FINANCIAL STRUCTURE OF THE MANUFACTURING CORPORATE SECTOR OF THAILAND AROUND THE ECONOMIC CRISIS: A DECOMPOSITION MEASURE BASED APPROACH

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ABSTRACT

This paper describes an investigation into the financial structure of the manufacturing corporate sector of Thailand before and after the economic crisis. The structure is important for financial statement analysts who are often concerned with changes over time in the relative shares of the financial statement items. Decomposition analysis has been used for measuring the relative shares. It is found that the decomposition measures are higher after the economic crisis. The total liabilities decomposition measure was found higher as compared to the total assets decomposition measure before the crisis and lower in many cases after the crisis. Industry variations do not provide any systematic explanations for this variation.

Introduction

Studies on the Thai economic crisis have tended to conclude that it was due to the inability of the economy to effectively handle the macro level variables such as financial policies adopted for the industry, level of current accounts, extent of solvency of the financial institutions and amount of money supply (Tower, 1997). Micro level variables are not considered in the context of the crisis in most of the prior studies. This paper investigates the financial statement information to evaluate the manufacturing corporate sector around the economic crisis.

Financial statements provide information reflecting the result of financing and investing decisions made by a company. They reflect the allocation of corporate resources and deployment of these resources. Due to flow of resources within the company itself and between the company and its stakeholders, there is a constant change in the elements of financial statements. External environmental factors including demand of the customers, number of suppliers, global technological change, economic condition, social development and the like are responsible for these changes in the company. These changes could be expected or unexpected. Internal decisions of the company such as adding or dropping product lines, expansion or contraction, vertical or horizontal integration, investment or divestments are all associated with the changes of the environmental factors. Decisions in this regard are reflected in the income statements and the balance sheet of a company.

The impact of decisions changes the various items in the statements. Increase in market demand and consequent decision to extend production capacity of the company could result in acquiring new property, plant and equipment, hiring employees, raising resources from owners and lenders, which are reflected as changes in the financial statements. This composition in turn is associated with business risks and financial risks. A given fixed asset implies an investment that can not be retraced immediately. Holding a large quantity of property, plant, and equipment or fixed assets increase production capacity that can support higher sales. But, on the other hand, there is always a possibility of not achieving the full capacity for various reasons, such as wrong forecasting, poor management or economic downturns, causing a serious business risk. The investment in fixed assets also carries the risk of losing value if the technology changes.

Composition of cash, inventory, and accounts receivables are also subject to business risk. The current assets are held with the motive of exchange or transformation and hence carry with it a direct risk of transaction loss. Cash or near cash assets, which is held

with the motive of liquidity carries the risk of loss of value due to inflation and time value. At the same time, the value represented by these assets also demands the generation of the cost of the funds. There is also a possibility of loss or gain through borrowing funds for short and long term. Due to capital market and purchasing power fluctuation, interest rate paid to the lender might be favorable or unfavorable for the business at any point of time.

Liabilities represent the claims on the business to be repaid at a certain date at a certain value and hence place a demand on the cash flow of the business. Current liabilities have short maturates and have larger demands for immediate cash flows. Long-term loans, on the other hand, needs periodic repayments of the principal and interest and match the cash flow. The lenders also want to be assured that the value represented by assets in relation to their claims is maintained by the business. Equity too demands the generation of certain cash flow to match the expectation of shareholders to keep up the value of their investment.

The demands for cash flows and maintenance of value is to be seen in terms of revenues earned by the firm and its division, among the costs of earning the same as well as those suppliers of finance. It is these multiple demands on the firm, which lead to a certain balance among the various elements of the financial statements. The environment in which the firms operate as well as its own characteristics will also influence this balance. These influences may be due to the size of the firms, industry in which the firms operate, the growth status of the firm, the cost structure of the firm and so on. The essence of this argument is that the firms tend to maintain a homeostatic equilibrium in the relationships among different elements of the financial statements.

Management's effort would always be to achieve a balanced structure, which meets the overall objectives of the firms in the short and long run taking into account the various risks as discussed above. Any change in the balance, whether planned or unplanned, signals and alerts the analysts. In this paper we try to examine the empirical evidence from Thailand relating to structural changes in the financial statements before, during and after the crisis.

The study covers the manufacturing corporate sector as it plays an important role in the performance of the real economy. It is also important for the stability conditions of the economy through its linkages with the banking system and financial markets. This paper reviews the structural changes of this sector and their relationship with the firm characteristics around the economic crisis.

Decomposition Measure

When a given total is separated into a number of components, one may want to determine how the total is divided between the various components and how these "divisions" are affected by changes over time. Decomposition measure provides an answer to these questions. Since this study investigates the structural changes of firms over time, our interest is directed to the answers to the second question.

Lev (1974) points out that the decomposition measure can be applied to financial statement analysis because (1) financial statements are divided into different components, such as, assets, liabilities, revenues and expenses; and (2) structural changes in the firm's resource allocation occurs due to managerial decisions or environmental pressures.

Decomposition measure is originally used in measuring entropy. Entropy is the measure of uncertainty in communication theory. It suggests that the amount of information conveyed is a declining function of level of certainty in occurrence of a definite message (Shanon and Weaver, 1948). Depending on the number of events and ambiguity of message, the amount of information expected is subject to revision of probabilities associated with the possible events. Lev (1969) summarized these information concepts, as shown in Table 1.

Table 1
Information Content

	Single Event (Information)	Multiple Events (Expected Information)
Definite (certain) Message	$-\log p$	$-\sum p_i \log p_i$
Non-definite Message (Inaccuracy)	$\log (q/p)$	$\sum q_i \log (q_i / p_i)$

The use of decomposition measure for financial statement analysis was also proposed by Theil (1969). The model was of the form $\sum q_i \log (q_i/p_i)$ where q_i and p_i are the proportions of the appropriate totals in the current and the preceding years respectively. The $\log (q_i/p_i)$ is a measure of the extent to which the proportional representation of category i has changed over a year Each of these elements is weighted by q_i – the proportion for category i in the most recent statement for the firm under consideration. Structural imbalance increases as the differences between p_i and the q_i increases. The maximum imbalances occurs when $q_i > 0$ for some event given that $p_i = 0$ for that element.

As the function is derived from communication theory, it is customary to use logarithms to the base 2. The unit of information is called *bit*. In other applications, especially in finance, natural logs have been used. A unit of information is called a *nit* when natural logarithms are used.

Exploring the structural relationships will help managers to understand and predict the behavior and status of the company and make appropriate financial decisions. It is important to note that the decomposition measure mentioned in this study only qualitatively evaluates the direction of deviation of the business. Understanding the movement of a business with stable operation towards unstable situation would probably be more useful for a manager as compared to that of a business moving from an unstable to a stable situation.

Application of Decomposition Measures in Financial Statement

Application of decomposition measures emerged in financial literature following extension of Beaver's (1966) and Altman's (1968) failure prediction studies. Beaver (1966) constructed histograms with his best failure-predicting ratio, cash flow to total debt, to examine the structural stability of failure and non-failure firms over time. He found that distribution of this ratio was relatively stable for non-failed firms at all years and unstable for the failed firms immediately prior to the failure. Altman's (1968) model included 22 financial ratios categorized into liquidity, profitability, leverage, solvency, and activity ratios. Using a multiple discriminant analysis, Altman identified a model including only five financial ratios, working capital/total assets, retained earning/total assets, earning before interest and taxes/ total assets, market value equity/book value of total debt, and sales/total assets. The study found that larger changes (instability) in these ratios were associated with a higher tendency of firm failure.

Later, researchers had attempted to improve the predictability of company failure by either combining or separately using decomposition measures. Lev (1969b) used Beaver's data and conducted a paired analysis with 37 failed and 37 non-failed firms. The pairing was made based on similar industrial classification and firm size. The study compared total asset decomposition measure (TADM), total liabilities decomposition measure (TLDM), and balance sheet decomposition measure (BSDM) between failed and non-failed firms over a five-year period prior to the corporate failure. The result showed that the decomposition measures for the failed firms were consistently larger than those of the non-failed firms. As compared to the Beaver's (1966) study, this study found that only Beaver's best ratio, cash flow/total debt, performed better than the decomposition measure in terms of prediction accuracy.

Moyer (1977) found that decomposition measures in combination with financial ratios explains the structural change better and predicts firm failure more accurately. He improved the predictive ability of Altman's (1968) model by replacing the original two ratios, market value of equity/book value of debt and sales/total asset, with Beaver's (1966) cash flow/debt ratio and Lev's (1969) balance sheet decomposition measure.

On a small, paired sample of failed and non-failed firms, Walker, et al, (1979) found that the decomposition measures for failed firms were generally larger than those of the non-failed firms. TLDM was found generally larger and better than the TADM in the prediction of failed firms. To avoid the industry effect, the study used single industry samples from among only retail and discount department stores. The decomposition measure was found to have the same bankruptcy prediction power as financial ratios.

In his first study, Booth (1983) used the decomposition measures as independent variables in a multiple discriminant analysis model to predict firm failure. He selected a sample of 35 matched pairs of failed and non-failed firms based on asset size and industry classification. With five balance sheet data for five years before failure, four periods of decomposition measures, their average and coefficient of variations were computed for each failed and non-failed firm. The individual and the average values were used for measuring the size of decomposition measure while the coefficient of variations was used for its stability measure. The results showed that four-year average BSDM, and the second, third and

fourth year BSDM for the failed firms were larger than those for the non-failed matched firms. The result also showed that the four-year average TADM, and the first and the fourth year TADM were larger for the failed firms. Regarding the equities decomposition measure, the average of all years prior to failure decomposition values were found larger for the failed firms as opposed to their non-failed counterparts. Finally, the study found that decomposition measures for failed firms were more unstable than those for the non-failed firms. However, the study was not successful in classifying non-failed firms based on computed decomposition measures.

In the above studies, researchers had an implicit presumption that change has a negative connotation indicating that large structural changes are bad and small changes are good. Hence, high financial decomposition measures were associated with corporate failure. However, Booth and Hutchinson (1989) argue that both failure and growth are likely to result in a large structural change in a firm. The purpose of their study was to empirically investigate if decomposition measure could distinguish between growing and failed firms. To enable comparison with 'failure', 'growth' was identified with a particular point in time. Thirty-three firms listed on the Australian stock exchange whose increase in total assets exceeded twice the rate of inflation for first five years after listing were classified as growth firms. The first five-year financial statement data of these growth firms were matched with data of thirty-three failed firms over the last five years before their failure. Although the asset and equity decomposition measures of growth firms were found less stable over time, the results suggested that there were no significant differences between the balance sheet decomposition measures of failed and growth firms. This means that a high value of decomposition measures alone is not enough to foreshadow the failure of a firm.

It is evident from the above discussions that higher decomposition measures provides a signal for both growth and failure. But for the failed firms, decomposition measures or the structural changes are always high. Hence decomposition measures could be used as symptoms of the problems of organizational financial health.

Data

The data for this study consists of annual financial statements of the companies listed on the stock Exchange of Thailand (SET). The study covers the period 1992 to 1999. This has been taken with a view to examine the financial structure of the firms before, during and after the financial crisis in the country. Only the manufacturing sector is included in the study. The sector covers agribusiness, building materials, food and beverages, household goods, machinery and equipment, packaging, pharmaceuticals, pulp and paper, textile and footwear, vehicles and parts, chemicals and plastics, electrical and electronic products, and others. The SET had 192 listed manufacturing firms in 1997. Accounting data including balance sheet and income statements for all these firms are available across 1992-1997. In 1998 and 1999 a few of these firms were delisted where in each case of missing data, the data values of 1997 are plugged in. Hence a balanced panel of 192 manufacturing firms listed on the SET forms the sample size in this study. Since the sample period is 1992 to 1999, the study obtains 1536 sample observations. The manufacturing corporate sector is chosen as it sustains stability condition in the real economy through its linkages with the banking system and financial markets. Table 2 shows the position of the manufacturing sector among all the quoted companies in Thailand during 1992-99.

Table 2
Thai corporate Sectors 1992-1999

Sectors	1999				1997				1992			
	Number of firms	Total Asset (M. Baht)	Total Revenue (M. Baht)	Mkt. Cap. (M. Baht)	Number of Firms	Total Asset (M. Baht)	Total Revenue (M. Baht)	Mkt. Cap. (M. Baht)	Number of Firms	Total Asset (M. Baht)	Total Revenue (M. Baht)	Mkt. Cap. (M. Baht)
Banking, Finance and Insurance	57	5,945,954 (68.8%)	423,013 (23.1%)	725,410 (31.1%)	65	6,719,755 (66.7%)	784,261 (36.6%)	288,741 (25.5%)	84	3,214,671 (75.8%)	353,966 (36.1%)	592.503 (39.9%)
Manufacturing	168	1,216,044 (14.1%)	740,628 (41.5%)	450,413 (20.5%)	192	1,183,437 (11.8%)	718,886 (33.3%)	257,022 (22.7%)	205	493,833 (11.6%)	334,594 (4.1%)	389,028 (26.2%)
Others	164	1,480,245 (17.1%)	619,940 (34.8%)	1,017,244 (46.4%)	168	2,168,050 (21.5%)	657,919 (30.4%)	587,581 (51.8%)	151	533,712 (12.6%)	292,675 (29.8%)	503,488 (33.9%)
All	389	8,642,254 (100%)	1,783,581 (100%)	2,193,067 (100%)	425	10,071,242 (100%)	2,161,066 (100%)	1,133,344 (100%)	440	4,242,216 (100%)	981,235 (100%)	1,485,019 (100%)

Note: Mkt. Cap = Market Capitalization

It is evident from the Table 2 that the banking, finance and insurance sector constitutes the largest share of the corporate economy of Thailand. This sector has relatively less number of companies with a large share of market capitalization. Excluding this sector, the manufacturing sector covered by the sample accounts for a significant part of the Thai corporate sector. Since some of the industries in manufacturing sector had only a few quoted companies they are combined as other industries. These groups of industries include household goods, machinery and equipment, pharmaceuticals, pulp and paper, and others. The decomposition measure (DM) is defined as follows:

$$DM = \sum q_i \ln (q_i / p_i)$$

Five decomposition measures have been computed from balance sheet. Each of these measures was calculated with q_i defined as the proportion of accounts included over the appropriate aggregate category in the current year and p_i as the same proportion for the preceding year. Table 3 indicates the financial statement aggregate categories and the accounts included in calculating the decomposition measures in this study.

The economic crisis in Thailand took place in 1997. Therefore the study period has been divided into two sub periods – pre-economic crisis (1992-1996) and post economic crisis (1997-1999). Since the decomposition measure with temporal pattern considers two periods at a time, the pre-crisis DM consists of 1992/93, 1993/94, 1994/95 and 1995/96. The post crisis DM includes 1996/97, 1997/98, and 1998/99. Each DM during these periods is averaged for the corresponding era. This procedure is done with a view to eliminating unusual circumstances of any particular year.

Table 3
Decomposition Measure Computation Categories

Decomposition Measures	Aggregate Category	Accounts Included
Current Assets Decomposition	Current Assets	Cash on hand and at banks and short term investment, trade accounts and notes receivables, inventories, other current assets
Current Liabilities Decomposition	Current Liabilities	Bank overdrafts and short term losna, trade accounts and notes payables, other current liabilities
Total Asset Decomposition	Total Asset	Total Current assets, total investment and loans, propeerty, plant and equipment, other assets
Total Liabilities and Equities Decomposition	Total Liabilities and Shareholders' Equities	Total Current liabilities, long-term liabilities, shareholders' equities
Balance Sheet Decomposition	Total Asset Plus Total Liabilities and Shareholders' Equities	Total Current assests, total investment and loans, property, plant and equipment, other assets, total current liabilities, long-term liabilities, shareholders' equities

Manufacturing Corporate Sector in Pre and Post Economic Crisis Era – A Profile Analysis

Summary statistics for the financial statement data are determined for the sample. Means are calculated for the balance sheet (Table 4) and income statement (Table 5) across the years in the pre and post crisis era separately. A positive change has been observed in all the elements of the balance sheet except cash and short-term investment. The total assets averaged during pre-crisis era for 192 companies were 638,637 million Baht and this value increased to 1,131,862 million after the crisis. Total liabilities have increased substantially, more than 2 times. It is mainly because the other current liabilities, and the bank overdraft have increased at a higher rate after the economic crisis. However, the differences between the total shareholders' equity before and after the crisis are not substantial. Negative shareholders' equity in many firms appeared after the crisis. Considering the income statement, it appears that cost structure was slightly higher compared to its revenue.

Table 4

Aggregate Balance Sheet – Quoted Manufacturing Sector Companies 1992-96 and 1997-99 (in Million Baht)

Account Categories	1992-1996		1997-1999		Percentage change in 1997-99 over 1992-96
Cash and Short-Term Investment	53,222	(8.3)	42,815	(3.8)	-19.6
Inventories	80,397	(12.6)	101,343	(9.0)	26.1
Accounts Receivables	67,511	(10.6)	96,158	(8.5)	42.4
Other Current Assets	47,056	(7.4)	113,564	(10.0)	141.3
Total Current Asset	248,1 86	(38.9)	353,880	(31.3)	42.6
Total Investment and Loans	85,199	(13.3)	185,159	(16.4)	117.3
Property, Plant and Equipment	283,641	(44.4)	555,634	(49.1)	95.9
Other Assets	21,611	(3.4)	37,189	(3.3)	72.1
Total Asset	638,637	(100.0)	1,131,862	(100.0)	77.2
Bank Overdrafts	125,803	(19.7)	257,608	(22.8)	104.8
Accounts Payables,	37,679	(5.9)	60,293	(5.3)	60.0
Other Current Liabilities	58,466	(9.2)	237,486	(21.0)	306.2
Total Current Liabilities	221,948	(34.8)	555,387	(49.1)	150.2
Long-term Liabilities,	154,312	(24.2)	304,322	(26.9)	97.2
Shareholders' Equities	262,377	(41.1)	272,153	(24.0)	3.7

Note: Assets, liabilities, and shareholders' equity averaged over 1992-96 and 1997-99 for 192 companies, Figures in parenthesis represent percentage of total assets

Table 5

Aggregate Income Statement – Quoted Manufacturing Sector Companies 1992-96 and 1997-99 (in Million Baht)

Account Categories	1992-1996		1997-1999		Percentage change in 1997-99 over 1992-96
Sales	419,478	(100.0)	608,282	(100.0)	45.0
Other Income	20,225	(4.8)	44,699	(7.3)	121.0
Total Revenue	439,703	(104.8)	652,981	(107.3)	48.5
Cost of Goods Sold	348,236	(83.0)	508,736	(83.6)	46.1
Selling and Administrative Exp.	40,389	(9.6)	83,708	(13.8)	107.3
Interest Expense	18,232	(4.3)	56,628	(9.3)	210.6
Income Tax Expense	7,421	(1.8)	3,884	(0.6)	-47.7
Income (Loss) after Income Tax	25,425	(6.1)	25	(.0)	-99.9
Net Income (Loss)	25,513	(6.1)	-74,787	(-12.3)	-393.1

Note: Items in the account catergories averaged over 1992-96 and 1997-99 for 192 companies. Figures in Parenthesis represent percentage of sales.

Total revenue of 192 firms has increased from 439,703 million Baht to 652,981 Baht. The total cost increased from 414,278 Baht to 652,956 Baht. There is a decrease in the profitability after the economic crisis. This is verified by the change of positive net income value in pre-crisis to a high negative value in the post crisis era.

Empirical Findings

The variability of the balance sheet decomposition measure for all the industries is fairly small during the period of 1992/93 to 1995/96 (See Figure 1). This has increased largely after the period of 1995/96. Similar pattern has been observed in the case of total asset decomposition and total liabilities decomposition measures. This indicates that deviation of total assets or liabilities or their average (balance sheet) from proportional change was lower for all industries before 1995/96 and higher thereafter. The higher level of deviation after the economic crisis reflects the impact of economic crisis on the industries.

On examining the components of decomposition measures, it is evident that the high values of BSDM after 1996 are mainly due to the substantial increase in the debt structure of the firms. In the Textile industry, there was a substantial increase in the total current liabilities in 1997. A large measure of CLDM in 1996/97 identifies a sharp increase in current liabilities. Bank overdrafts and short-term loans were very unstable – increasing before crisis and decreasing during and after crisis except in 1998/99. Long-term liabilities were also found very unstable throughout the period. The average amount of increase of long-term liabilities was much higher than that of current liabilities during pre and post economic crisis.

Agribusiness industry was found to be relatively unstable before crisis and stable after the crisis compared to the Textile industry. The higher instability of balance sheet items in 1996/97 was caused by increase in current liabilities and investment and loans to related parties. In other words, the industry went for more short-term loans from 1996 to 1997. During 1996/97 the industry experienced a sudden increase in accounts receivables while other current asset items such as cash, inventory, and other current assets were relatively more stable than other years. The large value of CLDM in 1996/97 is due to an increase in trade credit and bank overdraft.

The instability of balance sheet constituents of the food industry as indicated by the BSDM was higher than Textile except in the year of 1996/97. In fact, five out of twenty eight firms in Textile industry had negative shareholders' equity after 1996 causing a high value of BSDM in 1996/97. For food industry, this number is four out of twenty two. The average instability was found higher than Agribusiness industry during both pre and post-economic crisis. The industry had observed an increase in long-term liabilities from 1992 to 1993 creating higher instability for the industry. After that period, through proportionate reduction of long-term liabilities, these items became more stable until the crisis started. From 1996 to 1997, the proportion of long-term liabilities increased again. Proportion of current liabilities also became higher during this time. In the subsequent year, demand slump resulting from the crisis could be seen in a drop of sales and rise in the inventory.

The firms grouped, as 'others' were highly diverse. Some industries such as machinery and equipment, pulp and paper are very capital intensive. Proportion of cash reserve was very high during 1992 to 1994. Subsequently, the industry experienced build ups of inventory in 1994/95 and accounts receivables thereafter. It indicates that the industries were one of the earliest to be hit by the crisis. Balance sheet instability after economic crisis suggests that the firms had an increase in the proportion of current liabilities and long-term liabilities. Four out of twenty four firms reported negative equity after the economic crisis.

The degree of structural instability in the Packaging industry indicated by BSDM had a decreasing trend during 1992-1996. In 1997, five out of 16 firms reported negative equity. Proportion of current liabilities and long term liabilities was the highest compared to other years. The instability of the current asset items of the industry during 1996 and 1997 was mainly due to the increase in the inventory level. It is the reflection of dropping of sales encountered by many firms in the industry as a result of contract cancellation by many of their customers facing difficulty during the economic crisis. Analyzing the current liabilities decomposition measure reveals that accounts payable and other current liabilities are the factors that had the higher deviation from the proportional change during 1996 and 1997. Proportion of bank overdraft was lower in 1997 as compared to its previous year.

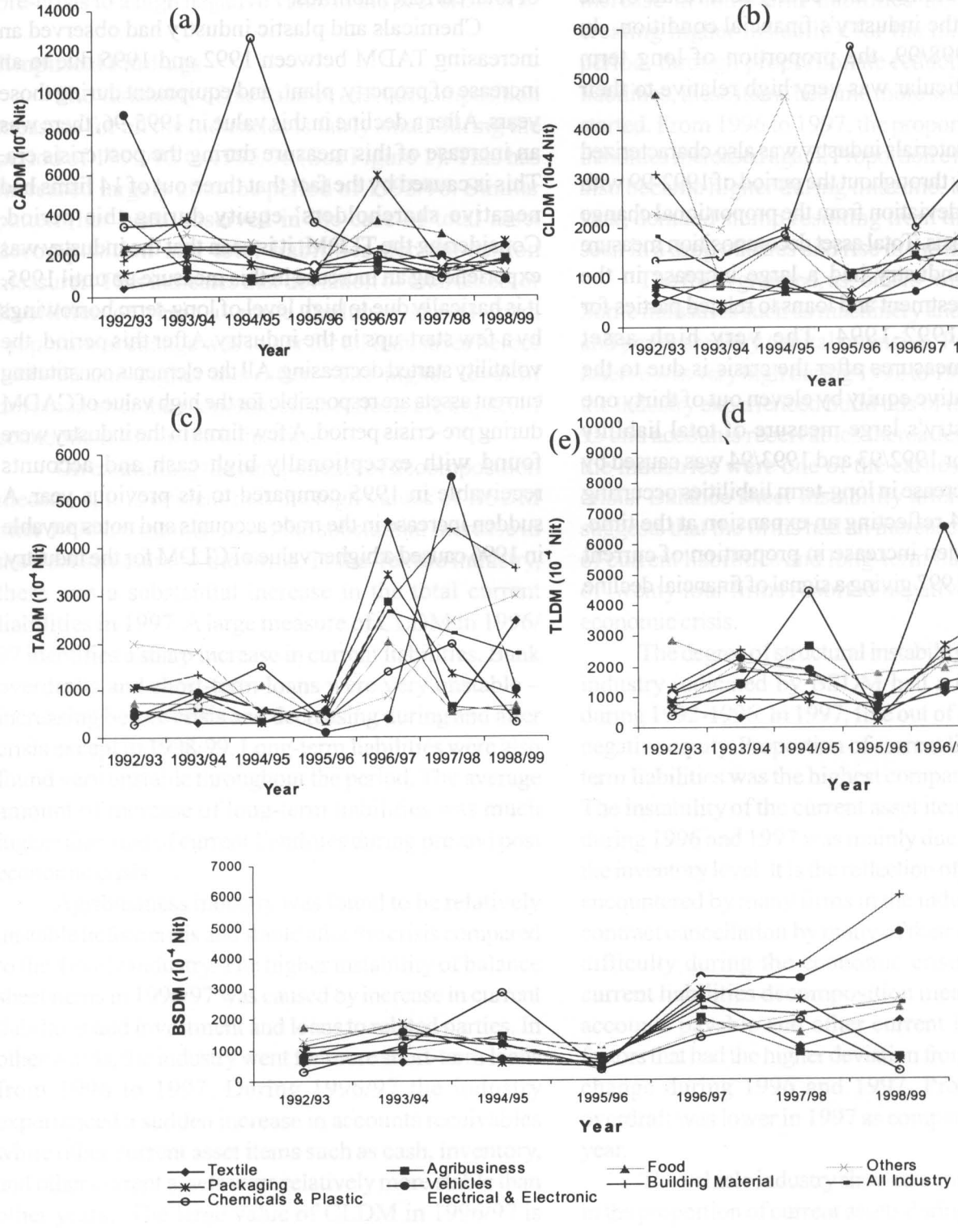
The vehicle industry showed a continuous decrease in the proportion of current assets during 1992-1998. The high instability of current assets from 1992 to 1993 is due to the increase in the proportion of accounts receivable. It is partly because of high unit value of the products in the industry. The industries large measure of TADM in 1993/94 was caused by the large changes in

investment and loans to related parties. The large total asset decomposition measure in 1997/98 was due to the reporting of negative shareholders' equity by two firms. The high instability of the total liabilities reflect the substantial changes that have occurred in both current and long term liabilities and equity as a result of the deterioration in the industry's financial condition. In 1996/97 and 1998/99, the proportion of long term liabilities in particular was very high relative to their previous year.

Building materials industry was also characterized by high instability throughout the period of 1992-99 with relatively higher deviation from the proportional change after economic crisis. Total asset decomposition measure shows that the industry had a large increase in the proportion of investment and loans to related parties for the period of 1992-1994. The very high asset decomposition measures after the crisis is due to the reporting of negative equity by eleven out of thirty one firms. The industry's large measure of total liability decomposition for 1992/93 and 1993/94 was caused by the substantial increase in long-term liabilities occurring in 1993 and 1994 reflecting an expansion at the time. There was a sudden increase in proportion of current liabilities during 1997 giving a signal of financial decline for the industry. In 1997 to 1999 the industry's high total liabilities decomposition measure confirms the fact. Current liabilities decomposition measure suggests that during pre crisis proportion of bank overdraft was relatively higher as compared to other two constituents of total current liabilities.

Chemicals and plastic industry had observed an increasing TADM between 1992 and 1995 due to an increase of property, plant, and equipment during those years. After a decline in this value in 1995-96, there was an increase of this measure during the post crisis era. This is caused by the fact that three out of 14 firms had negative shareholders' equity during this period. Considering the TLDM, it is seen that the industry was experiencing an increase in this measure up until 1995. It is basically due to high level of long-term borrowings by a few start-ups in the industry. After this period, the volatility started decreasing. All the elements constituting current assets are responsible for the high value of CADM during pre-crisis period. A few firms in the industry were found with exceptionally high cash and accounts receivable in 1995 compared to its previous year. A sudden increase in the trade accounts and notes payable in 1996 caused a higher value of CLDM for the industry.

Fig. 1 Decomposition measures classified by industries for the period of 1992-1999: (a) current asset decomposition measure, (b) current liabilities decomposition measure, (c) total asset decomposition measure, (d) total liabilities decomposition measure, and (e) balance sheet decomposition measure.



High investment and loans to related parties caused a high TADM of electrical and electronic industry in 1992-93. It is found that only three out of 18 firms had a very high proportionate increase in the investment and loans to related parties from 1992 to 1993. However, this value dropped in the subsequent years and remained relatively stable until the year of the economic crisis. In 1997, the TADM value rose drastically mainly due to the negative shareholders' equity experienced by six firms. TLDM had increased in the industry in earlier years of the study time frame due to few new companies experiencing disproportional changes in their financing and investment. With respect to CLDM, this industry did not have much variation throughout the 1992-99 time period.

Conclusion

Analysis suggests that the decomposition measures or the deviation from the proportional change does not show any systematic pattern for any industries before and after the economic crisis. Consequently, they do not provide any basis to relate the crisis occurring in 1997 arising out of changes happening in manufacturing sector. The total liabilities decomposition measures are found higher than their corresponding total asset decomposition measure for almost all industries in Thailand during pre economic crisis. It indicates that there were more unusual changes in the composition of total liabilities than total assets before 1997. The scenario changes in many cases after the crisis where total asset decomposition measure exceeds the total liabilities decomposition measure. The basic reason is the negative value of shareholders' equity as well as inventory and receivables accumulation as a result of the crisis. Followed by this problem are the long-term liabilities and current liabilities fluctuating throughout the period. Proportion of current liabilities to total liabilities was always found increasing from 1996 to 1997. This indicates the result of the crisis forcing firms to default their obligations. Moderate signals could be found in the current liabilities decomposition measure showing a structural change prior to the crisis. It reveals that there was a liquidity problem experienced by the firms even before 1995/96. This also indicates that manufacturing sector is perhaps a victim rather than a contributor to the economic crisis that occurred in 1997.

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