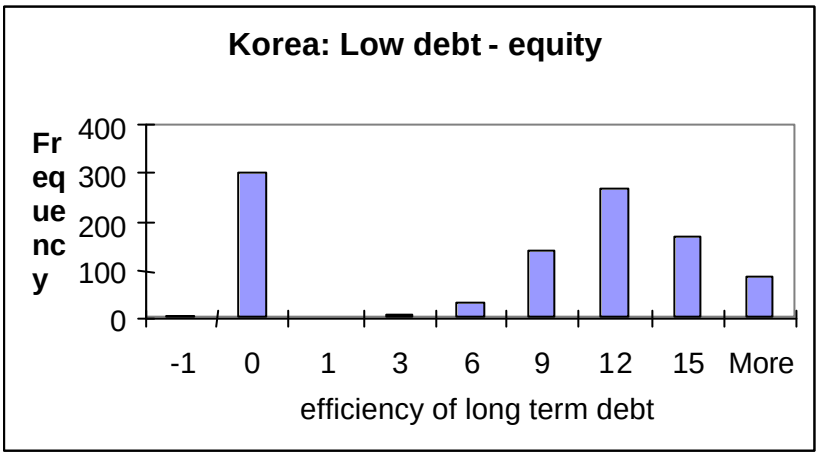


**Figure 2b. Distribution of EFF among Korean firms with high debt**

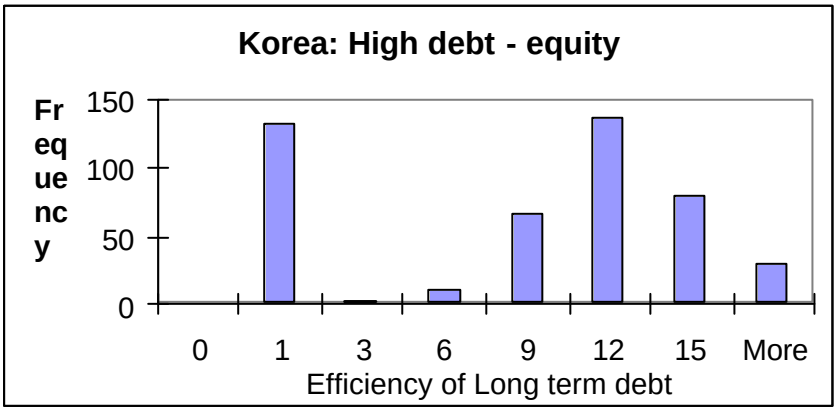

**Figure 3a. Distribution of EFF over time, Indonesia**


**Figure 3b. Distribution of EFF over time, Korea**

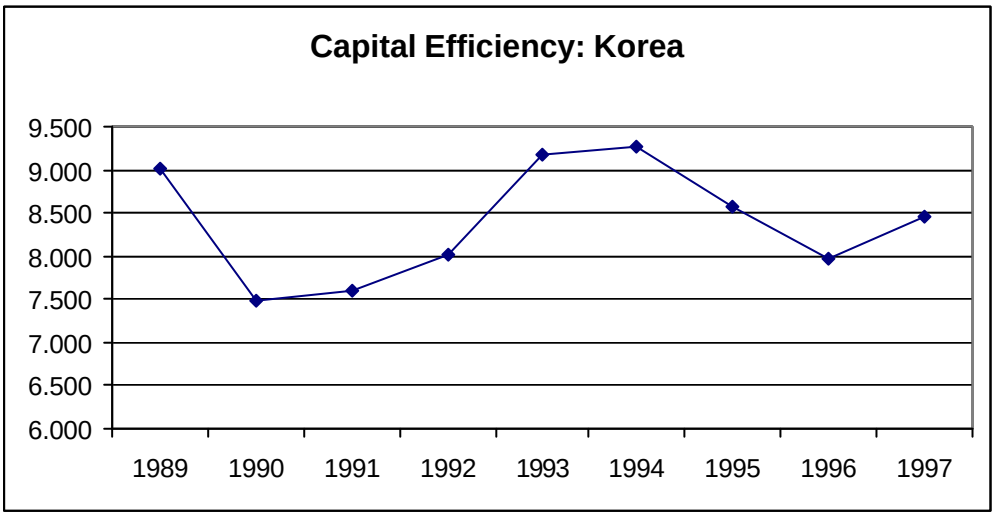

**Figure 3c. Distribution of EFF over time, Malaysia**

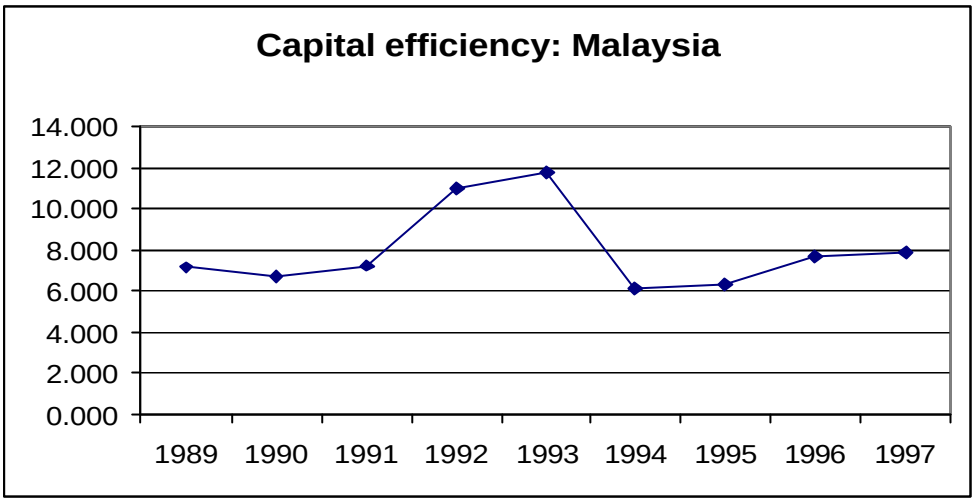


**Figure 3d. Distribution of EFF over time, Thailand**