Hong Kong Monetary Authority

5 November 2003

AN ANALYSIS OF THE FINANCIAL HEALTH OF HONG KONG CORPORATIONS

Key Points:

- *The health of the corporate sector impacts directly on the stability of the financial system. Based on accounting information of listed companies in Hong Kong, this study analyses the vulnerability of the corporate sector by a) examining the evolution of major financial ratios during 1990-2001, and b) highlighting ratios that are useful for monitoring the corporate liquidation risk.*

- *The examination of financial ratios reveals that the Asian financial crisis and the ensuing economic downturn have had significant impact on the corporate sector. Corporate profitability has been eroded sharply while debt burden has increased.*

- *The corporate sector has attempted to regain its competitiveness by diversifying its fund raising channels to reduce its reliance on bank loans, expanding long-term loans to replace short-term ones to help improve the liquidity position, and reducing costs. Small companies remain vulnerable, given the severe impairment in their earning power, and the lack of improvement in their capital structure and efficiency after the Asian financial crisis. However, the improvement in Hong Kong's business environment since the second half of 2003 is likely to benefit the corporate sector.*

- *Empirical studies show that financial ratios including indebtedness and profitability are useful in explaining corporate liquidation risk. Nevertheless, there is the risk of over-generalisation when applying summary financial ratios to a group of highly heterogeneous companies. As such, for monitoring purposes, these ratios should be examined alongside other information, including market intelligence and business surveys.*

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I. INTRODUCTION

A strong corporate sector contributes significantly to the stability of the financial system, through its close funding and investment links with the banking sector and financial markets. In contrast, a weak corporate sector will also expose an economy to financial shocks and speculation. This is particularly true in developing countries where financial problems in the corporate sector are often significant and, at times, have a larger impact on currency and stock market crises than the usual macroeconomic variables (Johnson et al., 2000). Given the close linkage between the health of the corporate sector and financial crisis, the understanding of the vulnerability of firms has become a matter of increasing concern to policymakers in recent years (IMF, 2002).

A common method to assess the soundness of the corporate sector is by examining a wide array of financial ratios reported in firms' balance sheets. At the firm level, financial ratios can help credit analysts in banks or rating agencies determine the default risk of that particular company.[1] At the aggregate level, financial ratios for the corporate sector can shed light on the vulnerability of the sector as a whole and the risk of spillover effects on other parts of the economy. A study by the International Monetary Fund (IMF) finds that the combination of high leverage, shorter debt maturities, and decreasing profitability in the corporate sector played a significant role in the 1997-98 Asian financial crisis (IMF, 2002).

Against this background, the first part of this study is devoted to the examination of the evolution of major financial ratios of listed companies in Hong Kong. The balance sheet information reveals the capital structure, the profitability, the ability to service debts, the liquidity and the efficiency of the corporate sector during the period 1990-2001. Where appropriate, these financial ratios are compared to those of other emerging economies presented in a recent IMF study (IMF, 2002).[2] Nonetheless, the results should be interpreted carefully because: 1) the effects of the heterogeneity of the companies are not taken into account as only summary statistics, such as mean or median, are examined, and 2) it may be misleading to derive the overall picture of the corporate sector based on these financial ratios if they are sector-biased or dominated by some special companies. To overcome these limitations, part two of the study aims to establish some quantitative relationships between corporate liquidation risk and selected financial

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[1] Many quantitative models used by credit analysts in financial institutions are extensions of the Z-score model developed by Altman (1968, 2000). Applying the multiple discriminant statistical methodology to a set of financial and economic ratios, the Z-score model produces a measure that can characterise the potential bankruptcy risk of an individual company.

[2] The first part of the paper emphasises the time series study of the financial ratios in Hong Kong to ascertain whether the financial positions of the corporate sector have been improving or deteriorating in the past decade. Due to vast differences in business culture and institutional arrangements in different economies, the cross-country comparison is for reference only and should be read with caution.

ratios. Different modeling techniques are applied to explore variables that are useful for monitoring the financial soundness of the aggregate corporate sector.

The remainder of the paper is organised as follows: Section II describes the data used in both the ratio analysis and the quantitative models for understanding the liquidation risk. Section III discusses the evolution of major financial ratios of the non-financial corporate sector in Hong Kong and, where appropriate, compares these ratios with those of other emerging economies presented in an IMF study (IMF, 2002). It is followed by a discussion of three different quantitative models that help explain the liquidation risk of corporations using macroeconomic factors and balance sheet information in Section IV. The study's conclusions are presented in the final section.

II. DATA

1. Financial Ratio Analysis

Data from the company accounts of non-financial corporations listed in the Hong Kong stock market during 1990-2001 are used in this analysis.[3] The sample size varies over the years: the number of companies ranges from a low of 179 in 1990 to a high of 717 in 2000. Although the number is small compared to the total population of non-financial businesses in Hong Kong, the sample covers companies that perform the great bulk of business activities in the corporate sector and hence have a significant impact on the stability of the financial system.[4] Adjustments for the different financial year cycles adopted by different companies are made to allow for a comparison of the ratios across companies and over time. For example, if a company's financial year-end is in March each year, then its financial information for the year 2000 is based on a weighted average of the corresponding data in financial years 1999-2000 and 2000-2001. The weight for the former is 0.25 and that for the latter is 0.75. Such adjustment ensures data comparability across different companies with different financial year cycles.

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[3] Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and the Growth Enterprise Market. The data are from Thomson Financial.

[4] In 2000, for example, there was a total of 504,823 registered companies in Hong Kong compared to 717 in the data. But the amount of bank loans taken by these 717 companies accounted for 58.4% of the total loans made by all authorized institutions to the corporations.

2. Quantitative Models for Liquidation Risk

Three models are considered in this part. The first model estimates the impact of macroeconomic variables on the corporate sector's liquidation rate, which is defined as the ratio of compulsory winding-up cases made to the Hong Kong Official Receiver's Office to all locally registered companies, during 1985-2001. The other two models examine the characteristics of individual companies and their liquidation risk. Balance sheet data of individual companies from Thomson Financial during 1997-2001 are used.

III. Results of Ratio Analysis

The evolution of financial ratios containing information on the capital structure, the profitability, the ability to service debt, the liquidity and the efficiency of the corporate sector are examined to assess the strength of Hong Kong's corporate sector.[5] The choice of such ratios is consistent with existing literature on analysing the performance of corporations (Brealey and Myers, 1991). Apart from focusing on the mean ratio for the aggregate corporate sector, intra-sector variations among firms of two different sizes: small firms and small-to-medium firms, are examined. These refer to companies in the 25th percentile and 75th percentile of total sales in the year respectively.[6]

The movements of the financial ratios over time for all corporations, the small firms and the small-to-medium firms during 1990-2001 are given in Charts 1-9. An overall summary is prepared in Appendix A.[7] The key findings from these financial ratios are presented in the ensuing paragraphs. Where appropriate, the performance of the corporate sector in Hong Kong is compared with that in other emerging economies presented in a recent IMF study (IMF, 2002).[8]

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[5] The financial ratio of the corporate sector is represented by its mean. Instead of simply averaging the ratio of each company, the mean ratio for the corporate sector as a whole is calculated by dividing the sum of all companies' data in the numerator by the sum of all companies' information in the denominator. Alternative measures such as the median or the average ratio of individual companies are used to represent the corporate sector in other studies (IMF, 2002; Wong et al., 2001). It should be noted that the corporate sector may look very different if these alternative measures are used. Compared to these measures, the mean ratio compiled in this study is less affected by the distribution of individual companies' ratios. The median ratio is also compiled in this study when comparing Hong Kong to other emerging economies discussed in the IMF study.

[6] The classification of firms is based on their sales revenues in a particular year. This differs from the common definition of SME, which refers to small-and-medium-sized companies with an employee size below a specified threshold.

[7] The definitions of the financial ratios are described in Appendix B.

[8] Where appropriate, the median ratio is also computed for comparison with the IMF study.

1. Individual Financial Ratio

a. Capital Structure

The capital structure of a company refers to the mix of debt and equity in its capital base. The ratio reveals the extent of leverage the firm assumes in its financing decision and is thus indicative of its ability to withstand shocks to its future cash flow and value of collateral. Generally speaking, a highly leveraged corporate sector is expected to suffer from more business failures in an economic downturn. Moreover, a high proportion of short-term debt in the loan structure of a company would subject it to interest rate risk when these loans are to be rolled over.

- **Hong Kong companies rely less on debt than equity financing.** Chart 1a shows that the debt-to-total-asset ratio of all corporations was around 41%-47% in the period, with equity making up the rest of the financing. The ratio for Hong Kong, however, is significantly higher than that of other emerging markets.[9] Analysed by different groups of companies, debt financing of small-to-medium firms dropped from the peak of 47% in 1998 to a 10-year low of 37% in 2001, indicating that a de-leveraging process has taken place in most corporations (except the very large ones) since the Asian financial crisis. For small firms, debt financing played a less important role in their capital structure compared to larger corporations in the 1990s. Nevertheless, its importance has been increasing gradually, reducing the gap with the larger corporations.

- **Debt is a less important long-term funding source compared to share capital.** In Chart 1b, long-term debt accounted for only a minor fraction of the total capitalisation despite its gradual rise from 1993 onward.[10] On the other hand, the ratio for small-to-medium firms declined to 12% in 2001, after peaking at 21% in 1998. The divergence of the movement in the ratio between all corporations and small-to-medium firms suggests that while very large companies have increased their share of debt in long-term financing, possibly because their greater creditworthiness gives them easier access to the loan market, most corporations have been consistently relying heavily on equity capital (Chart 1b).

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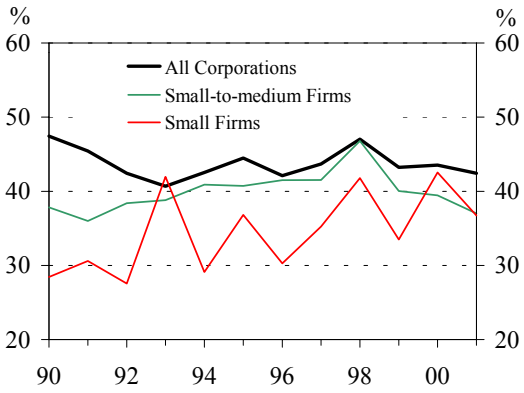
[9] The median ratio for Hong Kong is 41%, while that for Emerging Asia, Latin America, Emerging Europe and South America is about 32%, 25% and 13% respectively in 2000 (IMF, 2002).

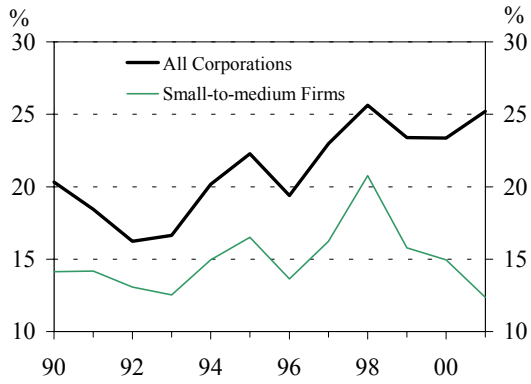
[10] A different trend, however, is found in the median ratio. In 2000, the ratio was at about 3.8%, significantly down from more than 10% in the mid-1990s.

Chart 1. Capital Structure of Non-financial Corporations in Hong Kong

(a) Debt to Total Asset



(b) Long-term Debt to Total Capitalisation



Source: Thomson Financial.

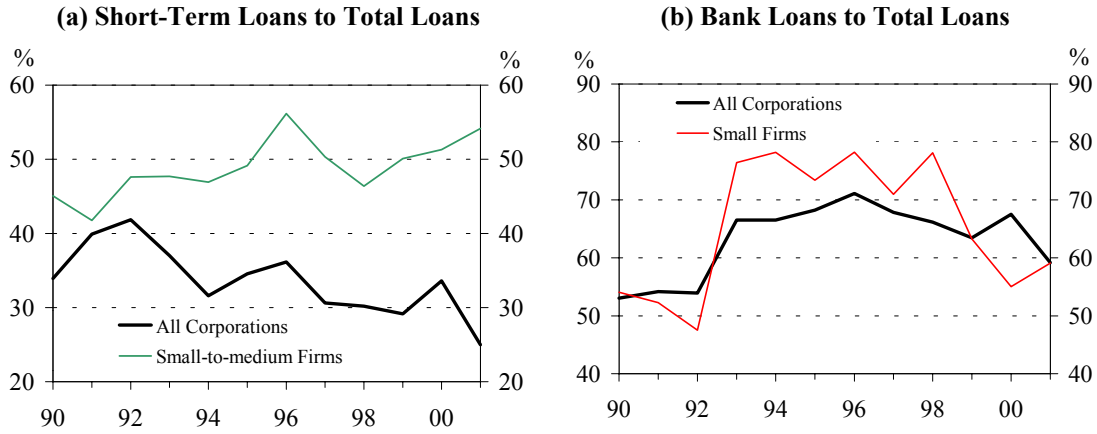
Notes:
1. The charts show the average ratios for the aggregate corporate sector and for firms of different sizes over the years. The ratio of debt to total asset represents total liabilities excluding shareholders' equity as a percentage of total assets of companies, and the ratio of long-term debt to total capitalisation represents total long-term debt as a percentage of total capitalisation of companies. Long-term debt refers to borrowings due one year or more after the balance sheet date, while total capitalisation is a summation of long-term debt and shareholders' equity.
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small firms and small-to-medium firms refer to companies in the bottom 25% and 75% in terms of total sales in the year respectively.

- **Short-term loans account for a relatively smaller share in the loan portfolio of large companies while the reverse is true for smaller ones.** As shown in Chart 2a, the share of short-term loans for all corporations declined to a low of 25% in 2001 after averaging about 34% in the study period. Contrary to the sector average, the majority of the loans taken by small-to-medium firms was short-term in nature, with the share in total loans ranging between 50% and 60% since 1998. The contrast suggests that while small-sized companies are still counting on short-term loans, the very large companies have gradually been reducing these exposures lately. Compared to other emerging economies, the Hong Kong corporate sector appears to rely more on short-term loans in its borrowing.[11]

[11] In 2000, the ratio of the median company in Hong Kong was 70%, while that for Emerging Asia, and Emerging Europe and South America was about 57%-60% and that for Latin America was slightly less than 45% in the same year (IMF, 2002).

- **The corporate sector of Hong Kong has diversified its debt financing sources since the Asian financial crisis, although the banking system remains its largest creditor.** Chart 2b shows that bank lending is the most important source of loans taken by the corporate sector during the study period.[12] However, its share in the total loans for all corporations declined to 59% in 2001 after peaking at 71% in 1996.[13] The most significant ratio decline is among small firms, dropping by over 20 percentage points from the peak in 1998 to the recent trough in 2000, possibly reflecting the post-crisis liquidity squeeze. In 2001, while most corporations increased the proportion of bank loans in their debt financing, the very large companies found alternative sources for funding their operations.

Chart 2. Loan Structure of Non-financial Corporations in Hong Kong



Source: Thomson Financial.

Notes:
1. The charts show the average ratios for the aggregate corporate sector and for firms of different sizes over the years. The ratio of bank loans to total loans represents the total bank loans as a percentage of total loans of companies, and the ratio of short-term loans to total loans represents the total short-term loans as a percentage of total loans of companies. Short-term loans refer to borrowings due in less than one year.
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small firms and small-to-medium firms refer to companies in the bottom 25% and 75% in terms of total sales in the year respectively.

[12] Other loans include, for example, finance leases and hire purchases, notes and bills, convertible loans, loan capital and intra-group loans. The details can be found in Table I of Appendix B.

[13] The median measure also confirms the falling trend, dropping to 76% in 2001 after peaking at 86% in the mid-1990s. Despite the drop, banks are still the most important creditors of the corporate sector as at least half of the companies in the sample had bank borrowings accounting for more than 76% in their total loans in 2001.

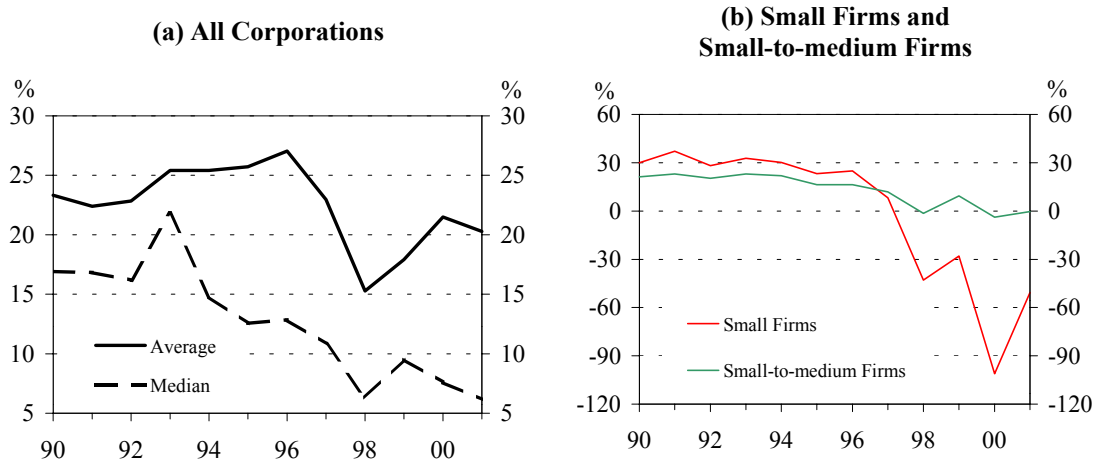
b. Profitability

Profitability is an important indicator of corporate health, as it directly affects the company's capability to repay its debt. In this study, profitability is measured by two variables: the profit margin based on the ratio of earnings before interest, tax, depreciation and amortisation (EBITDA) to total sales, and the ratio of operating profit to sales.

- **Corporate profit margins deteriorated sharply during the Asian financial crisis before rebounding significantly in recent years.** The profit margin of all corporations fell to 15% in 1998 from a pre-crisis average of 24%, but rebounded significantly to about 20% in 2000-2001 (Chart 3a). Small-to-medium firms had their profit margin reduced from 19% in 1990-97 to less than 1% in 1998-2001. The deterioration in profitability was most pronounced among small firms whose profit margin fell from an average of 26% prior to 1997 to an average loss of 55% during 1998-2001 (Chart 3b). The negative profit margin, compared to an 18% average for the whole corporate sector indicates that, on average, only the very large corporations managed to have profitable operations in Hong Kong in the past few years. A similar trend is also found if the median measure is considered. Since the mid-1990s, the profitability of the corporate sector has generally been on a declining trend, down to 6% in 2001 from an average of 13% in 1994-96. The observation is consistent with other emerging markets where profitability has declined since the mid-1990s (IMF, 2002).[14]

[14] It should be noted that the profitability measure in the IMF study is based on return on assets and is different from the one used in this paper.

Chart 3. Profit Margin of Non-financial Corporations in Hong Kong



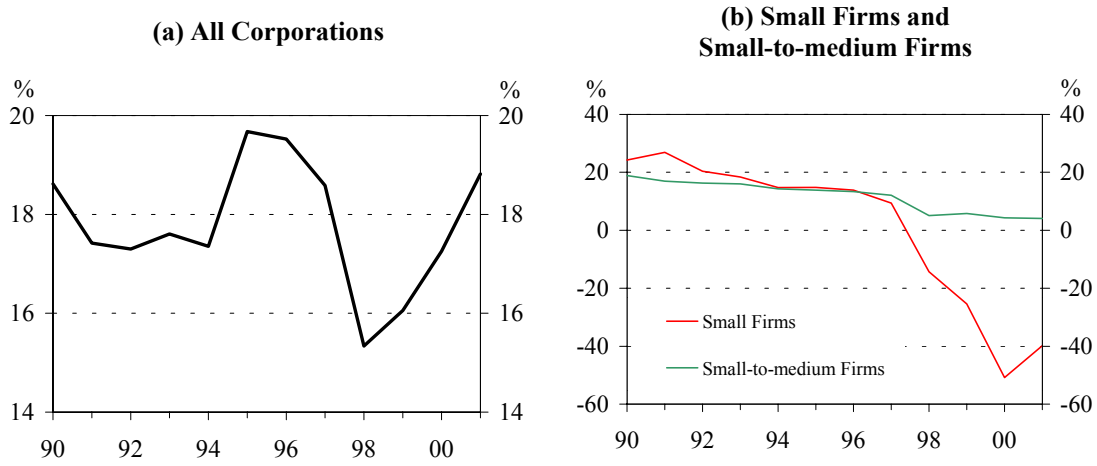
Source: Thomson Financial.

Notes:
1. The charts show the average ratios for the aggregate corporate sector and for firms of different sizes over the years. The ratios are calculated by dividing total EBITDA (earnings before interest, tax, depreciation and amortisation) by total sales revenue of companies (expressed in percentage terms).
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small firms and small-to-medium firms refer to companies in the bottom 25% and 75% in terms of total sales in the year respectively.
4. Company coverage excludes the financial performance of Hutchison Whampoa in 1999 and PCCW in 2000.

- **The profitability of the core business of the corporate sector is relatively stable**, as the losses experienced by small-to-medium firms are offset by gains by the very large ones. As shown in Chart 4a, the average operating profit margin of all corporations declined marginally in 1998-2001 from its pre-crisis level of 18%.[15] Even in 1998 when businesses experienced adverse macroeconomic conditions, the operating profit margin remained slightly above 15%. However, with the exception of the very large companies, the average operating profit margin of all corporations fell from a pre-crisis average of 15% to an average of 5% in the post crisis period. Small firms were the most affected by the economic downturn. Its ratio fell from an average of 18% before the crisis to -40% or below in 2000-2001 (Chart 4b). When the median measure is considered, the operating profit margin displays a similar declining trend to the median profit margin in Chart 4, dropping to 4% in 2001 from around 10% in the mid-1990s.

[15] If the financial performance of Hutchison Whampoa in 1999 and PCCW in 2000 are included, the decline in average operating profit margin would be even less in 1998-2001.

Chart 4. Operating Profit to Sales of Non-financial Corporations in Hong Kong



Source: Thomson Financial.

Notes:
1. The charts show the average ratios for the aggregate corporate sector and for firms of different sizes over the years. The ratios are calculated by dividing total operating profit by total sales of companies (expressed in percentage term). Operating profit is sales revenue deducting cost of goods sold and other trading expenses.
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small firms and small-to-medium firms refer to companies in the bottom 25% and 75% in terms of total sales in the year respectively.
4. Company coverage excludes the financial performance of Hutchison Whampoa in 1999 and PCCW in 2000.

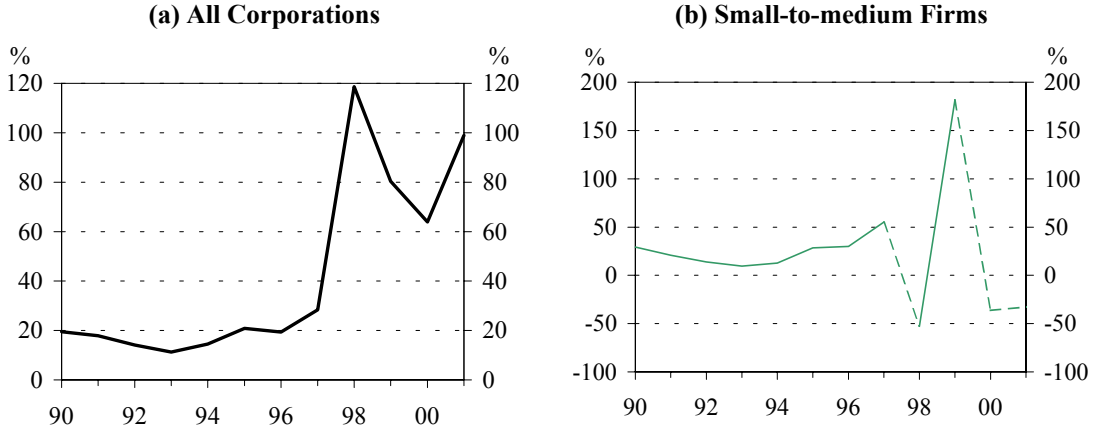
c. Ability to Service the Debt

One of the most commonly used indicators to highlight the risk of corporate failure is the firm's ability to service the debt. In this study, this indicator is captured in terms of: 1) income gearing, which is defined as the total interest expenses as a percentage of profit before interest and tax payments, and 2) the ratio of total loans to after-tax net profit.

- **Interest servicing burden of the Hong Kong corporate sector rose substantially after the Asian financial crisis.** In Chart 5a, the income gearing was relatively stable at 17% for all corporations during 1990-1996. However, after the Asian financial crisis, the ratio rose sharply to 99% in 2001. In particular, the burden of small-to-medium firms was more acute as they were either at a loss or had insufficient receipts to cover the interest payment in 1998-2001 (Chart 5b). Compared to other emerging

markets, Hong Kong's income gearing is significantly higher, partly due to its relatively larger proportion of debt in the capital structure.[16]

Chart 5. Income Gearing of Non-financial Corporations in Hong Kong



Source: Thomson Financial.

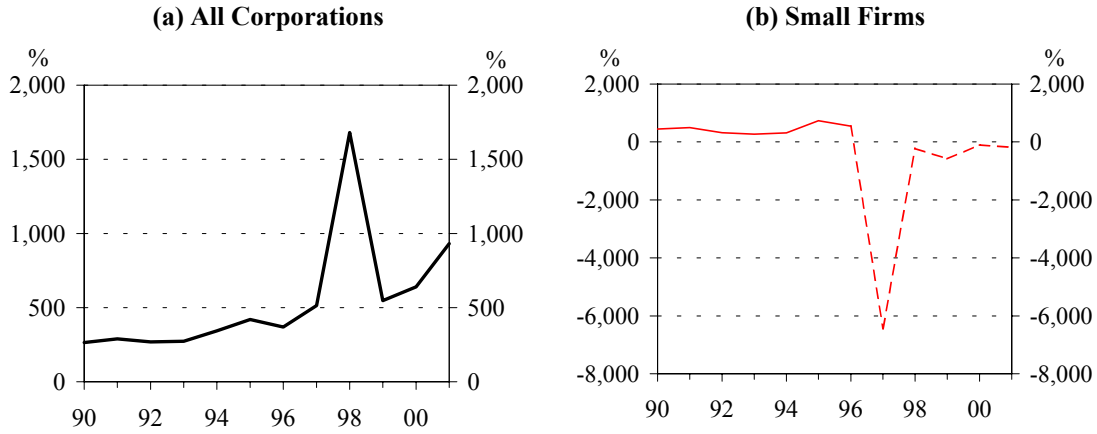
Notes:
1. The charts show the average ratios for the aggregate corporate sector and for small-to-medium firms over the years. The ratios are calculated by dividing total interest payment by profit before interest and tax payment (expressed in percentage term). A dotted line, showing ratio with negative total profit or changing from positive to negative total profit, should be interpreted cautiously.
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small-to-medium firms refer to companies in the bottom 75% in terms of total sales in the year.
4. Company coverage excludes the financial performance of Hutchison Whampoa in 1999 and PCCW in 2000.

- **The corporate sector is experiencing increasing difficulties in debt reduction through profits.** Due to the shrinkage in profits that outpaced the decline in outstanding debt after the Asian financial crisis, the debt exposure of all corporations, relative to the profit, increased to nine times in 2001 from four times or less in the years prior to 1997.[17] The situation is even more critical for the smaller firms which recorded losses in the years after the crisis (Chart 6).

[16] Although the income gearing is on a rising trend in all emerging markets, they are smaller than that in Hong Kong. The median income gearing of the companies was about 0.6, 0.3 and 0.6 in Emerging Asia, Emerging Europe and South Africa, and Latin America in 2000 respectively, while that for Hong Kong was 0.8 in the same year (IMF, 2002, HKMA estimate).

[17] In other words, it would take about nine years for the corporate sector to repay all the debts with its profits in 2001, doubling the time required prior to 1997.

Chart 6. Total Loan to After Tax Net Profit of Non-financial Corporations in Hong Kong



Source: Thomson Financial.

Notes:
1. The charts show the average ratios for the aggregate corporate sector and for small firms over the years. The ratios are calculated by dividing total loans by net profit after tax of companies (expressed in percentage term). A dotted line, showing the ratio with negative total profit or changing from positive to negative total profit, should be used cautiously when comparing with a positive one.
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small firms refer to companies in the bottom 25% in terms of total sales in the year.
4. Company coverage excludes the financial performance of Hutchison Whampoa in 1999 and PCCW in 2000.

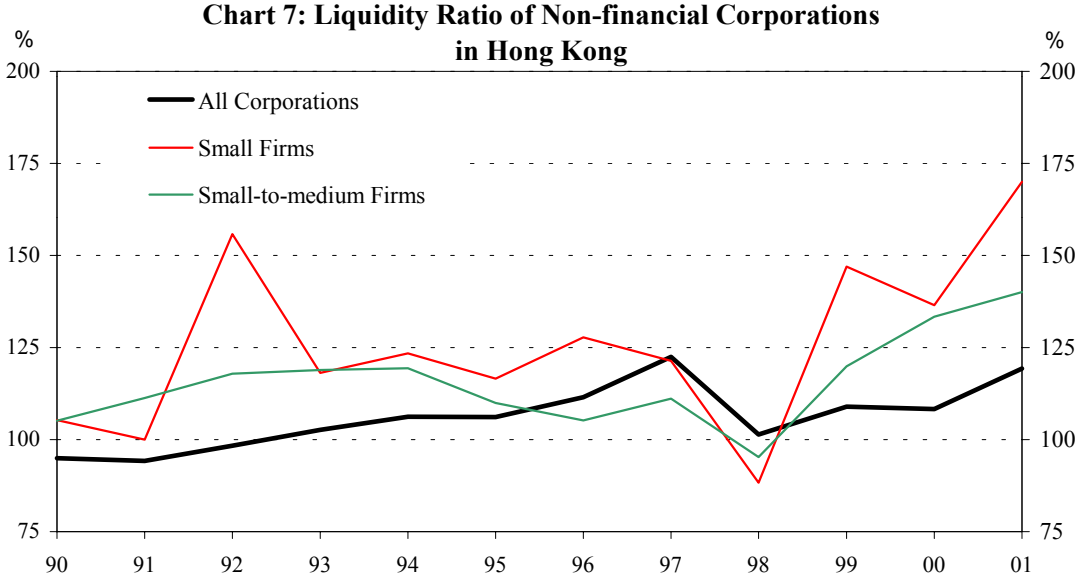
d. Liquidity

The liquidity ratio, defined as total current assets excluding inventories over total current liabilities of the company, measures the firm's ability to meet its short-term cash need without affecting its credit quality. In other words, it captures the extent of liquidation risk faced by the corporate sector as most corporate defaults are triggered by cash flow problems.

- **Hong Kong corporations maintained a healthy liquidity ratio after the Asian financial crisis.** Excluding the very large companies, the liquidity ratio of small-to-medium firms was at a 12-year high in 2001 after a brief drop in 1998. The improvement in the liquidity ratios varies inversely with the size of the companies. Although the liquidity ratio of small firms used to be more volatile, the rebound from the low of 88% in 1998 to 170% in 2001 is remarkable when compared with other companies. In fact, it is important for small firms to remain liquid, as external funds are not readily available to help them withstand financial shocks or keep them afloat during an economic slowdown (Chart 7). Similar improvement in

liquidity is also observed in other economies in Emerging Asia but not in Latin America, Emerging Europe or South America (IMF, 2002).[18]

Chart 7: Liquidity Ratio of Non-financial Corporations in Hong Kong



Source: Thomson Financial.

Notes:
1. The chart shows the average ratios for the aggregate corporate sector and for firms of different sizes over the years. The ratios are calculated by dividing total current assets excluding inventories by total current liabilities of companies (expressed in percentage term).
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small firms and small-to-medium firms refer to companies in the bottom 25% and 75% in terms of total sales in the year respectively.

e. Efficiency

As the corporate balance sheet provides little information on the number of employees, inventory and fixed assets are the two factor inputs used as proxies to measure the productivity of corporations. A rise in either sales-to-inventory or sales-to-average fixed assets ratio denotes improved efficiency in the corporate sector.

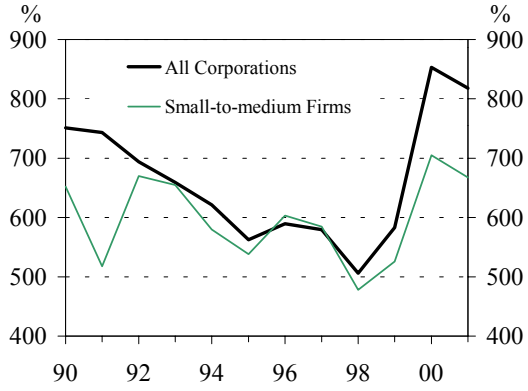
- **The sales-to-inventory ratio of Hong Kong corporations accelerated to a peak of about 840% in 2000-01, compared to an average of 650% in 1990-97**. The recent improvement reflects the efforts of corporations to reduce the inventory to counter the slowdown in sales (Chart 8a). During the same period, the sales-to-inventory ratio of small-to-medium firms also improved from 600% to 690%. The smaller increase for small-to-medium firms indicates that most efficiency gains in the corporate sector in

[18] It should be noted the liquidity measure in the IMF study is different from this paper and based on cash and short-term investments to total assets.

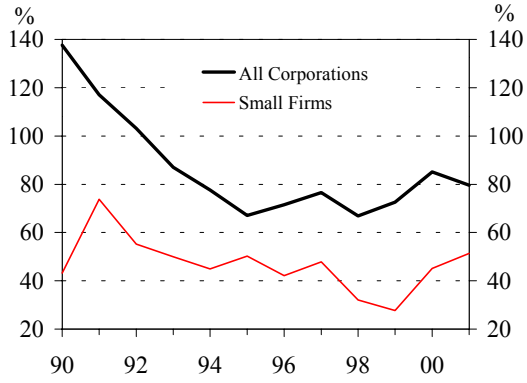
recent years have been achieved by large companies. A less significant improvement is observed for the sales-to-average fixed assets ratio of all corporations (Chart 8b). This declined from the early 1990s until 1998, but has edged up in 2000-2001. Despite a similar pickup in this ratio, small firms are less efficient when compared to the rest of the corporate sector.

Chart 8. Efficiency of Non-financial Corporations in Hong Kong

(a) Sales-to-Inventory



(b) Sales-to-Average Fixed Asset Value



Source: Thomson Financial.

Notes:
1. The charts show the average ratios for the aggregate corporate sector and for firms of different sizes over the years. The ratio of sales to inventory represents the total sales revenue as a percentage of total inventory, and the ratio of sales to average fixed asset values represents the total sales revenue as a percentage of companies' total average fixed assets in the past two years.
2. Non-financial corporations refer to companies, excluding H-shares companies, investment companies, and those engaged in banking, insurance or finance, listed on the Hong Kong Main Board and Growth Enterprise Market.
3. Small firms and small-to-medium firms refer to companies in the bottom 25% and 75% in terms of total sales in the year respectively.

2. Summary

The Asian financial crisis and the ensuing global economic downturn have had significant implications for the corporate sector. Profitability has been eroded sharply, as evidenced in the reduced profit margins for all corporations. Because of the falling profits, the debt burden of the corporate sector has increased notwithstanding the low interest rate environment in recent years. Worse still, the property market slump has significantly reduced the collateral value of the assets, thereby limiting corporations' access to bank financing.

To cope with the challenges arising from the external environment, the corporate sector has made an effort to increase their competitiveness. In the wake of the liquidity squeeze experienced after the Asian financial crisis, corporations, particularly those large ones which are more ready to gain access to the capital markets,

have diversified their fund raising channels to reduce their reliance on bank loans. Partly attributable to the low interest rate environment and party due to the corporate effort to avoid liquidity squeeze, long-term loans expanded at the expense of short-term loans. This has in turn helped improve the liquidity position of the corporate sector.

Apart from restructuring its financing positions, the corporate sector has endeavoured to increase their operational efficiency to reduce costs. With a strong liquidity ratio and profitable operations, most of the Hong Kong corporations are not facing immediate threat of liquidation, though the rising debt burden may jeopardise their long-term health.

That said, small companies are found to be more vulnerable to a sustained economic downturn and to external shocks. Their increasing reliance on short-term loans for financing makes them susceptible to interest rate risk. Their debt repayment capability is also threatened by substantial reductions in their profitability brought by the sluggish economy and the lack of improvement in their efficiency.

IV. ESTIMATION OF LIQUIDATION RISK

In this section, three approaches are employed to analyse the factors affecting corporate liquidations in Hong Kong. The first approach uses a regression model that relates the aggregate corporate failure rate in Hong Kong to a number of macroeconomic variables during 1985-2001. The other two approaches make use of the financial information of individual companies to identify the link, if any, between the characteristics of the firm and its liquidation risk. Using the company default data in 2000 and 2001, a probit model is applied to examine whether the financial ratios of a company can help predict the probability of its failure. The last approach applies a regression model to the cross-sectional data of individual company's financial ratios between 1997 and 1999 to examine how the company's potential liquidation risk is determined.

1. The Determinants of the Aggregate Corporate Liquidation Rate

The aggregate corporate liquidation rate in Hong Kong is estimated based on a sample of annual macroeconomic and corporate variables from 1985 to 2001. A study by Vlieghe (2001) shows that the corporate liquidation rate in the UK corporate sector depends on the profitability of the companies, the level of their indebtedness and other macroeconomic variables such as the interest rate and unit wage cost. This section explores whether a similar relationship exists in Hong Kong.

a. The Empirical Model

Following Vlieghe (2001), the corporate liquidation rate (*LQR*) at time *t* is modeled as a function of a group of macroeconomic variables in the previous period *t*-1:[19]

$$LQR_t = f(TAX_{t-1}, IR3_{t-1}, DGDP_{t-1}, LOAN_{t-1}, HSI_{t-1}, UWC_{t-1}, CPIP_{t-1}, RPROP_{t-1})$$

where

Dependent variable

LQR = Aggregate corporate liquidation rate[20]

Independent variables

TAX = The ratio of corporate profit tax to nominal GDP;
This variable is used as a measure of the profitability of the corporate sector. The higher it is, the less likely the corporate will fail.

IR3 = The 3-month interbank rate, in both nominal and real terms;
The interest rate gives the borrowing cost of the firm. A higher level of interest rates is expected to increase the liquidation rate of the corporate sector. The real interbank rate is defined as the nominal interbank rate deflated by the GDP deflator.

DGDP = The output gap;[21]
The output gap is used as a proxy for the business condition in Hong Kong. The probability of corporate failures would be higher if the level of real output is below potential.

LOANS = The ratio of bank loans to nominal GDP;[22]
As a high level of corporate indebtedness may render a firm vulnerable during difficult periods, one would expect a positive relationship between the ratio of

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[19] All variables are in natural log form, except the nominal and real 3-month interbank rates. Macroeconomic data are obtained from CEIC and HKMA.

[20] Defined as the ratio of compulsory winding-up cases made to the Hong Kong Official Receiver's Office to all locally registered companies.

[21] The output gap is the difference between actual GDP and the potential GDP obtained from the H-P filter.

[22] Bank loans are defined as total loans extended by all licensed banks in Hong Kong, excluding loans to financials concerns, stockbrokers, professional and private individuals.

bank loans (as a proxy of the corporate debt level) to nominal GDP and the probability of bankruptcy.[23]

HSI = The Hang Seng Index;
As a leading indicator, the stock price may signal the overall business environment ahead. It is expected that the level of stock price is likely to be inversely related to the probability of bankruptcy.

UWC = The ratio of nominal wages to GDP;
As labour cost is one of the determinants of profit, higher unit wage cost may lead to a higher liquidation risk by reducing the profitability of companies.

CPIP = The ratio of consumer prices to import prices;
This ratio captures the pricing power of the sector relative to its cost. A high ratio implies that the profit margin is high, thus lowering the risk of bankruptcy.

PROP = A real domestic property price index;[24]
Property is one of the main collateral for firms to secure bank lending. A fall in the property price may induce banks to recall their loans. This could significantly affect a firm's liquidity position and increase the probability of bankruptcy.

b. Estimation Results

The independent variables are examined step-wise by OLS to see whether these can be used to explain the aggregate corporate liquidation rate. After a series of regression estimations and comparison, the following model is selected.[25]

[23] In Hong Kong, bank lending is important for the corporate sector, especially for the small-and-medium sized companies that have limited sources of external funding. Due to the lack of corporate debt data, the level of bank loans is used as a proxy for the indebtedness in the corporate sector.

[24] The real domestic property price index is obtained from the domestic property price index deflated by the GDP deflator.

[25] A variable is selected when the estimated coefficient has the expected sign and is statistically significant.

Table 1. Estimation Results for the Aggregate Corporate Liquidation Rate (1985 – 2001)

Dependent Variable : *Aggregate Corporation Liquidation Rate*		
Independent Variable	**Estimated Coefficient**	**p-value**
Constant	-12.42*	0.00
Ratio of Bank Loans to Nominal GDP(t-1)	1.76*	0.00
Real 3-month Interbank Rate(t-1)	0.02*	0.03
Ratio of Nominal Wages to GDP(t-1)	2.49*	0.00
Adjusted R^2 :	0.81	
Observations :	17	
S.E. of Regression :	0.15	
F-statistic :	23.62 (p-value = 0.00)	
Serial Correlation LM(2) Test :	1.27 (p-value = 0.32)	
White's Heteroscedasticity Test :	1.02 (p-value = 0.50)	

Notes: The standard errors are obtained by the heteroscedasticity consistent estimator of White (1980) in the presence of heteroscedasticity in the residual terms.
* indicates significance at 5% level.

In Table 1, the estimated coefficients on all the independent variables are statistically significant and have the expected positive signs.[26] Thus, other things being equal, a higher (lower) level of bank loans (as a proxy of the corporate debt level), real interest rate and/or unit wage cost is associated with higher (lower) risk of corporate failures. With an adjusted R^2 at 81%, this model appears to possess reasonable strength to explain the aggregate corporation failure. In brief, this empirical model shows that the level of bank loans, real interest rate and the unit wage cost are important macroeconomic factors in explaining the level of aggregate corporate liquidation rate in Hong Kong.

[26] Other variables that are found to have a significant effect on the corporate liquidation rate are the corporate tax as a percentage of nominal GDP and the output gap, and their estimated coefficients have the expected negative signs. However, regression results with the inclusion of these two variables are not as good as the one presented in Table 1.

2. Modeling Corporate Failure Using a Probit Model

a. Introduction

This section makes use of balance sheet data from a two-year panel (2000-2001) extracted from Thomson Financial to model corporate failures in Hong Kong.[27] The probit approach applied in this study aims to investigate how changes in the financial ratios of an individual company affect the probability that a firm will fail in the coming year.

b. The Empirical Model

Although the direct cause of corporate failure may vary among firms, the decision of a firm to go into bankruptcy is likely to be driven by its short-term financial difficulties coupled with a pessimistic assessment of the long-term prospect of the firm (Geroski and Gregg, 1997). While the financial difficulties faced by the firm can be traced from balance sheet information such as the capital structure, the interest burden, the liquidity and the profitability, its long-term prospect is often linked with its size, its history, its growth rate and the particular industry or sector that the firm belongs to. Similar to the work of Geroski and Gregg (1997), probit models with different combinations of variables pertaining to the capital structure, the interest burden, the liquidity, the profitability, the size, the history, the growth rate of the corporations, and the industry dummies are examined. The final model that can best explain the failure probability after considering the above variables is as follows:[28]

[27] The two-year panel consists of 1,249 observations with eighteen companies that failed.

[28] This final model is quite robust in the sense that its results are very similar to those of other models using different combinations of profitability, interest burden and debt structures, and the inclusion of extra variables does not increase the overall explanatory power significantly.

Dependent Variable:

Indicator variable = 1, if the company liquidates in either 2000 or 2001[29]
= 0 otherwise[30]

Independent Variables:

1) Indebtedness
It is measured by (a) total liabilities/assets in the previous period; and (b) short-term debt/total debt in the previous period. In general, companies with larger debt burdens are expected to have a higher risk of liquidation.

2) Profitability
A dummy variable for negative operating profit margin in the previous period is used to indicate the company's prospects to repay its debt. Companies with negative profitability are expected to have higher liquidation risk.

3) Size of the firm
The size of the firm is represented by the (logarithm of the) sales in the previous period. As small-to-medium firms are more vulnerable to economic and financial shocks, companies with smaller size are expected to entail a higher liquidation risk.

4) Growth of the firm
The growth of the firm is measured by the change in sales revenue over the last two years. Barring the case of excessive expansion, companies with faster growth in general have a brighter outlook and hence are expected to have a smaller liquidation risk.

5) History
The history of the firm is given by the number of years that the firm has been listed on the exchange. As a company with a long listing history is usually more able to withstand past economic and financial downturns, a longer listing history is expected to be associated with a smaller liquidation risk.

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[29] If a company failed in 2001, it would have a value of 0 for the section of panel data for 1999, and a value of 1 for the section of panel data for 2000.

[30] Due to the availability of data in other variables, only 945 observations are used in the final probit model. Among these 945 observations, only 15 of them are companies that failed.

c. Probit Results

Table 2. Probit Estimates of Company Liquidation Probability in 2000-01

Variable	Coefficient	p-value
Ratio of total liabilities to total assets (t-1)	0.29	0.00
Ratio of short-term debt to total debt (t-1)	0.31	0.44
Dummy for negative operating profit margin (t-1)	0.48	0.08
Size of the firm	0.38	0.09
Growth of the firm	-0.04	0.92
Years of listing	0.03	0.04
Constant	-5.04	0.00
Log likelihood	-62.27	
Probability (LR stat)	0.00	
McFadden R-squared	0.19	
Sample size (adjusted)	1437	
Included observations	945	
Observation=0	930	
Observation=1	15	
Estimated equation:	Dependent=0	Dependent=1
P(Dependent=1)<=0.5	930	14
P(Dependent=1)>0.5	0	1
Hosmer-Lemeshow goodness-of-fit tests	4.05	
Probability Chi-Sq(8)	0.85	

Table 2 gives the result of the probit estimation. As expected, the signs of the two measures of indebtedness are positive. This indicates that the higher the ratio of total liabilities-to-asset or the ratio of short-term debt to total debt is, the more vulnerable the company will become. The dummy variable for the negative profit margin is significant in explaining the increase in corporate failure. The sign is expected, as a negative profit margin has an adverse effect on both the cash flows of the firm and its ability to repay the debt. In addition, the growth of the firm is negatively associated with corporate failure, consistent with the findings of Dunne and Hughes (1994) that firms with rapid growth have a lower risk of failure.

The size of the firm is, however, found to have a positive impact on corporate failure. This is contrary to the general belief that the small-to-medium firms, because of their limited funding choices, are more vulnerable than large companies.[31] Furthermore, the positive coefficient of the years of listing on the exchange to corporate failure is surprising, as this indicates that the companies with longer listing history would

[31] Dunne and Hughes (1994), in a study of listed and unlisted UK companies, showed that there is a broad inverse relationship between size and the probability of death.

have a higher default probability. The years of listing is arguably not a good proxy for the years of existence of the company because some recently listed companies could have already existed for a long time as private unlisted companies. On the other hand, companies that have been listed for a long time could have out-dated products or already lost their niches or competitiveness, thereby increasing their vulnerability to default.

Despite the statistically significant results, the predictive power of this model is limited. Out of the fifteen companies that failed in the sample, only one case can be accurately predicted by the model. The lack of predictive power by the model is, however, not surprising as it is in general very difficult to predict an event that rarely occurs.[32] Overall, the model is acceptable given its reasonable likelihood ratio statistics.

3. Assessing the Potential Risk of Corporate Liquidation

In light of the probit model's failure to predict company bankruptcy, an alternative approach is adopted to assess the financial health of individual firms. In the following empirical study, we examine the potential risk of liquidation of companies based on cross-sectional data of individual company's financial ratios and characteristics.

Theoretically, companies are more likely to go bankrupt when their asset values at current market prices fall below the book values of their total liabilities.[33] Thus, the ratio of asset values to book values of total liabilities can, in principle, be used to reflect the potential risk of failure. This potential risk, however, is difficult to derive as the market value of total assets cannot be directly observed. To calculate a similar ratio, the market capitalisation of the firm is used instead in this study.[34] In other words, a ratio of market capitalisation to total liabilities is constructed as a proxy for the probability of survival for each company. The higher it is, the less likely the firm will fail.

As an illustration, it is found that the average ratios of market capitalisation to total liabilities for surviving companies are at 0.65 in 1997 and 0.59 in 1998. These ratios are significantly above 0.24 and 0.14 for problematic companies (which later went into liquidation) in these two years respectively. The marked difference in the ratios between the two categories of firms demonstrates the relevancy of the ratio in analysing the potential risk of corporate liquidation.

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[32] Similar independent variables are also found to have a very limited predictive power on the vulnerability of firms for the UK companies (Geroski and Gregg, 1997).

[33] Merton (1974).

[34] The market capitalisation reflects the total value of the outstanding shares that helps decide the ownership of the company's total assets.

a. The Empirical Model

The general model is set up such that the ratio of market capitalisation to total liabilities (*LIQ*) of individual companies at time *t* is a function of a group of corporate financial ratios obtained in year *t*-1 and *t*-2. That is,

$$LIQ_t = f(LIQ_{t-1},\ Profitability_{t-1,t-2},\ Size_{t-1,t-2,}\ Liquidity_{t-1,t-2,}\ Indebtedness_{t-1,t-2,}\ Interest\ burden_{t-1,t-2},\ Industry\ dummy)$$

where

Dependent variable

LIQ = The ratio of market capitalisation to total liabilities

Independent variables that are tested in the model

1) Profitability
   - Profit margin
   - Return on asset
   - Return on equity
   - Profit before tax

   Companies with higher profitability are unlikely to go bankrupt.

2) Size of firms
   - Sales revenue
   - Total asset
   - Market capitalisation

   The firm size has an impact on the probability of liquidation risk. Small-to-medium firms, having limited funding choices during economic downturns, are more vulnerable to economic and financial shocks. In other words, a smaller company would entail a higher liquidation risk or a smaller ratio.

3) Liquidity
   - Cash ratio

   The cash ratio reflects the liquidity position. A higher cash ratio provides a cushion to withstand short-term liquidity squeeze, thus lowering the risk of company failure.

4) Indebtedness
   - Total debt
   - Debt to equity
   - Debt to asset

The level of indebtedness measures the leverage of a company. A highly leveraged company is expected to be more vulnerable to adversity. That is, the higher the indebtedness is, the smaller the ratio will be.

5) Interest burden
   - Debt services
   - Interest gearing

   The level of interest burden measures the extent to which a company's profit can be used to cover its interest payments. The lower the interest burden is, the less likely it will fail or the higher the ratio will be.

6) Industry dummy
   - Business services
   - Construction
   - Electricity, gas and water
   - Manufacturing
   - Mining and quarrying
   - Real estate
   - Social and personal services
   - Transportation, storage and communication
   - Wholesales, retail, import/export trade, restaurants and hotels

   Nine industry dummies are introduced to control the industry effect on the likelihood of corporate failures.[35]

b. OLS Estimation Results

The ratios of market capitalisation to total liabilities in 1999 are regressed on a group of independent variables of financial ratios in 1997 and 1998. After a series of regression estimations and comparison, the following model is selected.

[35] Each company is assigned to an industry sector. The industries are classified according to the Hong Kong Standard Industrial Classification Version 1.1 (HSIC V1.1).

Table 3. Estimation Results for the Potential Risk of Corporate Liquidation

Dependent Variable: *The ratio of market capitalisation to total liabilities (LIQ_{1999})*		
Independent Variable	**Estimated Coefficient**	**p-value**
Constant	0.38*	0.00
LIQ_{1998}	0.14*	0.00
Profit Before Tax$_{1998}$	0.61**	0.08
Sales Revenue$_{1998}$	0.36**	0.05
Cash Ratio$_{1997}$	0.09*	0.01
Total Debt$_{1998}$	-0.20*	0.01
Dummy for Social and Personal Services	1.54*	0.00
Dummy for Transportation, storage and communication	0.71*	0.00
Adjusted R^2 :	0.14	
Observations :	435	
S.E. of Regression :	0.97	
F-statistic :	11.47 (p-value = 0.00)	

Notes: Standard errors are obtained by the heteroscedasticity consistent estimator of White (1980) in the presence of heteroscedasticity in the residual terms.
* indicates significance at 5% level. ** indicates significance at 10% level.

Results from Table 3 show that the estimated coefficients of the levels for corporate profitability, the firm size and the corporate liquidity ratio are statistically significant and positively related to the ratio. In other words, the higher the profitability of a firm, the larger its size and the more liquid it is, the lower the risk of bankruptcy will be. On the other hand, the estimated coefficient of corporate indebtedness has the expected negative sign and is significant, implying that a highly leveraged company has a greater bankruptcy risk. Regarding the industry dummy, only the estimated parameters of social and personal services, and transportation, storage and communication are statistically significant and their signs are positive. The results suggest that companies in these two industries are less likely to go into bankruptcy.[36]

[36] Although the estimated parameters of other industry dummies are statistically insignificant, the signs of their coefficients may provide hints to the risk of bankruptcy in their respective industry sectors. A positive coefficient implies a lower risk of bankruptcy, and vice versa. For example, the other two industry dummies that have estimated coefficients of positive signs are the manufacturing sector and the electricity, gas and water sector. The rest of the industry dummies have negative estimated coefficients.

V. Conclusion

Given the close linkage between the financial soundness of the firms and the stability of the financial system, it is important to understand the vulnerability of the corporate sector. This study analyses the financial health of the non-financial corporations in Hong Kong using their balance sheet information. The financial ratio analysis shows that the prolonged economic downswing after the Asian financial crisis has been weighing on the corporate sector's ability to service its debts. In response to the difficult business environment, Hong Kong corporations are striving to maintain their competitiveness and regain their profit margin through tightening inventory control and more efficient use of fixed assets. In addition, the corporate sector has made efforts to maintain its financial soundness by increasing its liquidity ratio, reducing its funding risk through diversification and lengthening its loan profile to reduce its exposure to short-term interest rate fluctuations.

There are significant variations in the financial ratios of different sized firms. In general, very large corporations in Hong Kong appear to be least affected by the Asian financial crisis and the subsequent economic recessions as most of their financial ratios have returned to their pre-crisis levels. Notwithstanding efforts to de-leverage and improve operational efficiency, the profitability of medium-sized companies was reduced because of the adverse economic environment. Small-sized companies were particularly hard hit as their earning power was severely impaired. Their risk of default has risen, as shown by a lack of improvement in their capital structure and efficiency. However, it should be noted that the improvement in Hong Kong's business environment since the second half of 2003, is likely to strengthen balance sheets and financial conditions in the corporate sector, including small companies, when compared to 2001.[37]

Relating these financial ratios to the liquidation rate of the aggregate corporate sector in Hong Kong yields some interesting results. The indebtedness and the profitability of corporations are found to be the two most significant variables that help explain the liquidation rate. Nevertheless, these financial ratios do not appear to be helpful in predicting liquidation risk for individual companies. It is partly due to the small number of corporate bankruptcy cases filed in the past years that render test results unsatisfactory. Although financial ratios such as the indebtedness and the profitability provide significant information for monitoring the soundness of the corporate sector, they are not precise enough for predicting the liquidation risk of individual companies.

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[37] A survey released on 30 October 2003 by the SME Centre of the Hong Kong Productivity Council finds that the Business Operating Environment Index for SMEs, which gauges the views of Hong Kong's small-and-medium-sized enterprises in the areas of market opportunity, financial and investment situation, operating costs, human resources and risk assessment, reached a record high in October 2003 since it was introduced in 1998. This indicates that the financial health of small companies is likely to benefit from the upswing in economic conditions that is currently under way.

Finally, we emphasise that the results of this study should be interpreted with caution. The financial ratios of the corporate sector, presented in the form of the mean or median, are summarised into a single number to represent a group of highly heterogeneous companies in the economy. There is risk of over-generalisation. Sometimes, it may even be misleading when these summary statistics are combined together for an overall assessment of the corporate sector if these ratios are sector-biased or dominated by some special companies. For this reason, these ratios should be examined alongside other sources of information, including market intelligence and business surveys (Benito et al., 2001), when used to monitor the health of the corporate sector in Hong Kong.

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Appendix A

Selected Financial Ratios of Hong Kong Corporations
(1990-2001)

	All Corporations (non-financial)	Bottom 75% in Sales (Small-to-medium firms)	Bottom 25% in Sales (Small firms)
A. Capital Structure			
1. Total Liabilities – Shareholders' Equity / Total Assets	Stable between 41%-47%; edged down slightly from 1998 peak of 47% to 42% in 2001.	Less than all corporations; declined from 1998 peak of 47% to 37% in 2001.	Less than all corporations; on a slightly increasing trend.
2. Long Term Debt (LDT) / LDT + Shareholders' Equity	Increasing; 25% in 2001, approaching the peak of 26% in 1998.	Less than all corporations; declined to 12% in 2001 after peaking at 21% in 1998.	8 – 14 percentage points less than all corporations except in 1991; declined to 11% in 2001.
3. Total Short Term Loans (< 1 year) / Total Loans	Declining steadily from about 40% in early '90s to 25% in 2001.	Between 42% and 56% for most of the time.	On a general rising trend from 45% in early '90s to the peak level of around 60% in 1998 and 2001.
4. Total Bank Loans / Total Loans	Peaked at 71% in 1996; declined to 59% in 2001, but still above early '90s levels.	After peaking at 80% in 1995, declined to 61% in 2000; rebounded to 68% in 2001.	Between 73% and 78% in 1993-1998, fell to about 59% in 2001.
B. Profitability			
5. Total EBITDA / Total Sales	Averaged 24% in pre-crisis period; dropped to 15% in 1998 but rebounded to about 20% in 2001.	Declined from an average of 19% in 1990-1997 to 0.9% in 1998-2001; slightly negative in 2001.	Fell from a pre-crisis average of 26% to -101% in 2000; suffered severe negative margin in 1998-2001.

	All Corporations (non-financial)	Bottom 75% in Sales (Small-to-medium firms)	Bottom 25% in Sales (Small firms)
6. Operating Profit / Total Sales (Operating Profit Margin)	Fluctuated between 17% to 20% most of the time. The low point was reached in 1998 at 15%, and had recovered to 19% in 2001.	Fell from a pre-crisis average of 15% to a 5% average in post-crisis period.	Pre-crisis average of 18% versus negative value since 1998; on a downward trend from 27% in 1991 to a low of -51% in 2000; was at -40% in 2001.
C. Ability to Service the Debt			
7. Interest Payment / Profit Before Tax and Interest Payment (Income Gearing)	Averaged about 17% before 1997; surged to 119% in 1998 and averaged about 81% in 1999-2001.	Averaged about 21% before 1997; surged to 182% in 1999 and was negative in 1998, 2000 and 2001 due to negative profit.	Averaged about 20% before 1997; surged to about 587% in 1997 and negative after 1997 as a result of negative profits.
8. Total Loans / Net profit after tax	Less than 4 times before 1997; surged to 17 times in 1998; after dropping to 5 times in 1999, rose steadily to 9 times in 2001.	Less than 6 times before 1997; surged to 14 times in 1997; net profit were either negative or minimal in 1998-2001.	Fell from around 7 times before 1997 to negative territory thereafter.
D. Liquidity			
9. Total Current Assets ex Inventory / Total Current Liabilities (Liquidity Ratio)	Rising steadily from 0.95 in early 90s to 1.22 in 1997; after a drop to 1.01 in 1998, the ratio rebounded to 1.19 in 2001; averaged 1.12 in 1999-2001.	On a general declining trend from 1.19 at 1994 to 0.95 in 1998, then improved significantly to an all-time high of 1.40 in 2001; averaged 1.31 in 1999-2001.	Dropped from a high of 1,56 in 1992 to 0.88 in 1998; then surged to 1.70 in 2001; averaged 1.51 in 1999-2001.

	All Corporations (non-financial)	Bottom 75% in Sales (Small-to-medium firms)	Bottom 25% in Sales (Small firms)
E. Efficiency			
10. $\frac{\text{Sales revenue}}{\text{Total inventory}}$	Averaged 6.5 times in 1990-1997; dropped to a low of 5.1 times in 1998, then rose to 8.4 times in 2000-2001	Averaged 6.0 times in 1990-1997; dropped to a low of 4.8 times in 1998, then rose to 6.9 times in 2000-2001	Averaged 4.9 times in 1990-1997; at around the same level in 2000-2001; the low in 1998 was 4.0.
11. $\frac{\text{Total sales revenue}}{\text{Average fixed assets of last 2-years}}$	Declining steadily from 138% in 1990 to a range of 66%-77% in 1994-1999; edged up to 80% or more in 2000 and 2001	Fluctuated within 81% and 104% in 1990-2001; moved upward since 1998 to reach a high of 107% in 2001.	On a downward trend from 74% in 1991 to 28% in 1999; recovered to over 45% in 2000-2001.

Appendix B

Table I. Breakdowns on Balance Sheet

Assets (1)	**Liabilities**
▪ Current Assets (2) - cash (3) - inventory (4) - others ▪ Fixed Assets (5) ▪ Financial Assets	▪ Total Loans (6) = short-term loans (7) + long-term loans (8) **OR** = bank loans (9) + other loans ▪ Short-term Creditors (10) ▪ Deferred Liabilities ▪ Other Long-term Liabilities ▪ Shareholders' Equity (11)

Note: Other loans include finance leases & hire purchases, notes & bills, perceptual subordinated loans, subordinated loans, loan capital, convertible loans, government-backed loans, mortgage loans, pension loans, intra-group loans.

Table II. Breakdowns on Profit & Loss Account

Credit	**Debit**
▪ Sales Revenue (12)	▪ Trading Expenses (13) - cost of goods sold - depreciation (14) - amortisation (15) - other trading expenses
▸ **Operating Profit including depreciation and amortisation (16) = (12) – (13)** ▪ Interest Income ▪ Investment Income } (17) ▪ Other Income	▪ Exceptional Charges (18) - Fixed assets written off - Disposal of businesses - Financial assets written off - Goodwill written off
▸ **Profit Before Interest & Tax (19) = (16) + (17) – (18)**	▪ Financial Charges (20) - overdraft interest - lease & hire purchase interest - subordinated loan interest - short & long interest
▸ **Profit Before Tax (21) = (19) – (20)**	▪ Taxation ▪ Minorities Share of Profit } (22)
▸ **Profit After Tax or Net Income (23) = (21) – (22)**	▪ Dividends (24)

Table III. Financial Ratio Calculations

Chart	Title	Calculations
1a	Capital Structure: Total Debt to Total Asset	$\frac{(1)-(11)}{(1)}$ x 100%
1b	Capital Structure: Long-term Debt to Total Capitalisation	$\frac{(8)}{(8)+(11)}$ x 100%
2a	Loan Structure: Short-term Loans to Total Loans	$\frac{(7)}{(7)+(8)}$ x 100%
2b	Loan Structure: Bank Loans to Total Loans	$\frac{(9)}{(7)+(8)}$ x 100%
3	Profit Margin*	$\frac{(19)+(14)+(15)}{(12)}$ x 100%
4	Operating Profit Margin	$\frac{(16)+(14)+(15)}{(12)}$ x 100%
5	Income Gearing (Interest to Profit before Interest Payment & Tax)	$\frac{(20)}{(19)}$ x 100%
6	Loans to After Tax Net Profit	$\frac{(6)}{(23)}$ x 100%
7	Liquidity Ratio	$\frac{(2)-(4)}{(7)+(10)}$ x 100%
8a	Efficiency: Inventory Turnover (Sales to Inventory)	$\frac{(12)}{(4)}$ x 100%
8b	Efficiency: Sales to Average Fixed Asset Value	$\frac{(12)x2}{(5)_t+(5)_{t-1}}$ x 100%

Note:
The number in brackets refers to the definition in Table I and II of Appendix B.
* Based on EBDITA (earnings before interest, tax, depreciation and amortisation).