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Dynamics of Corporate Performance in Thailand

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Abstract

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Recent crises in emerging markets have highlighted the role of the corporate sector in transmitting financial shocks to the macroeconomy. This paper takes stock of the performance of the Thai corporate sector in emerging from the Asian crisis, and discusses remaining challenges and vulnerabilities. Econometric evidence is presented on the impact of excess leverage on performance. Debt levels, though high, have fallen from post-crisis peaks, while returns and corporate cash flows have stabilized. However, the aggregate picture masks significant firm-level variation, which is analyzed by examining estimated distributions for various indicators across firms.

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I. INTRODUCTION

Recent crises in emerging markets have highlighted the role of the corporate sector in transmitting financial shocks to the macroeconomy. Prior to the Asian crisis, growth in the regional emerging market countries was driven by private investment, financed mostly by bank lending. In Thailand, growth accelerated in the 1990s prompted by large capital inflows, ultimately driving an investment and asset-price bubble. The financial crisis triggered by the baht devaluation in 1997 was followed by a slump in economic activity. Firms found themselves unable to service their debt in an environment of weak aggregate demand and a sharply higher cost of capital. Their crippled position was reflected in the rising level of nonperforming loans held by financial institutions, which undermined the stability of the financial system and fed back into an intensification of the downturn.

This paper takes stock of the performance of the Thai corporate sector in emerging from the crisis and discusses remaining challenges and vulnerabilities.² Aggregate economic growth resumed in Thailand in 1999 and showed particular strength in 2002. However, prospects for sustained high growth are not secure, owing in part to the unfinished task of corporate restructuring, which is reflected in the still-high burden of distressed assets in the financial sector (on the order of 35 percent of GDP).

The main findings of the paper include the following:

- **Econometric analysis of the Thai data suggests that high levels of debt were correlated with poor performance.** These findings suggest that as leverage increased progressively in the 1990s with the debt-financed growth of Thai corporates, the rate of return on investment systematically declined.
- **Debt levels, though high, have fallen from post-crisis peaks, while returns and corporation cash flows have stabilized.** Profitability and liquidity picked up in 2002 in line with the stronger economy. Interest coverage ratios also improved.³
- **The aggregate picture masks significant firm-level variation.** Not all firms in the sample are still highly leveraged. Indeed, half of the firms (mostly small companies) have reduced their debt ratios to below pre-crisis levels. In contrast, a small number of highly indebted large firms account for a disproportionate share of total listed company liabilities. However, at the same time, a significant subset of smaller firms remains highly leveraged.

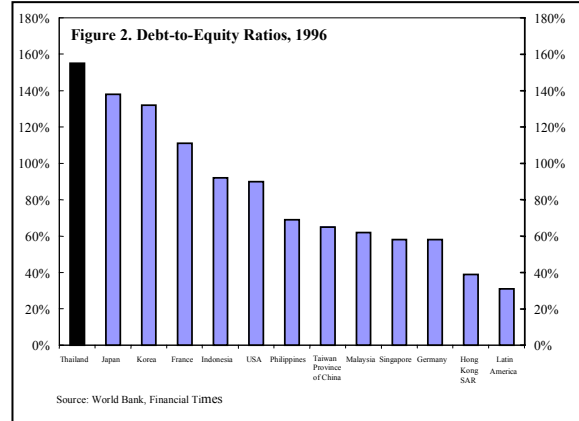
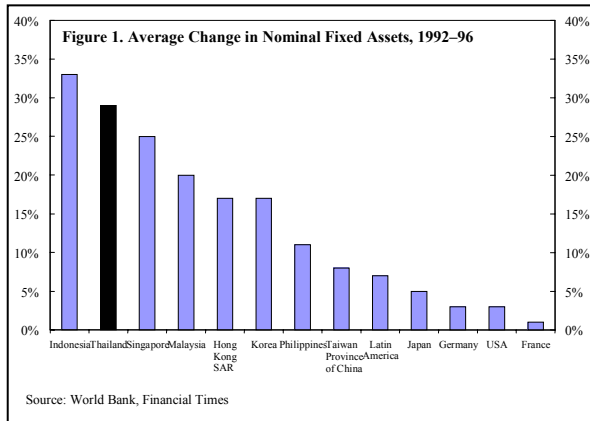
II. BACKGROUND

Thai corporations borrowed heavily in the 1990's, sustaining growth rates that were very high by international standards. Thailand grew rapidly during 1970-90,

² The paper analyzes firm level data using companies listed on the Stock Exchange of Thailand (SET) as a proxy for the broader corporate sector. Listed companies account for around 28 percent of domestic private borrowing.

³ The interest coverage ratio is earnings before interest and taxes divided by total interest expenses. A firm with a coverage ratio less than 1 is unable to fully service all its debts.

reflecting a pattern of export-led growth, high savings and stable macroeconomic policies. In the early 1990's, on the back of capital account liberalization, substantial foreign savings were intermediated through the financial system leading to an investment boom, high growth, and a surge in asset prices.⁴ Investment by firms grew at an average of about 30 percent per annum during this period, faster than in most other countries in the region (Figure 1). While growth was debt-financed across Asia, the resulting skewed capital structure was particularly pronounced in Thailand, reflected in high debt-equity levels even before the crisis (Figure 2).⁵ Moreover, an increasing share of private corporate debt was denominated in foreign currencies, and largely unhedged as firms bet on the stability of the baht peg.⁶

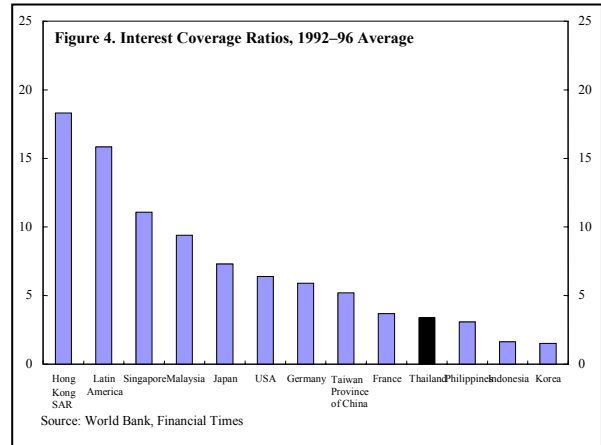
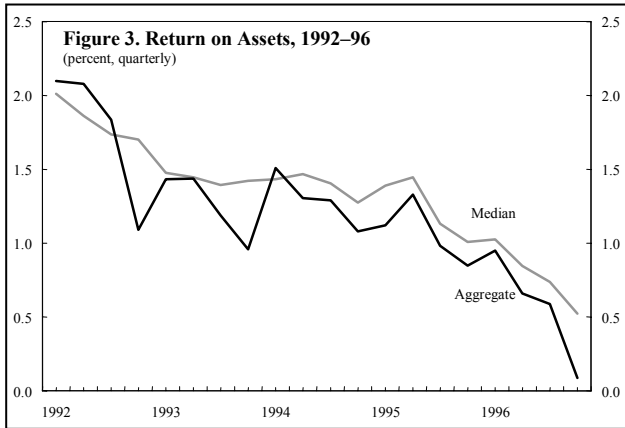


Returns on investment were declining already before the crisis while corporate liquidity was also coming under pressure (Figure 3). While there was a bona fide asset bubble involving real estate and share prices, the factors driving the broader surge in corporate investment have been widely debated. Much attention has fallen on weaknesses in bank supervision, large capital inflows, and the exchange rate regime. From a corporate finance perspective, the governance structure of family-owned Asian conglomerates is often cited as a motivating factor behind a focus on growth through debt. In such a model of corporate governance, there is little outside pressure for immediate return on investment. This mode of organization may well have been appropriate at an early stage of development and worked well in an environment of high growth. However, vulnerabilities were growing insofar as firms borrowing externally without hedging their exposure were not internalizing the true cost of capital (i.e., to include the risk from possible exchange rate movements). Meanwhile interest coverage ratios in Asia and especially in Thailand were dipping to dangerously low levels.

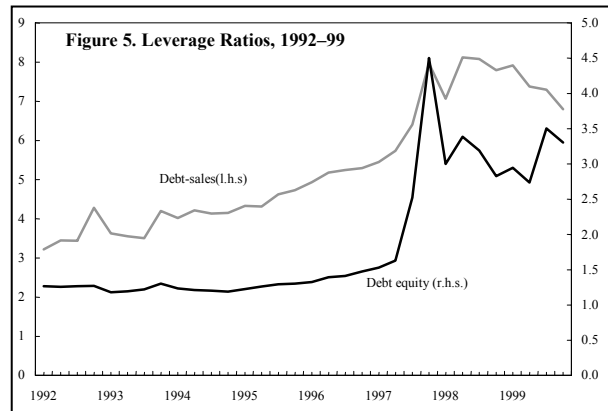
⁴ This was reflected by a clear upward break in the trend of real GDP as well as the capital output ratio during the period 1992-96, the so-called bubble years.

⁵ The rapid growth of Thai debt during this period was evinced by the increase in the leverage ratio from 71 percent at end-1992, to 155 percent by end-1996 (Pomerleano, 2001).

⁶ About 30 percent of corporate debt was foreign currency denominated at end-1996. The share jumped to over 40 percent by end-1997 reflecting the devaluation, but has since declined to below 17 percent as of 2002.



The substantial depreciation of the exchange rate following the crisis effectively bankrupted a large part of the Thai corporate sector. While debt levels were already high prior to 1997, the doubling of the baht-dollar exchange rate during 1997 wiped out the capital of many firms (Figure 5). The cost of servicing unhedged foreign currency debt doubled, while the temporarily high interest rates used to manage the depreciation of the exchange rate also caused an increase in debt service on local currency liabilities. Leverage shot up, while interest coverage ratios for many companies dropped to levels that would ultimately drive the large increase in NPLs in the banking system.



The authorities initially opted for a more private sector-led approach to corporate restructuring, and only established a central asset management corporation in 2001. While direct state intervention in the financial sector was substantial, the strategy for corporate debt restructuring revolved around facilitating private party resolution. A first round of reforms of the legal framework for debt restructuring was undertaken in the wake of the crisis. The main measures included passage of an important new bankruptcy law and procedures to expedite the foreclosure process. The voluntary Corporate Debt Restructuring Advisory Committee (CDRAC) process was set up to help bring debtors and creditors to the negotiating table. At its peak, CDRAC was advising on deals worth almost 50 percent of GDP. More recently in 2001, the Thai Asset Management Corporation (TAMC) was established. The TAMC has taken over most of the nonperforming loans from the state-

owned banks and some from private banks, and has been granted special powers to speed up the asset resolution process.⁶

III. THE PROBLEM WITH LEVERAGE

High leverage can reflect poor corporate governance. The theoretical literature on choice of capital structure is wide-ranging and points to different costs and benefits of issuing debt (Box 1). In general, the optimal capital structure depends on the specific circumstances of the firm and overall development of the capital market infrastructure. From the Asian perspective, a particularly relevant strand of the literature focuses on agency costs and corporate governance. It could be argued that *insiders*—in this case often the founding family—exerted too much control over firms that outgrew family-based management. As such, Asian conglomerates eventually focused more on size and market share while downplaying return on investment. Further, insiders were more likely to use debt financing as opposed to raising equity and diluting their ownership control. In this scheme high leverage is ultimately a symptom of weak governance.

Leverage also exposes firms to risks in the event of economic volatility. Another important part of the literature focuses on financial fragility, especially arising from debt.

Pioneering risk assessment models by Altman (1977 and 1993) established a modeling framework for assessing the probability of firms entering into bankruptcy. In particular, the level, maturity and repricing structure of debt are

considered to be important variables affecting the credit-worthiness of companies. For example, ratings agencies apply standard criteria when assessing companies, many of which center around the riskiness of the firms' capital structure as compared to average historical risk. Table 1 gives some of the standards applied by S&P in rating U.S. corporates. While international differences in historical volatility reduce the cross-country applicability of these standards, they do provide a flavor of the relatively weak position of Asian firms.

In the wake of the crisis, the empirical corporate finance literature has begun to explore the sources of weaknesses in the Asian corporate sector. Research has generally

	AAA	AA	A	BBB	BB	B
Interest coverage ratio	20.3	14.9	8.5	6.0	3.6	2.3
Long-term debt/capital	13.4	21.9	32.7	43.4	53.9	65.9
Total debt/capital	23.6	29.7	38.7	46.8	55.8	68.9

Source: Pomerleano (2001)
Note: Ratios are calculated as three-year medians (1994–96)

⁶ For a discussion of CDRAC and the “Bangkok Approach” to debt restructuring, see IMF Country Report No.00/21. The main features of the TAMC are discussed in IMF Country Report No. 01/147.

BOX 1. WHY DO FIRMS ISSUE DEBT, AND WHEN DOES IT BECOME A PROBLEM?

The literature on capital structure suggests that the issuance of debt carries both benefits and costs. Building on the pioneering work by Modigliani and Miller (1958), some of the main strands of literature revolve around the implications of agency costs, asymmetric information, and risk management.¹

Agency costs illustrate the various possible conflicts of interest between managers, shareholders, and debt-holders (Jensen and Meckling (1976)). Issuing debt to solve one agency cost problem may give rise to a different incentive compatibility problem. Whereas the conflict of interest between managers and shareholders suggests that issuing debt should be beneficial (add to firm value) by better aligning the manager's interests with those of the shareholders, agency costs of debt are also found in the conflict of interest between debt-holders and equity-holders. This conflict may lead to suboptimal investment decisions (the underinvestment problem), as equity-holders may not reap the full benefits from undertaking good projects. For example, when firms are close to bankruptcy, there is little incentive for shareholders to inject more capital, as any improvement in performance will fully benefit the debt-holders only (the debt overhang problem highlighted by Myers (1977)). This line of models also suggests that firms with high growth opportunities would issue less debt, while firms with well-established cash flow would have higher debt (Jensen 1986)). A related implication is that firms with more tangible assets can support more debt and have higher market value, but would be more likely to default (Harris and Raviv (1990)).

Asymmetric information has also been identified as a motivating factor for firms to issue debt. This strand of the literature is based on the assumption that managers know more private information about the firm's investment opportunities and future revenue stream. Debt may then be used as a signaling device for the quality of investment opportunities to the firm (Ross (1977)). Alternatively, given the costly nature of raising finance, firms raise funds according to a hierarchy, preferring first to undertake investments out of retained earnings, then to issue (riskless) debt, and only to issue new equity as a last resort (Myers and Majluf (1984)). This "pecking order" theory implies a negative relationship between debt and firm value, as high profit firms can finance future growth internally without resorting to issuing debt.

A related strand of the literature deals with risk management issues, including on the maturity structure, currency composition of debt, and hedging decisions. Some of the agency costs identified above are actually mitigated by the choice on the maturity structure of debt. For example, issuing more short-term debt can help eliminate the underinvestment problem by giving debt-holders control over renewed financing at relatively short intervals (Myers (1977)). This hypothesis implies that firms with high growth opportunities are likely to issue more short-term debt. Signaling hypotheses suggest that high-quality firms (with higher credit ratings) will issue more short-term debt.² On the other hand, the finance literature appears largely silent on the issue of currency composition of debt. It notes mainly that firms that operate in many countries tend to issue foreign debt to better match asset and liability positions in their different countries of operation. However, the accumulation of foreign currency debt by domestic firms has been identified as an important contributing factor to some of the Asian crisis countries. By taking on external debt at the prevailing lower foreign interest rates, these firms made savings on their interest costs but exposed themselves to exchange rate risk (debt was mostly unhedged). After the shock hit, firms were unable to service their debt, with many still suffering from this legacy.

Other determinants of corporate performance have also been identified in the literature, including diversification, ownership concentration, and corporate governance. Diversification may have advantages at certain levels of financial development, but could also become a weakness as firms expand into non-core areas and lose focus. Concentrated ownership has been seen as a method of control to help investors ensure some return on their investment, as another approach to solving the agency problem. However, ownership concentration can also create problems of its own, if majority shareholders try to expropriate resources for their own purposes to the detriment of the firm (Grossman and Hart (1988)). Solutions to this problem reach into the field of corporate governance, including mechanisms for investor protection (such as minority shareholder rights) and the legal and regulatory framework (such as information standards and disclosure requirements).³

¹ For a more extensive survey of the various strands of the literature on capital structure, see Harris and Raviv (1991).

² When the market cannot distinguish between good and bad borrowers, bonds will be mispriced (and the problem will be worse for longer-term debt). As a consequence, high quality firms will prefer to issue (better priced) short-term debt.

³ For surveys on corporate governance issues, see Shleifer and Vishny (1997), and Becht, Bolton, and Roell (2002).

focused on other possible weaknesses besides high debt, including the role of ownership structure and concentration, or the strength of corporate governance. Alba, Claessens, and Djankov (1998), Wiwattanakantang (2001), and Suehiro (2001) focus on the ownership concentration issue in Thailand. The first paper finds a weak negative relationship between ownership concentration and performance in listed companies, while the latter two papers dispute this finding. Suehiro (2001) does not formally test this empirical relationship, but provides stylized facts on ownership, debt, and performance within an extensive classification scheme for ownership in a larger sample of firms. Claessens, Djankov and Xu (2000) explore cross-country corporate performance of listed companies during the East Asian crisis, and highlight the role of institutional weaknesses (e.g., property rights, bankruptcy, and accounting procedures) in compounding the risk from weak firm financial structures before the crisis.⁸ While these papers do not focus in particular on the role of debt, leverage often enters as a control variable in the regression analysis, and the estimated coefficient on leverage is consistently negative (where the dependent variable is some measure of performance).⁹ In those studies, the sign of the coefficient has usually been interpreted as being consistent with the “pecking-order” theory. In a related vein, Allayanis and others (2001) find that the level of debt, but not its currency composition, is inversely correlated with performance.

Other studies have emphasized more strongly the impact of debt on corporate fragility. Dollar and Hallward-Driemeier (2000) highlight the role of pre-crisis borrowing for Thai industrial firms, particularly short-term, even in the face of declining profitability. They also note that only a small proportion of firms were audited. Heytens and Karacadag (2001) analyze Chinese corporate data and find that true liability levels are higher than apparent from bank and balance sheet data, reflected in low interest coverage and correspondingly higher vulnerability. Mulder and others (2002) and Ghosh and Ghosh (2002) explore the macroeconomic impact of shocks to corporate balance sheets, finding evidence of feedback between weak balance sheets and economic activity. High debt and weak governance are found to exacerbate the contractionary impact of currency crises. Thaicharoen and Kiatikomol (2002) focus on the role of high leverage in hampering firms’ new investment in Thailand since the crisis, with implications for sustained economic recovery.

Econometric analysis of the Thai data suggests that high levels of debt were correlated with poor performance. Panel regression results (Annex I) indicate that, controlling for size, the following factors influence listed firms’ performance in Thailand:

⁸ They analyze the role of nonfinancial firm-specific factors (e.g., sales growth, size), financial structure (initial leverage and liquidity, ownership concentration), and institutional environment (equity rights, creditor rights and judicial efficiency), as well as country and industry effects.

⁹ Some studies have focused on the determinants of corporate debt in various countries, for example Wiwattanakantang (1999, Thailand) and Lee and others (2000, Korea).

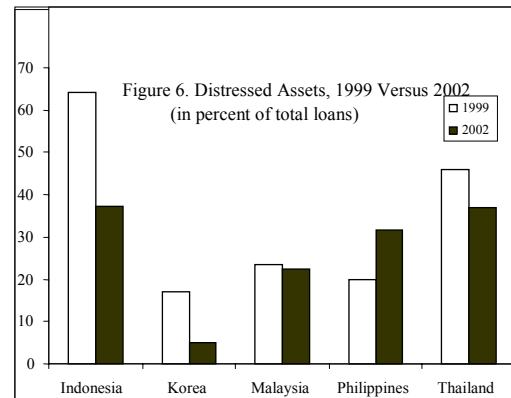
- A higher debt to asset ratio is associated with lower returns (both gross and net returns on assets). Higher input costs also adversely affect firm performance.
- Larger market share (within the sample of sectors and firms), and higher liquidity, are associated with stronger performance.

These findings suggest that as leverage increased progressively in the 1990s with the debt-financed growth of Thai corporates, the rate of return on investment systematically declined. This is consistent with the empirical literature on corporate performance in Asia and the extensive anecdotal evidence of family-owned Thai conglomerates seeking rapid growth but focused mainly on expanding sales as opposed to return on equity. Indeed, much of the investment was financed through bank loans while the founding families' equity contribution remained small. Moreover the high proportion of unhedged foreign currency borrowing exposed these firms to sharp movements in the exchange rate. Eventually, the crisis crystallized these imbalances, leading to sharp contractions in returns and a spike in debt levels which no doubt contributed to the regression results presented here.

An alternative way of framing this issue is in terms of the classic agency problem described in the Box. High debt levels create a disincentive for the firm (controlled by insider large equity holders) to take on high-yielding projects, because all the returns from these investments would first accrue to the debt holders rather than equity holders. Forgoing such projects leads firms to systematically underperform, while having a capital structure skewed toward debt. Such interpretations also have implications looking forward, as, if debt levels are not brought down for the highly leveraged firms, the debt overhang or underinvestment problems will remain, with macroeconomic implications.

IV. RECENT THAI CORPORATE PERFORMANCE

The Thai corporate sector remains among the most highly leveraged in the region (Figure 6).¹⁰ The slow progress in debt restructuring is mirrored in the continued high level of *total* distressed assets, which is used here as an indicator of the amount of troubled corporate debt that remains to be resolved.¹¹ A similar pattern is reflected in measures such as debt-equity ratios,

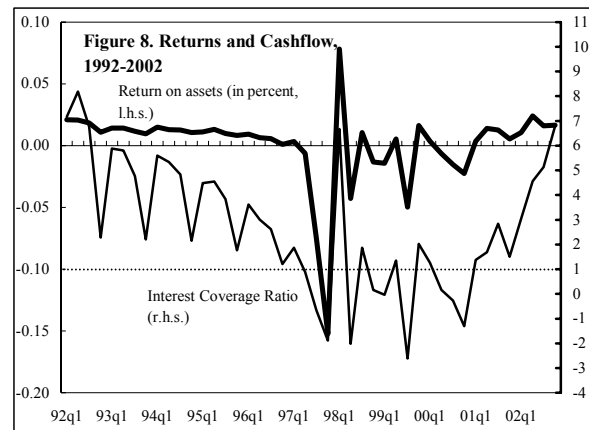
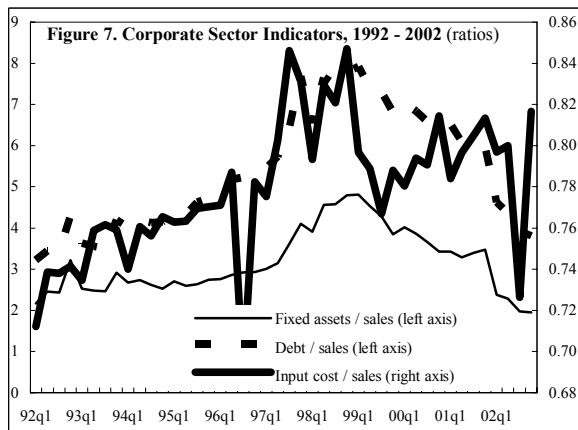


¹⁰ The definition of distressed assets varies across countries and should therefore be interpreted with caution.

¹¹ Distressed assets are defined here as on balance sheet NPLs, plus NPLs transferred to off balance sheet AMC's, plus the written off portion of fully provided NPLs. The lack of detailed information on restructuring means that this definition is likely an upper bound. While banks already had adequate reserves for the write-offs, in many cases these have not translated into debt reduction for corporates reflecting unfinished troubled debt resolution.

which have fallen somewhat further in most other countries in the Asia region following the crisis.

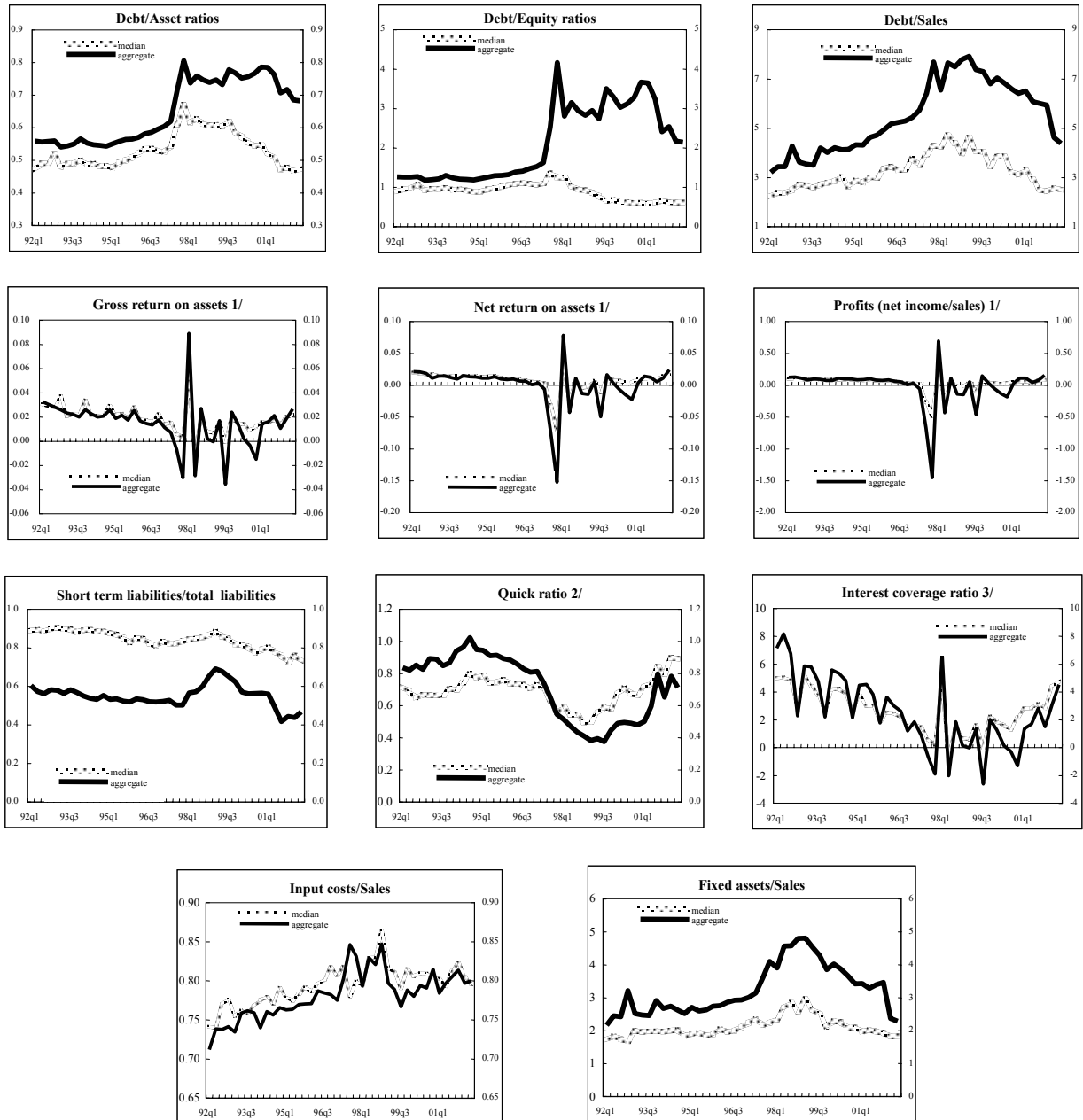
Debt levels, though high, have fallen from post-crisis peaks, while returns and corporate cash flows are showing signs of stabilizing.¹² Debt has fallen in part reflecting the stabilization of the exchange rate, though the overall level remains high. Fixed asset ratios have also come down markedly, perhaps reflecting some asset transfers in the process of debt restructuring. Corporate profitability has picked up to pre-crisis levels, and returns have shown signs of stabilizing, while interest cover has improved significantly (Figures 7 and 8). The improvement in interest cover reflects not only current low interest rates but also up-front reductions in interest rates as part of the debt restructuring process. Further, the share of input costs to final sales, considered an indicator of underlying profitability and efficiency, remains elevated.



The aggregate picture presented above masks significant firm-level variation. Figure 9 shows the difference between the medians and aggregated debt measures for all firms. The charts suggest that not all firms in the sample are still highly leveraged. Indeed, more than half of the firms (mostly smaller firms) have reduced their debt ratios to below pre-crisis levels, and have done so at a faster pace than the aggregated figures suggest. At the same time, the large difference between the aggregate and the median figures that has persisted since 1997 reflects that a substantial subset of firms is still highly leveraged.

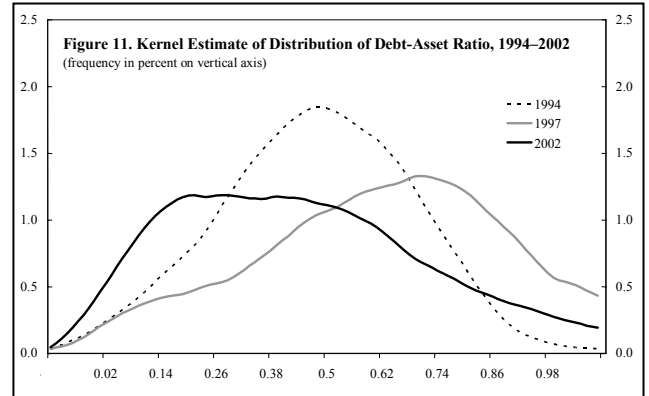
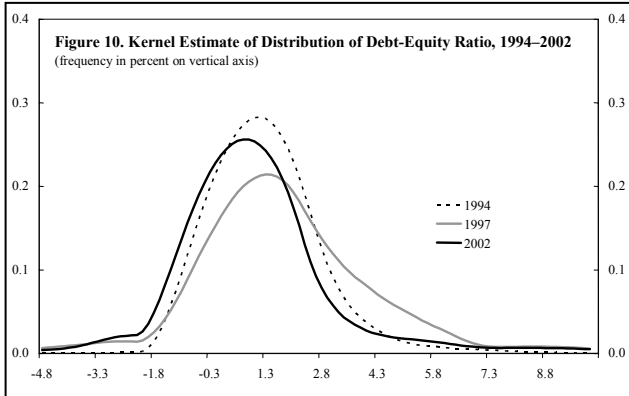
¹² The focus of the firm-level analysis here on the listed company sector introduces important caveats to generalizing from these findings. But data from other sources suggests that performance among SMEs is not superior to that of listed companies (see IMF Country Report No. 01/147).

Figure 9. Median Versus Aggregate Corporate Performance Measures



1/ The figures are not annualized.
 2/ Quick ratio = (current assets - inventory)/current liabilities.
 3/ Earnings before interest and taxes divided by interest expense.

The difference between the aggregate and firm-level financial position is borne out by looking at the distribution of key ratios across firms. Figures 10 and 11 below



show kernel density estimates of the dynamic evolution of key firm-level distributions.¹³ The distribution of leverage ratios through time shows the expected rightward shift during the crisis as the exchange rate depreciated, increasing the baht value of foreign currency denominated debt. The distributions have since shifted back with current modes even lower than pre-crisis levels. However, the fatter tails at both ends of the distributions indicate the increased dispersion in leverage arising in the wake of the crisis. The increased number of highly leveraged firms is what drives the divergence between the aggregate and median ratios. Moreover the distributions discussed are not weighted by size. Thus the divergence between aggregate and median ratios shows that some large companies remain troubled and highly indebted.

Further examination reveals two main reasons for the divergence between the aggregate and median debt ratios:

- Firstly, as noted above, a small percentage of large firms with high debt-equity ratios account for a large percentage of total nonfinancial SET listed company liabilities. Table 2 shows that, at end-2002, 4 percent of firms account for almost 57 percent of liabilities and 53 percent of sales (see columns for high debt firms).

¹³ See Annex II for a description of the methodology used to estimate kernel densities.

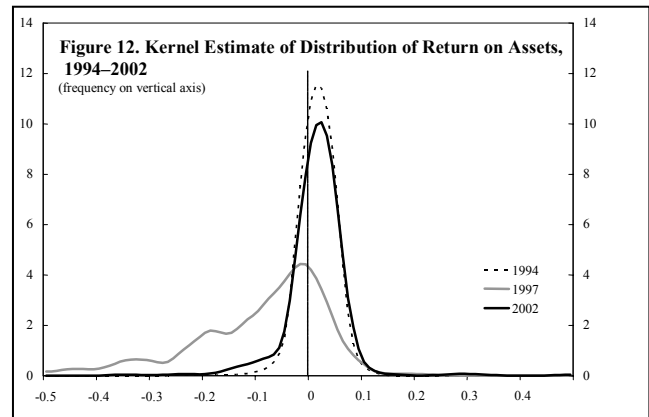
Table 2. Composition of Corporate Balance Sheets Across Different Sample Splits

Full sample # (yr end)		High debt firms 1/				Firms with negative book value equity				Firms with low interest coverage 2/			
		Percent	Debt	Assets	Sales	Percent	Debt	Assets	Sales	Percent	Debt	Assets	Sales
1992	337	2.7	38.9	30.0	21.6	0.0	0.0	0.0	0.0	9.2	4.3	4.9	5.9
1993	356	4.2	44.5	35.8	32.3	0.6	0.1	0.1	0.1	12.1	10.5	12.9	6.4
1994	360	3.6	36.8	29.0	27.3	0.8	0.4	0.2	0.2	13.6	8.6	8.5	7.5
1995	359	4.2	36.1	29.7	27.2	1.4	0.5	0.3	0.5	19.2	16.5	15.0	11.5
1996	366	4.6	45.0	39.3	31.9	1.9	1.4	0.6	0.3	33.3	34.6	32.0	16.6
1997	359	5.3	42.8	43.1	24.8	13.6	24.5	15.8	16.6	57.4	70.0	65.7	49.8
1998	346	6.1	54.5	52.0	38.2	13.9	15.3	8.0	4.7	53.5	52.5	45.6	37.6
1999	327	4.9	49.3	46.5	38.5	16.8	21.2	9.3	4.5	38.5	28.1	20.1	15.9
2000	323	4.3	41.3	40.7	32.0	16.4	31.5	14.8	11.6	41.2	71.1	57.0	47.4
2001	300	4.7	51.7	45.6	35.2	12.0	18.0	6.5	3.1	34.7	44.4	38.5	33.7
2002	322	4.0	56.6	48.8	53.4	11.2	13.6	5.2	1.7	26.1	27.3	21.3	14.7

1/ Firms with debt-to-equity larger than 1 and those that account for at least 1 percent of total liabilities of nonfinancial listed firms.
 2/ Firms with interest coverage less than 1 (earnings before interest and taxes/interest expense).

- Secondly, firms with negative (book value) equity account for almost 14 percent of total liabilities, but only 2 percent of sales.¹⁴ Around 11 percent of listed firms are basically insolvent (most of these firms are also in SET rehabilitation status).¹⁵
- The rest of the gap is filled by a substantial number of smaller firms (in terms of sales) whose debt-equity ratios remain high (Figure 13). Panel 1 of Figure 13 shows that most of the firms with debt-equity ratios below 1 are indeed small. However, a significant number of relatively small firms are still highly leveraged, with debt-equity ratios exceeding one, in many cases, by a large margin (Panel 2). Finally, the third panel shows that several of the largest firms in the SET are also those with high debt-equity ratios.

The aggregate profitability data obscure interesting firm-level dynamics. Again as expected, the distribution across firms of returns on assets shifted to the left during the crisis, with a fattening of the negative tail (Figure 12). (Indeed it is interesting to note that even in 1994, a sizeable number of firms were losing money). With the economic pick up, the



¹⁴ In the aggregate debt/equity measure which sums debt and equity across all firms before calculating the ratio, companies with negative equity would reduce the denominator while the numerator would reflect these companies' debt. The two humps seen in the aggregate debt/equity measure in Figure 1 during 1999-2001 are explained mainly by these companies.

¹⁵ Listed companies that are experiencing financial difficulty and meeting some specific criteria on profitability and net worth, can be moved to the so-called "Rehabilitation" board of the SET. They are then removed from their specific industry sub-category of the SET index. In principle, this would typically constitute a first step towards delisting. But many companies under rehabilitation have continued to be listed.

distribution has shifted right again into more positive territory. While the mode is similar to that prior to the crisis, the slightly fatter negative tail again points to the presence of the still higher number of loss-making firms.

A comparison of financial ratios for various sub-samples further highlights substantial variation at the firm level (Figures 14 and 15). Weak firms, as defined by those with interest coverage less than 1, while on the decline, still account for over 25 percent of firms and a large portion of SET debt (Table 1), but only 15 percent in sales. An interest coverage multiple below 1 implies that firms are not generating adequate net cash flow to service fully their debt. These firms have persistently high debt, more volatile performance, and continued poor cash flow positions. They also hold higher proportions of fixed assets (relative to sales).

The performance of high debt firms that have never been under SET rehabilitation status seems to lag behind firms with lower leverage. High debt firms are here defined as firms with debt-equity ratios in the upper quartile of the sample. Their median performance has lagged that of the full sample, including on return on assets, liquidity measures, and interest coverage (Figure 15, “hd healthy” firms). These firms are found in sectors that would be expected to have more tangible assets (real estate, capital-intensive manufacturing).¹⁶

While the small number of large and highly indebted firms appear to be doing well on aggregate, performance varies widely under the surface (Figure 3, “big debt” firms). These firms stand out from the pack on aggregate debt measures, but in other measures they largely mirror the sample of healthy and the full sample of firms. However, even within this small sample of firms there is considerable diversity in performance. For example, the sample includes both Thai Petrochemical Industries (TPI) and Siam Cement Corporation (SCC), two firms at opposite ends of the spectrum. As the SET’s largest private debtor, TPI continues to struggle as the company’s debt restructuring and operational restructuring have been hindered by legal battles. TPI is currently classified as a company under rehabilitation. In contrast, SCC is considered one of the more successful listed companies in Thailand.

¹⁶ These include communication, entertainment and recreation, energy, household goods, agribusiness, food and beverages, electronic components, chemicals and plastics, and commerce.

Figure 13: Debt/equity vs. Proportion of total SET sales, 2002Q2

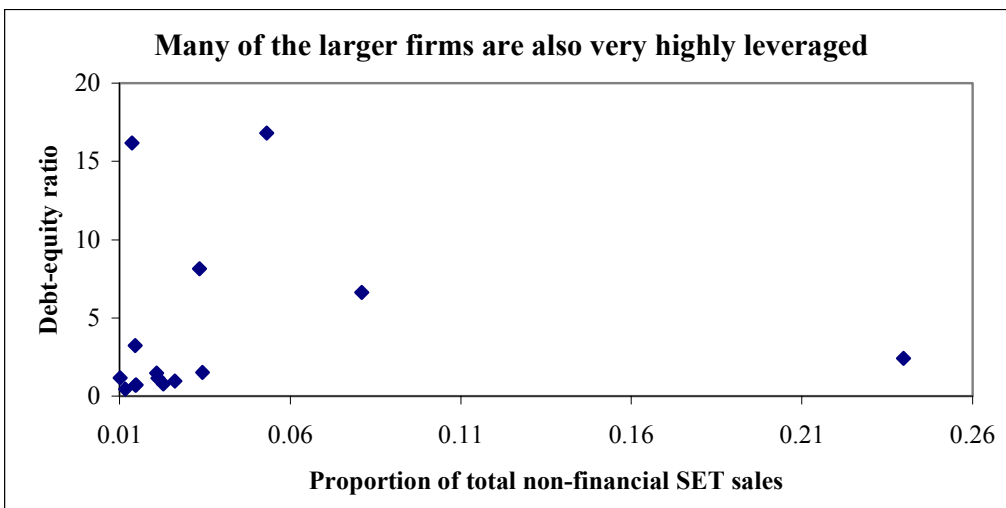
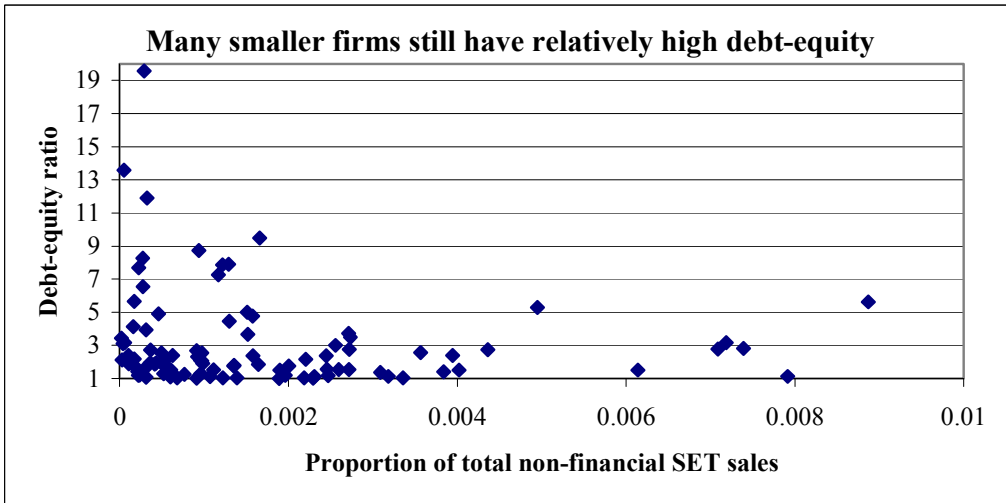
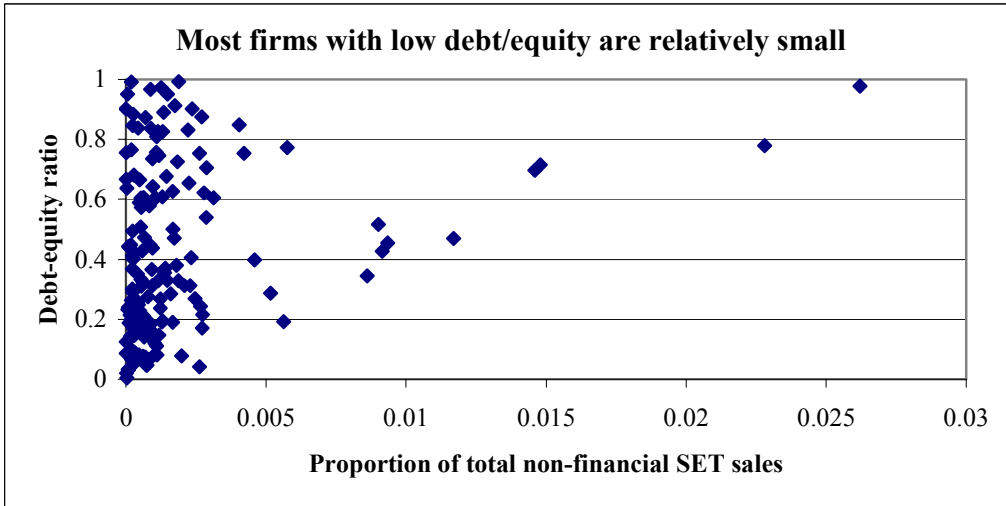
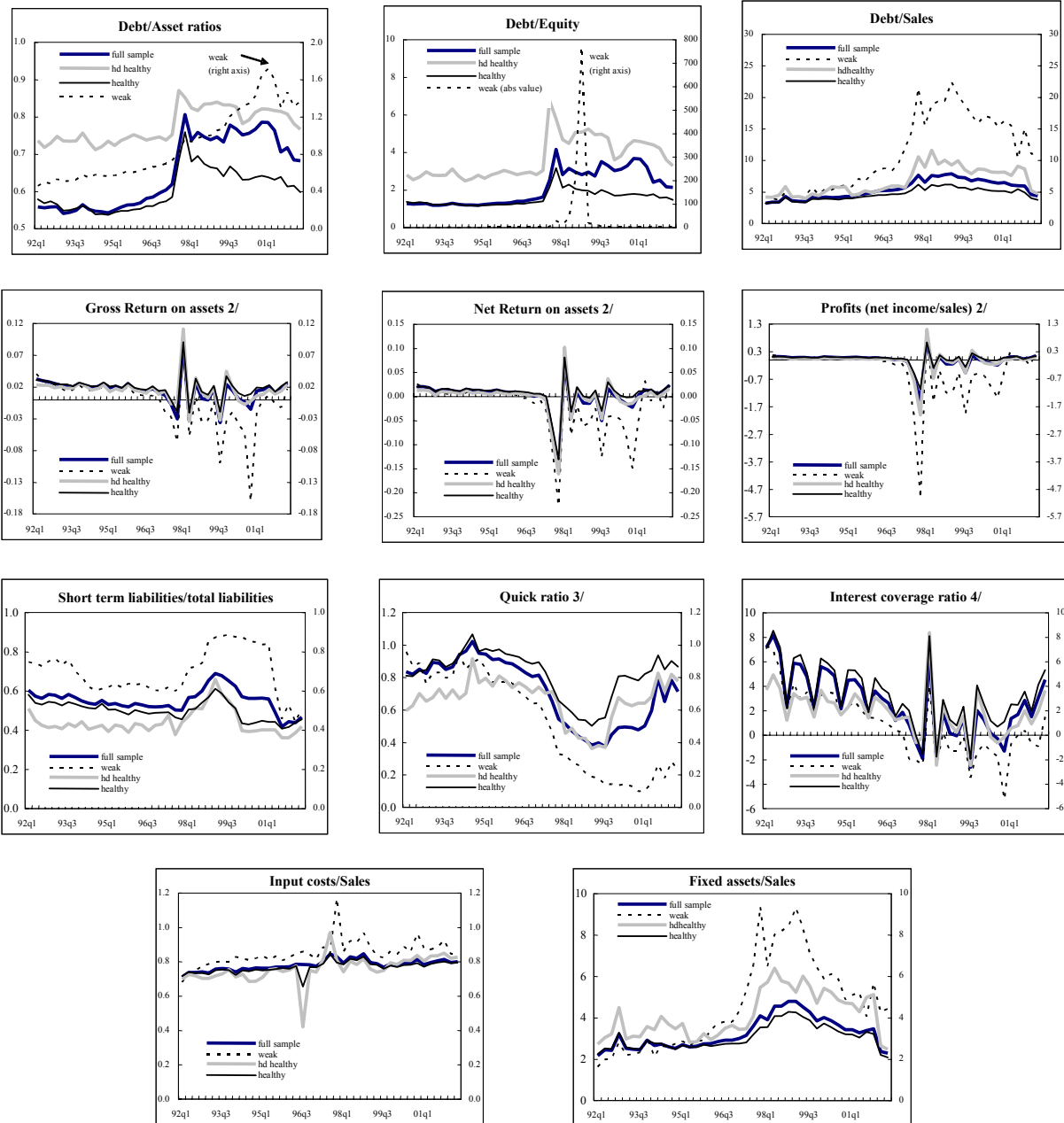
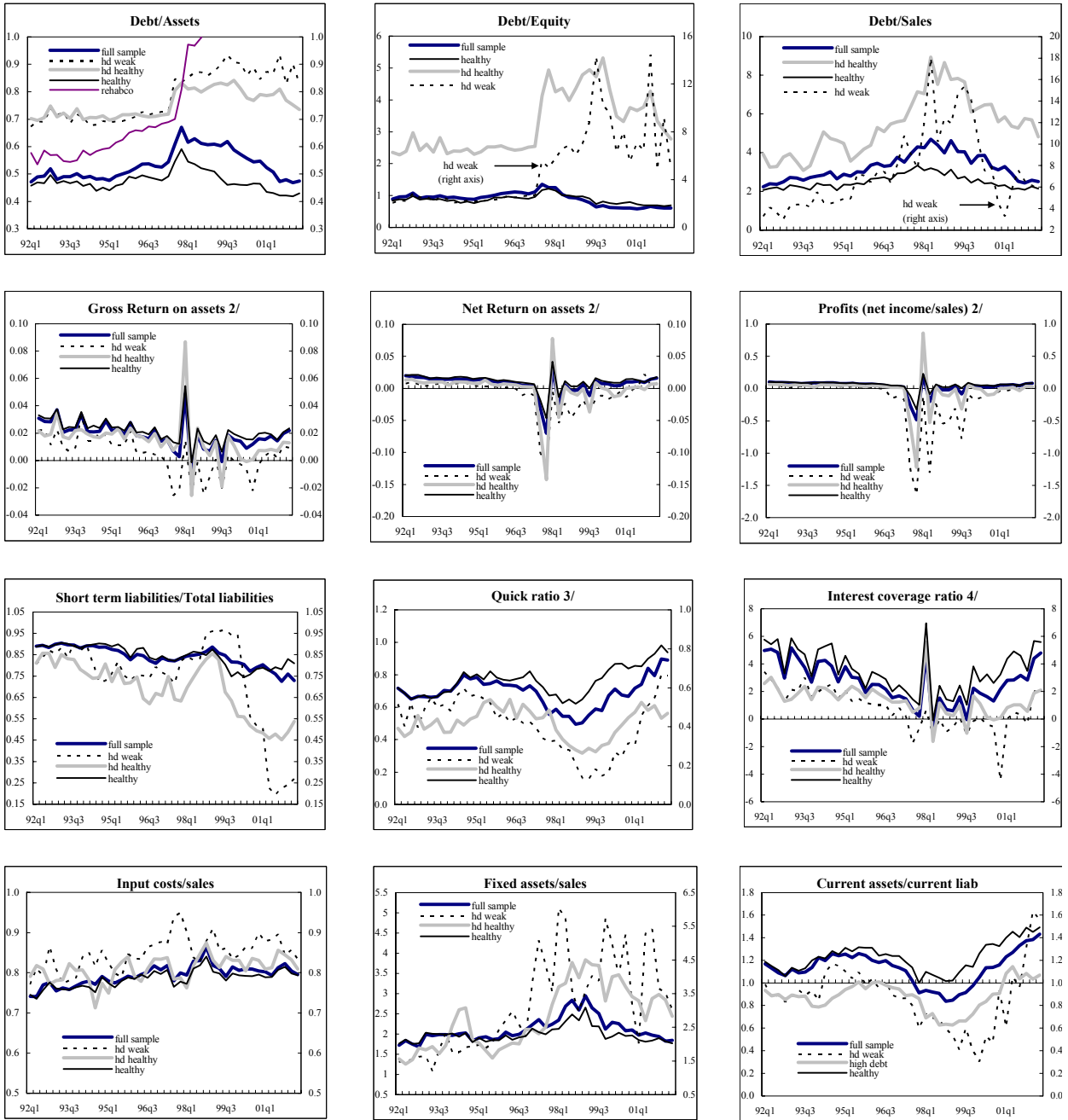


Figure 14. Aggregate Corporate Performance Measures 1/



- 1/ The label "hd healthy" refers to firms with high debt that have never been in "rehabilitation". High debt is defined as a debt-to-equity ratio in the upper 25th percentile of the sample. "Weak" firms are those that have been in "rehabilitation", as defined by the SET, at some point. "Healthy" firms are those that have never been in rehabilitation.
- 2/ The figures are not annualized.
- 3/ Quick ratio = (current assets - inventory)/current liabilities.
- 4/ Earnings before interest and taxes divided by interest expense.

Figure 15. Median Corporate Performance Measures 1/



1/ The label "hd healthy" refers to firms with high debt that have never been in "rehabilitation". High debt is defined as a debt-to-equity ratio in the upper 25th percentile of the sample. "Weak" firms are those that have been in "rehabilitation", as defined by the SET, at some point. "Healthy" firms are those that have never been in rehabilitation.

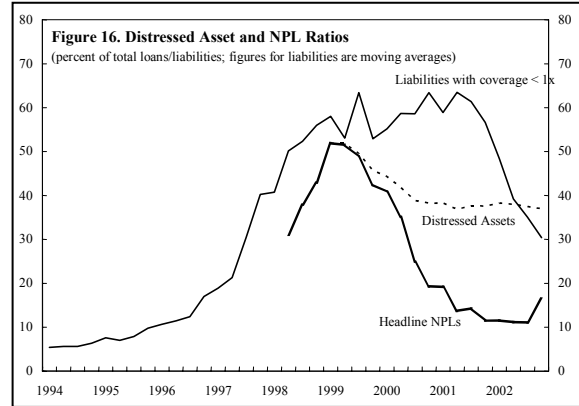
2/ The figures are not annualized.

3/ Quick ratio = (current assets - inventory)/current liabilities.

4/ Earnings before interest and taxes divided by interest expense.

Data on interest coverage suggests that the level of corporate debt under stress remains higher than reflected in the headline NPL figures. An interest coverage multiple

below 1 has typically been used by market analysts as a threshold to categorize all such firms' liabilities as "implied NPLs". Figure 16 presents the value of total liabilities held by firms whose coverage multiple is less than 1, as a share of total listed company liabilities for the quarter in question. As can be seen, though this ratio has fallen significantly since the peaks during the crisis and has recently come below the distressed asset ratio, it remains high and above the NPL ratio. While it is not possible to map directly from listed company data to the

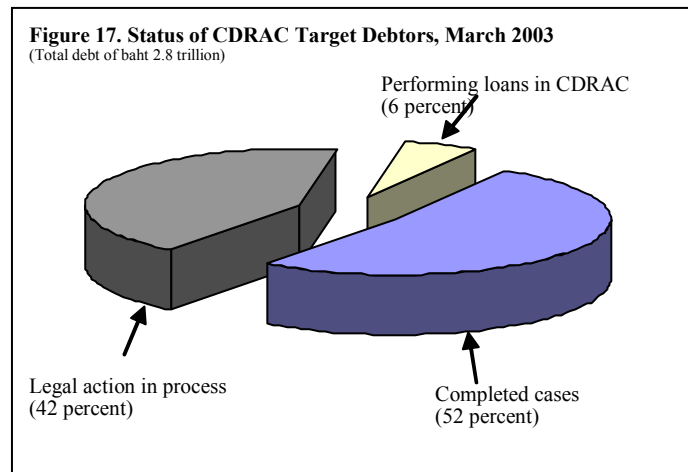


broader sample of the financial sector data on NPLs/distressed assets, the analysis is still sobering. As noted earlier, however, a full 25 percent of listed firms still face debt servicing difficulties, and it is likely that many unlisted firms suffer from these same problems.

V. PROGRESS ON CORPORATE DEBT RESTRUCTURING

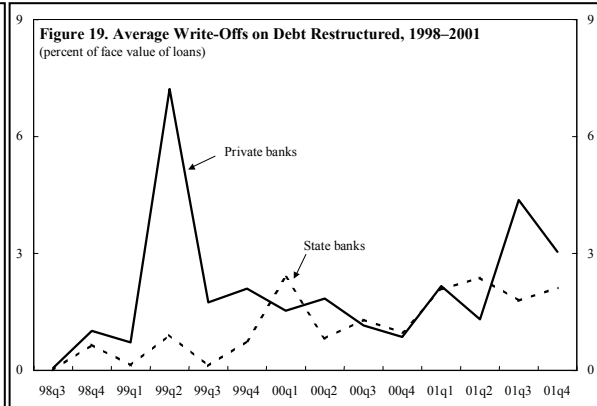
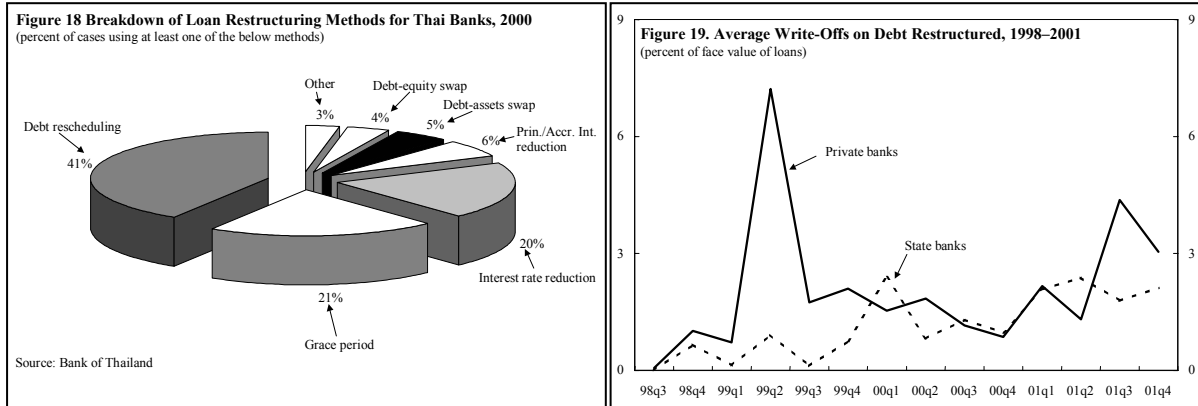
Financial institutions have reported restructuring a substantial volume of nonperforming corporate debt.

Large portions of claims were negotiated under the auspices of the CDRAC process, with a completion rate of over 50 percent (Figure 17). But this has still left troubled debt worth about 22 percent of GDP to be dealt with in the over-burdened court system. Moreover, the sustainability of the debt restructuring achieved under the CDRAC process remains to be demonstrated. The continuing re-entry of previously restructured NPLs is a testament to this concern.



The TAMC has reported that it has resolved most of the debt that was transferred to its portfolio. Of a total B 733 billion in book value that it took on, B 535 billion has been resolved (10 percent of GDP) as of early 2003. The two principal vehicles for debt resolution were debt restructuring (43 percent of total book value) and foreclosure/final receivership of properties (47 percent). The average debt reduction is approximately 33 percent of the book value, and the expected recovery rate is around 46 percent. Further details on the terms of debt restructuring, even in aggregate, are not available. These figures, however, only reflect the processing of paperwork, while the extent of actual restructuring and foreclosure is unclear.

Companies in SET rehabilitation status are also undergoing debt restructuring, mainly in the form of rescheduling. Payment deadlines have been extended for 51 percent of the cases in which debt has been reported as restructured. The rest of the cases involve lowering principal and interest payments or sales or transfer of assets (26 percent), turning debt into capital or debentures (17 percent), and capital increases (6 percent) (Figures 18,19).



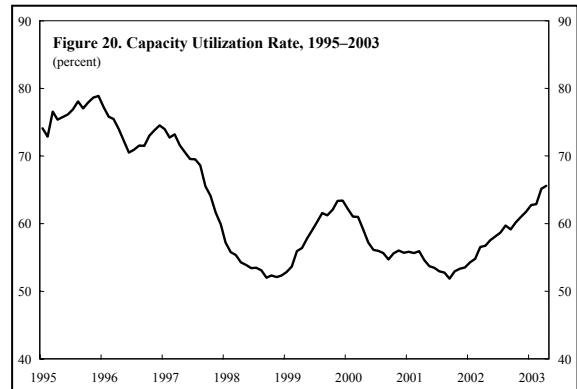
Still high corporate debt levels reflect that much debt restructuring has involved debt rescheduling and less debt reduction. The difficulties in pursuing adversarial bankruptcy proceedings and slow pace of foreclosure have undermined the ability of creditors to convert debt into equity in the process of restructuring. While debt restructuring is an inherently iterative process, creditors also face incentives to stretch out the process of loss recognition and so conserve capital. As such, there has been relatively less reduction in the net present value of debt, whether through debt-equity conversion, or debt and debt service reduction. Thus both corporate leverage and its financial sector counterpart, distressed assets, remain high. This is evinced by available data on the terms of completed debt restructurings shown in the accompanying text charts.

Evidence on adjustment in the real sector is also mixed. There has certainly been exit of listed companies, particularly in those sectors most clearly identified with the asset price bubble—the finance companies and real estate-related businesses. Also, employment in the industrial and service sectors has been reduced. Moreover, there has been substantial new capital raised in the banking sector resulting in significant dilution of existing owners, though in no case of the largest banks has there been any change in control. However, comparatively little equity has been raised in the broader corporate sector and corresponding anecdotal evidence suggests that ownership remains mostly unchanged.¹⁷ Comparatively little exit has

¹⁷ Total new equity raised since the crisis by firms reporting to the SEC (Securities and Exchange Commission) amounts to about \$15½ billion, some 42 percent of average market capitalization. But of this, approximately \$10 billion has been raised by private commercial banks. This leaves a much smaller share raised by the private nonfinancial sector. Moreover, merger and acquisition activity has been mostly absent. The value of mergers approved by the SEC since the crisis has amounted to just above 2 percent of market capitalization.

been reported in the manufacturing sector, and capacity utilization remains below pre-crisis levels (Figures 20 and 21).¹⁸

	Jan. 97	Apr. 03	Change
Total Listed Companies	454	391	-63
Main sectors			
<i>Of which:</i>			
Finance and securities	52	27	-25
Property development	44	29	-15
Building materials	35	17	-18
Agribusiness	29	20	-9
Food and beverage	29	23	-6



VI. CONCLUSION

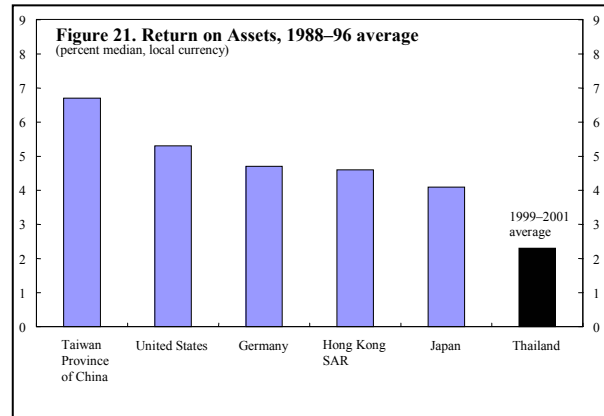
The corporate sector, although recovering, still appears fragile and vulnerable to potential adverse shocks. Performance has improved but remains somewhat volatile, debt levels are still high, and capacity utilization has yet to fully recover. Many firms are still vulnerable to shocks from a slowdown in demand, higher interest rates, and a weakening of the exchange rate, which could have adverse implications for macroeconomic and financial stability.

While the aggregate listed company sector remains strained, many firms appear well on the road to recovery. The preceding firm-level analysis suggests that the problems in the Thailand's listed corporate sector are concentrated in a subset of firms that expanded too rapidly in the bubble years, many with capital structures particularly exposed to foreign debt. Thus, weakness in the aggregate corporate sector remains and has substantial macroeconomic implications. But the strength of a broad base of other firms (including many smaller companies) is encouraging and suggests that a targeted debt-restructuring strategy could have large payoffs.

The true extent of the remaining need for a reduction in excess capacity can best be found using a market-based process. It is hard to gauge the *full* extent of the remaining

¹⁸ The capacity-utilization index must be interpreted with caution. Anecdotal evidence suggests that the installed capacity of plants that are no longer producing is still included in computation of the ratio. This would tend to bias downward the utilization index. But it is unclear whether the financial losses associated with the implied economic depreciation of installed capital have been fully realized. In this context, the currently measured low level of capacity utilization could still provide useful information on the extent of losses yet to be realized to reflect the shutting down of defunct capital stock.

debt overhang, which is the financial counterpart to excess capacity. Despite recent gains, the relatively low post-crisis rate of return on capital in Thailand compared with some international benchmarks suggests unresolved problems.¹⁹ But this is a fundamentally microeconomic restructuring process that must work its way through in time. The key is to set up an institutional framework and incentive structure that facilitate price discovery of assets and an efficient sharing of the costs associated with restructuring, whether incurred through losses at banks or ownership changes in, and exits from, the real sector.



¹⁹ While an inherently difficult comparison, the figure attempts to present benchmarks in the form of longer-run averages that smooth out cyclical effects. Thus, data on Thailand spanning the post-crisis recovery are compared with data from other countries over a time period spanning a global business cycle.

ANNEXES

I. RESULTS FROM ESTIMATION OF PANEL DATA ECONOMETRIC MODELS

The regression model estimated is of the following form²⁰:

$$\begin{aligned} \text{Return on assets} = & \alpha + \beta_1 * \log(\text{sales}) \\ & + \beta_2 * \text{debt/assets} \\ & + \beta_3 * \text{short-term liabilities/total liabilities} \\ & + \beta_4 * \text{firm's market share} \\ & + \beta_5 * \text{current ratio} \\ & + \beta_6 * \text{cost of goods sold/sales} \\ & + \beta_7 * \text{ownership concentration} \end{aligned}$$

The model includes as independent variables factors that are commonly used in the literature on determinants of corporate performance, such as firm size, measures of leverage, market power, liquidity, input costs, and ownership concentration. Both gross and net return on assets (on a quarterly basis) were used as dependent variables.²¹

As noted in the text, the main results suggest that returns are negatively associated with measures of debt and input costs, and positively associated with liquidity measures and market power (Tables 1 and 2). Ownership concentration (share of company held by top 5 or top 10 shareholders), as a proxy for firm-level governance, was not found to be significant. Also, an index of industry concentration (Herfindahl) was not consistently significant.

Various techniques were used in estimating the regression equation, and specification tests conducted. Formal econometric tests favored fixed effects over random effects, with test results shown in the bottom rows of the tables below. Fixed effects results with firm effects only are reported in column 1. In column 2, results are shown from a regression with time effects included and some corrections made, including for: (i) the unbalanced panel, (ii) the likely presence of cross-panel correlation (from the large macroeconomic shocks common to all firms during the crisis period); (iii) possible heteroskedasticity. After these corrections, the market share and short-term liabilities terms drop out of significance, but the rest of the variables from the first regression result remain, with most coefficients remaining close to previous estimates. The same regressions run with gross returns yield similar results, with the exception that the short-term liabilities coefficient switches signs to positive, and the current ratio's coefficient loses some significance. This set of results yielded very low R squared, and

²⁰ Data are for over 350 companies listed on the Stock Exchange of Thailand available on CD-ROM, quarterly from 1992Q1 to 2002Q2, with gaps in time and firm coverage.

²¹ Gross return on assets is defined as earnings before interest and taxes(EBIT)/total assets; net return on assets is defined as net income/total assets.

were chosen to report due to the inclusion of the most number of companies and the reasonable-looking magnitudes for the coefficients.

Table A-1. Fixed-Effect Panel Model Results*

	(1)	(2)	(3)	(4)
Dependent variable	Net ROA	Net ROA	Gross ROA	Gross ROA
Independent variables				
Log(sales)	0.007 (3.16)	0.006 (3.68)	0.014 (8.09)	0.008 (5.81)
Debt/assets	-0.026 (-17.05)	-0.03 (-3.25)	-0.012 (-10.38)	-0.018 (-1.98)
ST liab./Total liab.	-0.017 (-2.27)	0.0001 (0.02)	0.016 (2.88)	0.018 (3.43)
Market share	0.114 (4.6)	-0.0002 (-0.02)	0.094 (4.90)	-0.002 (-0.20)
Current ratio	0.002 (2.35)	0.002 (2.29)	0.0007 (1.35)	0.001 (1.87)
Input cost ratio	-0.004 (-4.01)	-0.005 (-3.05)	-0.003 (-3.88)	-0.005 (-2.79)
Constant	-0.071 (-2.42)	-0.054 (-2.21)	-0.177 (-7.85)	-0.091 (-3.96)
Number of firms	362	362	362	362
Total number of obs.	13,720	13,720	13,720	13,720
Number of quarters (average)	37.9	37.9	37.9	37.9
R-squared	0.04	0.05	0.03	0.04
Hausman test (p-value)	110.10 (0.00)		175.41 (0.00)	
Breusch Pagan LM test (p-value)	16.71 (0.00)		57.68 (0.00)	

* t-ratios in parentheses

In a second set of regressions, the regression fit improves while magnitudes still appear reasonable (Table A-2). A smaller subset of firms is included in the sample, though the average number of time periods included is only marginally reduced. In this set, the short-term liabilities variable has been excluded (given the sign ambiguity in the previous set of regressions), and the quick ratio included as an alternative to the current ratio as a measure of liquidity. Results are quite similar to those in the first set, though the liquidity measures now appear less significant. They drop out altogether when gross ROA is used as the dependent variable. The coefficient on the debt variable increases in magnitude in absolute value terms, possibly now also reflecting the effect of the short-term debt variable.

Table A-2. Panel Regression Results*

	(1)	(2)	(3)	(4)
Dependent variable	Net ROA	Net ROA	Gross ROA	Gross ROA
Independent variables				
Log(sales)	-0.003 (-1.63)	0.004 (3.1)	0.004 (2.9)	0.006 (6.47)
Debt/assets	-0.067 (-33.45)	-0.064 (-9.53)	-0.05 (-36.35)	-0.051 (-9.80)
Market share	0.092 (4.08)	-0.0007 (-0.08)	0.078 (4.99)	-0.003 (-0.39)
Quick ratio	0.002 (2.54)	0.001 (0.92)	0.0004 (0.72)	-0.00007 (-0.39)
Input cost ratio	-0.004 (-4.46)	-0.004 (-2.81)	-0.003 (-4.76)	-0.004 (-2.43)
Constant	0.077 (2.89)	-0.008 (-0.53)	-0.014 (-0.8)	-0.03 (-2.53)
Number of firms	354	354	354	354
Total number of observations	13,159	13,159	13,159	13,159
Number of quarters (average)	37.2	37.2	37.2	37.2
R-squared	0.11	0.12	0.145	0.15
Hausman test (p-value)	102.13 (0.00)		62.74 (0.00)	
Breusch-Pagan LM test (p-value)	16.79 (0.00)		101.41 (0.00)	

*(t-ratios in parentheses)

II. KERNEL DENSITY ESTIMATES²²

When looking at firm level data, it is useful to develop an understanding of the underlying distribution of firms across particular characteristics of interest. This reflects that focusing on particular moments of the underlying distribution may obscure interesting firm-level variations that convey useful information for making economic assessments. Moreover, imposing a rigid distributional assumption on firm level data could mask unusual patterns in the data, particularly if the sample examined straddles a period of structural break such as was the case for the Asian crisis. Accordingly, this paper uses standard non-parametric techniques to compute the distribution of firms across key variables.

The basic problem of interest involves estimating the probability density function of a random variable X drawn from some unknown distribution f where:

$$f(x) = \lim_{h \rightarrow 0} \frac{1}{2h} P(x-h < X < x+h)$$

Typical *parametric* density estimation assumes that the data are drawn from a particular family of distributions and then focuses on estimating the moments sufficient for parameterizing the assumed distribution. So for example, firms in the sample could be assumed to be normally distributed with mean μ and variance σ^2 . Then the density could be constructed by estimating μ and σ^2 .

Non-parametric density estimation however makes less rigid assumptions about the distribution of the observed data and has its root in histogram analysis where the density is defined as:

$$f(x) = \frac{1}{nh} \quad \forall X_i \in [x_0 + mh, x_0 + (m+1)h]$$

given an origin x_0 and a bin width h for positive and negative integers m and a sample size n . The choice of the bin width parameter m is the key to determining the degree to which the constructed density is smoothed. Alternatively, a naïve estimator of f is:

$$\bar{f} = (x) \frac{1}{nh} \sum_{i=1}^n w\left(\frac{x - X_i}{h}\right)$$

Where w is a weight function defined for example as $w(x) = (1/2 \text{ if } |x| < 1, 0 \text{ otherwise})$. This naïve estimate is equivalent to constructing a histogram where every point is the center of a particular bin width thus freeing the histogram from the particular choice of x_0 . However the parameter h still remains a choice determining the bin width and extent of smoothing. The resulting constructed densities have a “step-wise nature” with each step corresponding to the size of the bin-width.

The next step in constructing a smoother estimate of the underlying density is to replace the weight function w by a kernel function K which satisfies the condition

²² This annex summarizes a fuller discussion contained in Silverman (1986).

$$\int_{-\infty}^{\infty} K(x) dx = 1$$

Usually K will be a symmetric probability density function, for example the normal density. Following this, it is possible to derive the kernel estimator defined as:

$$\bar{f} = (x) \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x - X_i}{h}\right)$$

Clearly an important consideration is the size of the band-width parameter, h . Too small a value could lead to spurious variation being introduced into the distribution while too large a value could lead to over-smoothing that masks important features of the underlying distribution. A criteria for choosing an optimal value of h can be derived from minimizing the approximate mean integrated squared error of the estimated distribution defined as:

$$MISE(\bar{f}) = E \int \{\bar{f}(x) - f(x)\}^2 dx$$

It can be shown that the optimal value for h or h_{opt} is equal to:

$$h_{opt} = k_2^{-2/5} \left\{ \int K(t)^2 dt \right\}^{1/5} \left\{ \int f''(x)^2 dx \right\}^{-1/5} n^{-1/5}$$

where k_2 is a constant, normally the variance of the distribution f derived with kernel K . It can then be shown that the kernel K consistent with h_{opt} and minimizing the MISE for the distribution is:

$$K_e(t) = \left(\frac{3}{4\sqrt{5}} \left(1 - \frac{1}{5} t^2 \right) \forall t \in [-\sqrt{5}, \sqrt{5}] \right) \text{ and } 0 \text{ otherwise}$$

This is known as the Epanechnikov kernel and is used in the estimation of the kernel density functions presented in this paper. The starting point in the estimation of the kernels densities in this paper was to use an h_{opt} consistent with $K_e(t)$ and an unrestricted range for the underlying data. But using h_{opt} as the bandwidth parameter can lead to over-smoothing when the underlying data are particularly skewed, with extreme outliers, as is the case in the firm-level data analyzed here. As suggested by Silverman (1986), we thus iterated over a choice of smoothing parameters in the neighborhood of h_{opt} until the degree of over-smoothing evident in graphs of the distribution appeared to drop-off with no significant gains in added variation. Similarly, given the extreme long tails in the actual data, the densities were estimated over a still large, but constrained range of the data. This allows an analysis of the variation in the interior of the data range without getting overwhelmed by the few large outliers.

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