Hong Kong Monetary Authority

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DETERMINANTS OF BANK PROFITABILITY IN HONG KONG

KEY POINTS:

- *A profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system. It is therefore important to understand the determinants of banking sector profitability. This is especially important in the light of several important changes in the operating environment of banks in Hong Kong following the Asian Financial Crisis in 1997, which are likely to affect their profitability.*

- *Empirical analysis finds that both bank-specific as well as macroeconomic factors are important determinants of banks' profitability. With regard to macroeconomic factors, real GDP growth, inflation and real interest rates are positively related to banks' profitability. Among bank-specific variables, operational efficiency and business diversification, as measured by lower non-interest expenditure and higher non-interest income ratios respectively, contribute to higher returns on assets, after controlling for differences in the credit quality of loans.*

- *The deterioration in profitability in recent years is mainly attributable to the adverse macroeconomic environment in Hong Kong. Operational efficiency is the major factor in determining performance across banks. Recently banks increasingly have to enhance their competitiveness by diversifying their traditional lending activity into non-interest income generating businesses.*

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I. INTRODUCTION

The banking sector plays an important role in the service-based economy of Hong Kong. Its value-added has been growing steadily over the past decade, from about 5½ percent of GDP in 1990 to 8½ percent in 2001. At the same time, its share in total employment has declined from 2.6 percent in 1995 to 2.3 percent in 2002, reflecting strong productivity gains achieved through bank consolidation, rationalisation of branch networks and greater utilisation of electronic banking services. The sector contributed 16 percent of total profits tax in 2001, accounting for about 3 percent of government revenue.

The banking sector provides worldwide services that enhance the international financial centre status of Hong Kong. Of the world's 500 largest banks, 168 had operations in Hong Kong in 2002, while 107 of the 133 licensed banks in Hong Kong were incorporated outside Hong Kong. Before the Asian Financial Crisis in 1997, loans to customers outside Hong Kong accounted for over 50 percent of total lending. This share has declined substantially since then to 12 percent in 2002, largely reflecting the contraction in Euro-yen Impact Loans and reduced foreign currency borrowing by other economies in the region.[1] Banks in Hong Kong have also been active in the Asian syndicated loans market, arranging on average about 15 percent of total lending over the past six years.

There have been some important changes in the operating environment of the banking sector in Hong Kong in recent years, which have affected its profitability. These include the effects of the Asian Financial Crisis in 1997, declining global inflation and interest rates, the ongoing consolidation of global banks, and persistent weak domestic economic conditions.

This paper analyses the evolution of profitability in the banking sector in Hong Kong. Section II discusses recent developments in the operating environment of the banking sector and how banks have responded to these changes. Section III considers how some of these changes have affected banking sector profitability and presents an empirical study of the determinants. Section IV examines the contribution of bank-specific and macroeconomic factors to variations in profitability across banks and over time. Prospects for bank profitability over the medium-term are discussed, based on different macroeconomic assumptions. Section V concludes.

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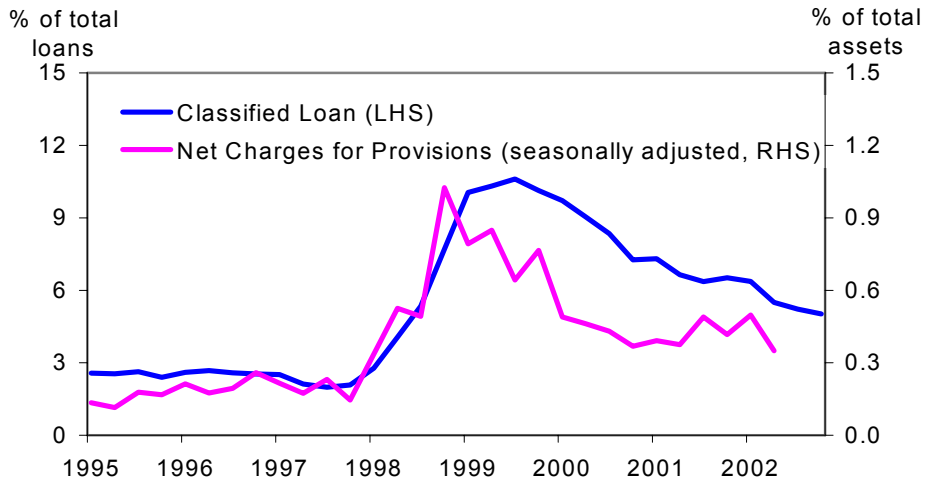
[1] Euro-yen Impact Loans are made to borrowers in Japan by a domestic branch of a Japanese bank, but booked offshore in its Hong Kong office to avoid domestic regulations and to achieve lower funding costs. Regulatory reforms and problems in the Japanese domestic banking system have resulted in a sharp decline in these loans from 1997 (HKMA, 2000).

II. RECENT DEVELOPMENTS IN THE BANKING SECTOR

The banking sector in Hong Kong has experienced significant changes in its operating environment in recent years. Both external and domestic factors have affected its performance and structure.

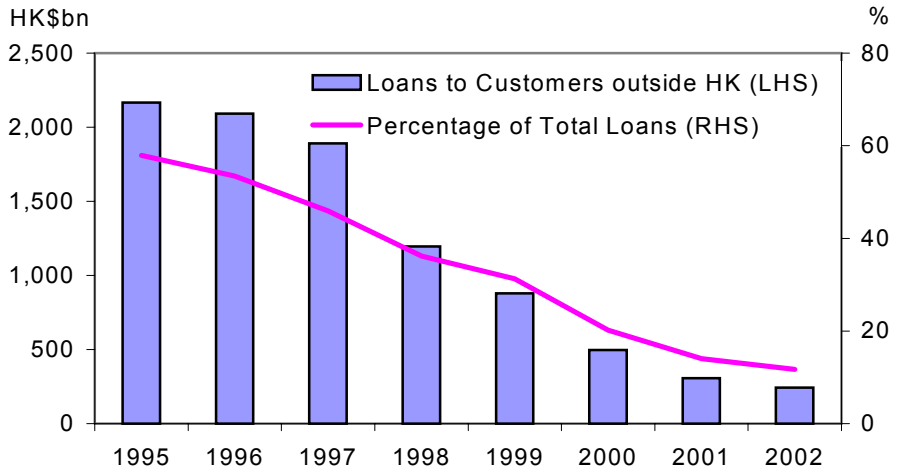
Notable external developments include the effects of the Asian Financial Crisis in 1997, declining global interest rates and an ongoing process of consolidation by the big international banks. The Asian Financial Crisis was characterised by large capital outflows over a short period of time from the region, sharp depreciation in the exchange rates of several regional economies, widespread corporate bankruptcies owing to currency and maturity mismatches, and a number of banking sector crises. In Hong Kong, the number of non-performing loans by the banking sector rose substantially, and reduced regional financing flows resulted in a sharp drop in credits extended to outside customers and Asian syndicated lending arranged by banks in Hong Kong (Chart 1 and 2).

Chart 1. Non-performing Loan Ratios for Retail Banks, 1995-2002

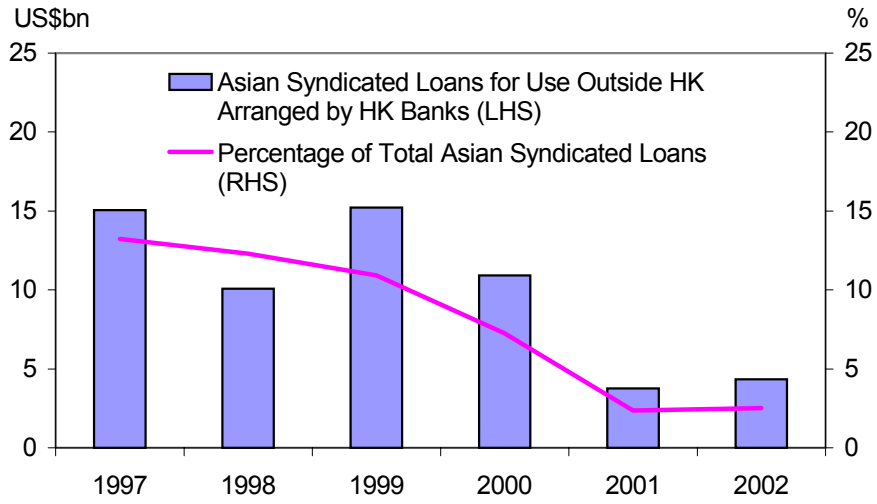


Source: HKMA.
Note: Retail banks include all the locally incorporated banks plus the local offices of a number of large foreign banks.

Chart 2. Loans to Customers Outside Hong Kong and Asian Syndicated Loans Arranged by Hong Kong Banks, 1995-2002



Source: HKMA.



Source: Thomson Financial.

Perhaps of more lasting significance, however, are the effects on profitability arising from the shift to low global inflation during the 1990s and the associated decline in interest rates. This presents new challenges to banking sector profitability, although the effects are not clear-cut.

The conventional view is that cuts in short-term interest rates should lead to higher banking sector profitability by increasing the spread between saving and borrowing rates. Banks are typically involved in transforming short-term liabilities, such as deposits, into long-term loans. As a result, their liabilities tend to be short-term relative to their assets. Thus, changes in interest rates at the short end of the yield curve which are not matched by changes at the long end – or a steepening of the yield curve – tend to lead to higher profit margins. This will especially benefit those banks with relatively more assets further down the maturity spectrum than its liabilities.

However, at very low levels of interest rates, the effect on bank profitability of further cuts in short-term interest rates becomes ambiguous as banks' lending spreads come under pressure.[2] When deposit rates are close to zero, a reduction in interest rates that feeds through to lower lending rates is unlikely to be matched by a similar reduction in deposit rates. The consequent reduction in banks' intermediation margins will tend to reduce profitability.

In addition, the shift to low inflation and interest rates could affect banks' profitability through its effect on real interest rates and loan quality. In general, lower interest rates reduce the financing costs of businesses, thereby improving asset quality and raising banks' profits through lower loan loss provisions. However, if inflation falls faster than nominal interest rates, as has been the case in Hong Kong, the rise in real interest rates and associated higher real debt burden on borrowers may actually lower asset quality, thereby reducing banks' profitability through higher loan loss provisions.[3]

Empirical evidence on the relationship between interest rates and profitability is not conclusive. Declining interest rates could leave banks' intermediation spread intact, as changes in the US interest rates are found to pass through to lending and deposit rates equally in Hong Kong (Peng, et al, 2003). Cross-country studies have found either a positive relationship between interest rates and profitability (Demirguc-Kunt and Huizinga, 2000) or a mixed relationship (English, 2002).

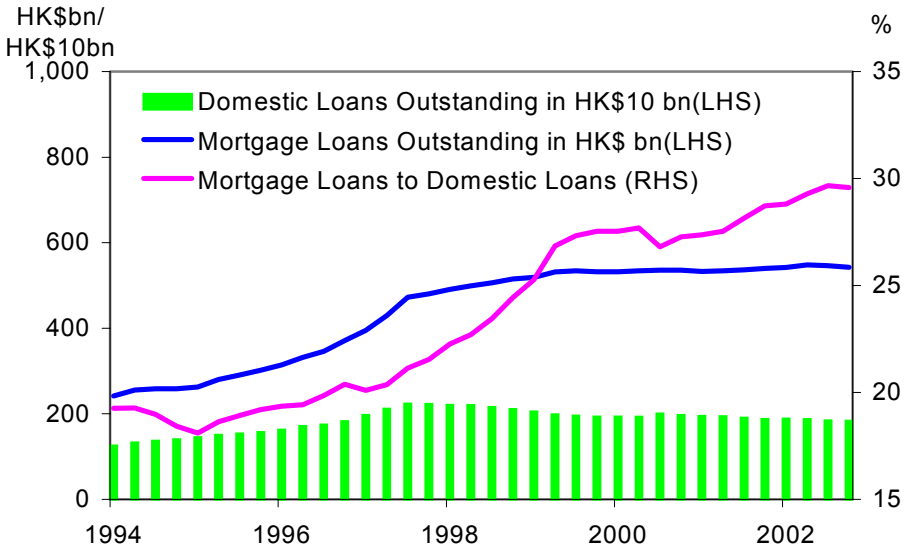
[2] A 10 basis point spread for bank lending at 1 percent interest rate is 10 percent of the financing cost, but would be only 5 percent if bank lends at 2 percent interest rate.

[3] Dooley argued that inflation forecasts tended to over-predict inflation when it was falling. As a result, nominal financial contracts tend to favour savers and increase the real debt burden of borrowers in an environment with falling interest rates (Dooley, 1999).

Separately, the consolidation of global banks has reduced the number of international banks operating in Hong Kong. While mergers and acquisitions are targeted at reducing costs, through economies of scales and risk diversification, and raising revenues, international evidence suggests that only relatively small banks are able to become more efficient by increasing their size (Group of Ten, 2001). Consolidation affects market concentration and the degree of competition in the banking sector, which could affect its profitability[4]

In addition to external factors, a number of domestic developments have affected banks' profitability in recent years. In particular, the collapse of the property market, a sustained period of weak domestic demand conditions and deflation, have created a difficult trading environment for domestic banks. The demand for mortgage loans has fallen sharply, as has the loan-to-deposit ratio. The balance sheets of corporations and households were weakened by falling property prices, with an increasing number of homeowners becoming negative equity holders. Together with weak domestic demand and higher real interest rates, this has depressed loan demand more generally (Charts 3-5).

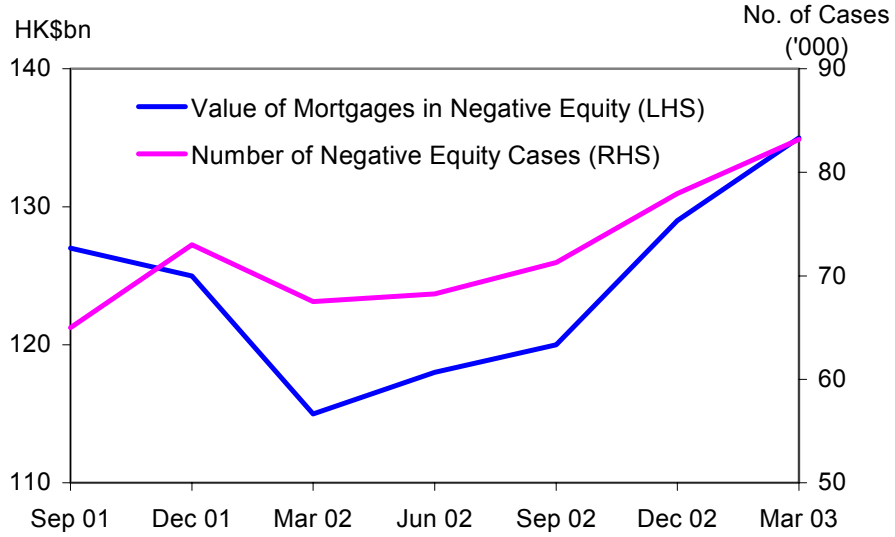
Chart 3. Mortgage Loans Outstanding and its Share in Total Domestic Loans



Source: HKMA.

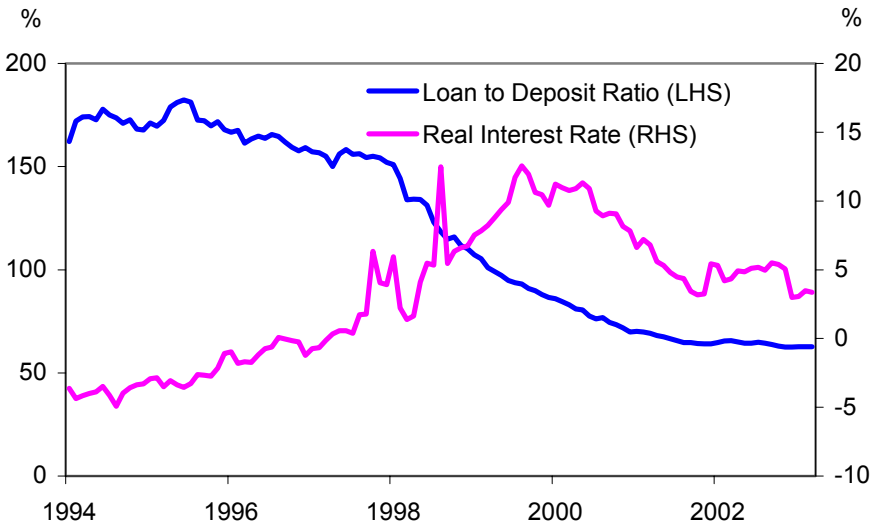
[4] A decline in the number of banks resulting from consolidation does *not* necessarily lead to an increase in market concentration, as measured by the Herfindahl-Hirschman index, which is defined as the sum of the squared deposit market shares of all the banks in the market. Furthermore, the market may *not* become less competitive (Gelos and Roldos, 2002).

Chart 4. Number of Negative Equity Holders and Value of Mortgages in Negative Equity



Source: HKMA.

Chart 5. Real Interest Rates and Loan-to-Deposit Ratio, 1994-2003



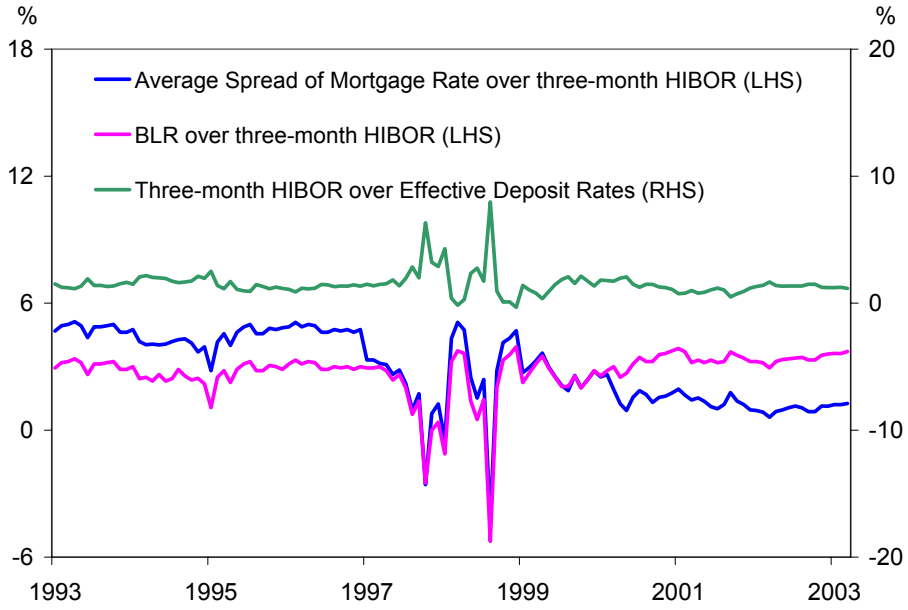
Sources: HKMA and CEIC.

In addition to weaker economic conditions, a number of regulatory changes implemented by the HKMA since 1998 are also expected to affect banks' profitability in the medium term. These regulatory changes could increase the competition in the local banking sector and reduce banks' ability to set their own lending and deposit margins (Box 1).[5] Although the lending margin, measured by the best lending rates (BLR) over the three-month HIBOR, has increased slightly, from around 3 percent in 1996 to over 3½ percent in 2003, the margin for mortgage loans has declined substantially, from 300 basis

[5] The separate analysis of lending and deposit margins follows the Klein-Monti model of banking competition. It assumes that banks have some market power in setting prices in both the credit and deposit markets, but cannot influence the inter-bank money market or long-term debt market. It further assumes that costs are separable by activity and no cross subsidisation (ECB, 2000).

points (bps) above three-month HIBOR prior to the crisis to less than 100 bps in early 2003.[6] Since mortgage lending constitutes about 30 percent of total bank loans, the overall lending margin for banks is likely to have declined during this period. The deposit margin, measured by the spread between three-month HIBOR and effective deposit rates, has been relatively stable, except during the crisis period. It is possible that the effect on deposit spreads from excess liquidity in the local banking system has been offset by increased competition for funds as a result of the deregulation of the Interest Rate Rules (Chart 6).

Chart 6. Lending and Deposit Margins



Sources: HKMA and CEIC.

Banks have responded to the changing environment by improving asset-liability management, expanding consumer finance, and increasing their business fee income. With ample liquidity in the banking system but limited credit expansion opportunities, banks have increased their holdings of bonds to 19 percent of total assets in 2002 from 6 percent in 1997.[7] While loans to customers remain their core business, their share has declined from about 47 percent in 1997 to 41 percent in 2002. Compared to the stylised bank balance sheet of G10 countries, Hong Kong banks have held more assets in securities and inter-bank lending. There is still plenty of scope for Hong Kong banks to expand their use of debt securities as an alternative source of funding to customer deposits (Table 1 and 2).

[6] Mortgages in Hong Kong are predominantly floating rate loans priced against the BLR. The mortgage rate has declined from 125 bps over the BLR prior to the crisis to 250 bps below in February 2003.

[7] Bonds here include floating rate notes, government bills, notes and bonds, and other debt instruments.

Table 1. Balance Sheet of Hong Kong Banks

Assets	(In percent)			Liabilities	(In percent)		
	1997	2000	2002		1997	2000	2002
Cash and Cash Equivalents	**0.4**	**0.4**	**0.3**	**Inter-bank Borrowing**	**18.4**	**11.7**	**8.2**
Inter-bank Lending	**36.3**	**39.4**	**28.3**	**Customer Deposits**	**65.5**	**74.8**	**76.5**
Securities	**9.6**	**15.7**	**23.2**	**Debt Securities**	**4.8**	**3.4**	**3.9**
Negotiable Certificates of Deposits	1.8	2.1	2.3	**Negotiable Certificates of Deposits**	4.6	3.2	3.9
Acceptance and Bills of Exchange	1.2	0.5	0.7	**Other Debt Instruments**	0.2	0.1	0.02
Commercial Papers	0.8	2.0	0.8	**Capital, Reserves and Other Liabilities**	**11.3**	**10.1**	**11.5**
Floating Rate Notes	0.9	2.0	5.1				
Government Bills, Notes and Bonds	4.0	4.9	5.8				
Other Debt Instruments	0.9	4.1	8.5				
Loans and Advances to Customers	**47.4**	**39.3**	**40.9**				
Inside Hong Kong	45.3	38.2	40.0				
Outside Hong Kong	2.1	1.1	0.9				
Other Assets	**6.4**	**5.2**	**7.2**				
Total Assets	**100**	**100**	**100**	**Total Liabilities**	**100**	**100**	**100**

Source: HKMA.
Note: Hong Kong banks refer to retail banks.

Table 2. Stylised Bank Balance Sheet

Assets	(In percent)	Liabilities	(In percent)
Cash and Cash Equivalents	**0.8**	**Inter-bank Borrowing**	**10.1**
Inter-bank Lending	**12.4**	**Customer Deposits**	**60.4**
Securities	**8.5**	**Debt Securities**	**10.9**
Loans and Advances to Customers	**68.2**	**Capital, Reserves and Other Liabilities**	**18.6**
Tangilble and Intangible Fixed Assets	**1.9**		
Other Assets	**8.2**		
Total Assets	**100**	**Total Liabilities**	**100**

Source: BIS, 2001.
Note: The stylised bank balance sheet is prepared by the Joint Forum banking working group, with supervisory representatives from countries including Belgium, France, Germany, Italy, Japan, Switzerland, the United Kingdom and the United States.

To enhance their income growth, banks have diversified their businesses by expanding consumer finance and fee-generating services. They have increasingly shifted to higher risk and return products, such as credit cards and other types of personal finance. In addition, banks have sought to expand their role as financial service providers—earning fee income from wealth management and selling securities, unit trusts, insurance, pensions, and private banking (Carse, 2001) (Table 3). However, banks in Hong Kong still rely more heavily on interest income than their US counterparts and there is room for further expanding the non-interest income share of profits (Stiroh, 2002).[8]

[8] However, Stiroh (2002) also finds that, while diversification may increase banks' profitability, it may not enhance the stability of profits. This reflects a higher correlation between the growth rates of net interest income and non-interest income, particularly service charges and fees, as banks have become more successful at cross-selling products and the fact that some elements of non-interest income, in particular trading income, are more volatile than net interest income.

Table 3. Income Structure of Hong Kong Banks

(In percent)

	1992	1997	2001
Interest Income	**81.6**	**88.0**	**84.7**
Non-interest Income	**18.4**	**12.0**	**15.3**
Gross Income	**100**	**100**	**100**

Source: HKMA.
Notes: Hong Kong banks refer to retail banks.
Gross income is interest income plus non-interest income. Non-interest income includes gains less losses from foreign exchange operations and trading in derivatives, income from investments, income from fees and commissions, and profit/loss on sale of fixed assets and other.

III. DETERMINANTS OF BANK PROFITABILITY

1. Profitability indicators

A key indicator of banks' profitability is the return on assets (ROA), defined as the before-tax profits (BTP) divided by total assets (TA). It can be decomposed into four constituent parts by an accounting identity:

$$profitability = ROA = \frac{BTP}{TA} = \frac{NI}{TA} + \frac{NII}{TA} - \frac{OV}{TA} - \frac{LLP}{TA}$$

where *NI* is net interest income, *NII* is non-interest income, *OV* is non-interest overhead expenses, and *LLP* is loan loss provisioning.

The net interest margin ($\frac{NI}{TA}$) creates a wedge between returns to savers and investors and reflects the cost of bank intermediation services and the efficiency of the banking sector. In general, the higher is the net interest margin, the higher are banks' profit margins and the more stable is the banking sector. However a higher net interest margin could reflect riskier lending practices associated with substantial loan loss provisions, and could be an indication of inefficiency in the banking sector.

The Hong Kong banking sector experienced a considerable decline in profitability following the Asian Financial Crisis in 1997 but quickly recovered. In the wake of the crisis, the post-tax ROA of all authorized institutions (AIs) declined from 0.60 percent in 1997 to 0.28 percent in 1998, although this was moderate compared with other crisis-hit economies in Asia (Table 4). The decline of profitability was largely attributable to a substantial increase in non-performing loans. Since 2000, banks' asset quality has

improved steadily as lower interest rates have improved the ability of households to service their debt, limiting the number of mortgage defaults and rescheduled loans as economic growth has slowed. However, loan loss provisions are still running at a higher level than before the crisis mainly because of a high delinquency ratio in consumer finance, especially credit card loans, which have been a recent source of lending growth.

Table 4. Profitability Indicators of the Hong Kong Banking Sector, 1997-2002
(In percent)

	1997	1998	1999	2000	2001	2002
Hong Kong *(All AIs)*						
Return on Assets (Post-Tax)	0.60	0.28	0.39	0.77	0.76	0.81
Net Interest Margin	1.08	1.13	1.34	1.43	1.45	1.52
Cost-income Ratio[1]	45.9	48.3	44.2	45.5	48.0	47.3
Bad Debt Charge to Total Assets	0.13	0.45	0.64	0.26	0.23	0.24
Return on Assets (Post-Tax)						
Asia[2]	-0.1	-4.4	-2.0	0.0	0.4	1.0
Japan	0.0	-0.6	-0.5	0.2	0.0	-0.4
United States	1.3	1.1	1.3	1.2	1.1	1.4
Canada	0.7	0.5	0.7	0.7	0.6	0.5

Sources: HKMA, 2002 and IMF, 2003.
Notes: [1] Cost-income ratio is defined as operating expenses as a percentage of total operating income.
[2] Asia includes India, Indonesia, Korea, Malaysia, Pakistan, Philippines and Thailand.

The recovery in banking sector profitability has been helped by an increase in net interest margins. This primarily reflects an improvement in asset-liability management of the banking sector and, in particular, the investment of excess liquidity in higher-yielding securities. By contrast, the operating efficiency of banks, as measured by the cost-income ratio, has weakened in recent years. This largely reflects the one-off costs of restructuring arising from business integration and bank network reshuffling, and greater investment in information technology. Going forward, these same factors should help to improve operational efficiency.[9]

[9] Note that earlier studies found that Hong Kong banks were efficient by international and regional standards. Studies found that the efficiency of Hong Kong banks was comparable to that in the US, with cost inefficiency averaging about 16 to 30 percent of total costs. Furthermore, the unit cost of production in Hong Kong banks was similar to Singapore, but lower than those in South Korea, Indonesia, Thailand, Malaysia and Philippines. The level of inefficiency in Hong Kong declined over time during 1992-99. Larger banks were found to be more efficient, after controlling bank characteristics (Kwan, 2002).

2. An empirical study of the determinants of banking sector profitability

This section attempts to quantify factors affecting the profitability of banks in Hong Kong. Data from 14 individual banks' annual income and balance sheet statements are collected from Primark, a publicly available commercial database.[10] Panel regression techniques are used to analyse the data, which allow for the study of the impact of macroeconomic developments on profitability after controlling for individual bank characteristics (Demirguc-Kunt and Huizinga, 2000; Karasulu, 2001).

The regression analysis takes the following form:

$$y_{it} = C_{it} + \sum_{j} \alpha_j B_{ijt} + \sum_{k} \beta_k X_{kt} + \varepsilon_{it}$$

The dependent variable y_{it} is the ROA, defined as operating profit before tax over total assets for bank *i* at time *t*. The average ROA across our sample of 14 banks rose significantly in the period of 1992 to 1996, before the Asian Financial Crisis, and its standard deviation declined, indicating that profit growth was both strong and broadly based across the sector. Following the crisis, profitability declined during 1998-99, and the performance across banks varied widely. Profitability then recovered during 2000-02, though it remained below its historical average (Table 5).

The independent variables include the intercept C_{it}, the *j-th* bank-specific characteristic of bank *i* at time *t* B_{ijt}, the *k-th* macroeconomic variable X_{kt} that all banks take as given, and the error term ε_{it}. For fixed effects models, different intercepts are estimated for each bank, i.e., $C_{it} = C_i$. This allows for differences between banks to be reflected in the intercepts, in addition to those captured by the bank-specific variables in the model. In random effects models, the intercepts are treated as random variables across banks with a mean value of *C* and the error term μ_i, i.e., $C_{it} = C + \mu_i$, $E\mu_i = 0$, and $E(\mu_i \varepsilon_{it}) = 0$.

The bank-specific variables that are considered in the regression are:

[10] The 14 banks in the sample are Bank of East Asia, Bank of China (Hong Kong), CITIC Ka Wah Bank, Dah Sing Bank, Dao Heng Bank, Hang Seng Bank, Hongkong Chinese Bank, HSBC, Industrial and Commercial Bank of China (Asia Limited), International Bank of Asia, Liu Chong Hing Bank, Standard Chartered Bank, Wing Hang Bank, and Wing Lung Bank. Their operations in Hong Kong accounted for about 45 percent of total assets and 48 percent of total loans of the banking sector at end-2000. As some of the banks are international conglomerates, the available data cover their global consolidated operations that go beyond Hong Kong. As a result, caution is needed in interpreting the empirical results. Nonetheless, an internal study based on data covering retail bank group yields similar results.

- **The equity capital/total assets ratio** measures the impact of financial leverage. A higher equity ratio is expected to result in a higher ROA.

- **The loans/total assets and deposits/total assets ratios** capture the effect of changes in portfolio shifts on profitability. Loans are the largest segment of interest bearing assets and deposits are the main source of funding.

- **The provisions/total loans ratio** measures asset quality. Provisions declined sharply during 1992-1996, and the improvement in asset quality was broad-based. However, the Asian Financial Crisis led to a major deterioration in the creditworthiness of borrowers, and provision increased sharply in 1998, before gradually declining in recent years.

- **The non-interest expenses/total assets ratio** captures the operational efficiency of banks. The large increase in this ratio in 1998 partly reflected a sharp decline in asset size after the Asian Financial Crisis, while rationalisation of branch networks and the number of employees took time. Increased spending on bank restructuring and investment in information technology have kept costs high but these same factors should eventually contribute to an improvement in operational efficiency.

- **The non-interest income/gross income ratio** picks up the importance of fee and commission based services, as well as proprietary trading for banks. Before the Asian Financial Crisis, banks tended to focus on commercial lending that generated rising interest income during periods when the demand for loans was strong and lending was profitable. However, the fall in property prices since 1997, coupled with sluggish loan demand and depressed lending margins, have caused banks to shift their focus towards non-interest income. Reflecting this, the share of non-interest income in gross income has doubled in the past five years.

Table 5. Descriptive Statistics of Selected Banks and Macroeconomic Variables

Bank Specific Variables	Operating Profit Before Tax/Total Assets				Provisions/Total Loans			
	Mean	Sd	Max	Min	Mean	Sd	Max	Min
1992	1.4	1.0	2.5	0.6	3.9	4.4	8.7	0.0
1993	1.9	0.5	2.7	1.2	2.5	2.5	9.6	0.7
1994	1.9	0.4	2.8	1.5	1.6	1.1	4.3	0.7
1995	2.0	0.4	2.6	1.5	1.5	0.8	3.6	0.6
1996	2.0	0.3	2.5	1.6	1.4	0.8	3.7	0.6
1997	1.9	0.4	2.7	1.3	1.5	0.8	4.0	0.7
1998	0.7	1.1	1.9	-2.3	2.6	1.2	6.0	1.4
1999	0.8	1.2	2.2	-2.9	3.7	1.8	8.4	1.8
2000	1.4	0.5	2.3	0.7	3.3	2.8	12.2	1.7
2001	1.1	0.8	2.4	-0.9	2.6	1.2	5.3	1.6
2002	1.2	0.5	2.4	0.7	2.1	0.9	4.7	1.3

Bank Specific Variables	Non-interest Expenses/Total Assets				Non-interest Income/Gross Income			
	Mean	Sd	Max	Min	Mean	Sd	Max	Min
1992	2.5	1.5	4.0	1.1	18.0	6.9	23.5	10.2
1993	1.9	0.9	4.2	0.8	16.6	5.2	27.6	11.3
1994	1.7	0.7	3.5	0.9	15.2	6.5	25.0	1.9
1995	1.7	0.6	3.1	1.0	12.2	5.0	22.9	6.4
1996	1.7	0.6	2.9	0.9	12.9	5.3	23.6	8.4
1997	1.8	0.7	3.1	1.1	13.1	5.4	24.4	7.7
1998	2.6	1.0	5.2	1.6	10.3	4.9	22.6	5.8
1999	2.5	1.0	5.0	1.2	11.4	5.7	26.7	6.3
2000	1.9	0.6	3.0	0.8	12.5	5.3	24.8	6.9
2001	2.1	0.9	3.7	0.9	17.0	6.0	26.7	7.4
2002	1.9	0.8	3.0	0.8	22.4	5.7	32.1	13.4

Macroeconomic Variables	Real GDP Growth Rate	CPI Inflation	Real Interest Rate
1992	6.7	9.6	-5.8
1993	6.3	8.8	-5.4
1994	5.5	8.8	-3.9
1995	3.9	9.0	-2.8
1996	4.3	6.3	-0.8
1997	5.1	5.8	1.6
1998	-5.0	2.9	5.6
1999	3.4	-4.0	9.9
2000	10.2	-3.7	10.0
2001	0.5	-1.6	5.2
2002	2.3	-3.0	4.9
Mean	***3.9***	***3.5***	***1.7***
Sd	***3.9***	***5.6***	***5.8***

Sources: Primark and HKMA staff calculations.
Note: Sd refers to one standard deviation.

- **The taxes/operating profit before tax ratio** reflects the ability of banks to allocate its portfolio to minimise its taxes, passing the tax burden on to their customers to maintain the level of post-tax ROA when taxes increase.

- **The value of loans and deposits (in logarithms)** measures bank size. Larger banks can potentially achieve higher profitability through economies of scale, though such gains are not guaranteed and the empirical evidence on the relationship between bank size and efficiency is mixed (Group of Ten, 2001 and Kwan, 2002).

- **Ownership origin** is divided into three categories—foreign, local and Mainland-owned banks.[11] Local and Mainland-owned banks are represented by two dummy variables separately.

The macroeconomic variables include real GDP growth, real interest rates (measured by three-month HIBOR minus the CPI inflation rate) and CPI inflation. **Asian syndicated loans** arranged by Hong Kong banks for use outside Hong Kong are used as a proxy for regional financial flows intermediated through the Hong Kong banking system. The **Herfindahl-Hirschman (HH) index** measures market concentration and competitive pressure in the banking sector. High market concentration is expected to improve profitability through price setting powers and monopolistic profits.

Table 6 presents our regression results. The fixed and random effects models generate broadly similar results. Among the bank-specific variables, provisions for losses, non-interest expenditure share, and non-interest income share are statistically significant at the one-percent level. This implies that after controlling for the differences in credit quality of bank lending portfolios (with higher provisions reducing profits), a more efficiently operated and diversified bank (with lower non-interest expenditure and higher non-interest income ratios) achieves higher profits. The macroeconomic variables are all significant—higher real GDP growth, inflation and real interest rates are all found to be positively related to profitability.

The tax rate variable has a positive effect on the ROA (but is significant in the random effects models only), suggesting that banks successfully manage to pass through increases in corporate income tax to their customers to maintain the level of post-tax ROA. The size variable, represented by loans or deposits, has a negative relationship with profitability (but is only significant in the fixed effects models), suggesting that, on average, larger banks achieve a lower ROA than smaller ones, after controlling for other bank-specific

[11] Foreign banks include HSBC and Standard Chartered Bank. Local banks are Bank of East Asia, Dao Heng Bank, Dah Sing Bank, Hongkong Chinese Bank, Hang Seng Bank, International Bank of Asia, Liu Chong Hing Bank, Wing Hang Bank, and Wing Lung Bank. The Mainland-owned banks are Bank of China (Hong Kong), CITIC Ka Wah Bank and Industrial and Commercial Bank of China (Asia Limited).

and macroeconomic factors. This is evident that the inter-bank market is competitive and efficient since banks with a large retail deposit-taking network do not gain a cost advantage against other banks after taking into account the expenses associated with attracting deposits. Nonetheless, larger banks may benefit from their network by cross-selling non-interest income-generating products, thereby improving their profitability.

With regard to ownership, the results suggest that local and Mainland-owned banks achieved a lower ROA, on average, than foreign banks in this specific sample period, though local banks appeared to be more efficient than Mainland-owned banks. These findings should be interpreted with caution, like all statistical results. In particular, past performance is not necessarily indicative of future returns. Furthermore, the dummy variables used to capture ownership prevent the use of fixed effects panel regression techniques. This could distort the estimates.

The equity capital ratio and the share of loans and deposits in total assets are not significantly related to bank profitability. The latter implies that gaining market share would be unlikely to increase ROA. The proxy for regional financing and index of local market concentration are also not significant, suggesting that banks' profitability is mainly driven by local conditions, and the modest decline in market concentration in recent years may not be sufficient to induce changes in the competitive pressure.

Table 6. Determinants of Bank Profitability

Dependent Variable: Operating Profit Before Tax/Total Assets

Sample Period: 1992 – 2002

	Regression Results			
	(1)		(2)	
Independent Variables	**Fixed Effects**	**Random Effects**	**Fixed Effects**	**Random Effects**
Constant	--	1.246	--	1.664 **
	--	(0.803)	--	(0.244)
Bank Characteristics				
Equity Capital/Total Assets	0.001	-0.002	--	--
	(0.013)	(0.012)	--	--
Loans/Total Assets	-0.007	0.004	--	--
	(0.009)	(0.006)	--	--
Customer Deposits/Total Assets	0.013	0.003	--	--
	(0.009)	(0.007)	--	--
Provisions/Total Loans	-0.047 *	-0.090 *	-0.068 **	-0.090 **
	(0.027)	(0.023)	(0.024)	(0.023)
Non-interest Expenses/Total Assets	-0.752 *	-0.671 *	-0.757 **	-0.655 **
	(0.081)	(0.069)	(0.075)	(0.062)
Non-interest Income/Gross Income	0.035 *	0.035 *	0.034 **	0.034 **
	(0.011)	(0.010)	(0.010)	(0.009)
Taxes/Operating Profit Before Tax	0.009	0.013 *	--	0.013 **
	(0.006)	(0.005)	--	(0.005)
Loans (in log)	--	--	--	--
	--	--	--	--
Customer Deposits (in log)	--	--	--	--
	--	--	--	--
Mainland-owned Bank Dummy	--	--	--	--
	--	--	--	--
Local Bank Dummy	--	--	--	--
	--	--	--	--
Macroeconomic Indicators				
Real GDP Growth Rate	0.030 *	0.038 *	0.037 **	0.042 **
	(0.010)	(0.010)	(0.009)	(0.008)
CPI Inflation	0.127 *	0.085 *	0.118 **	0.109 **
	(0.042)	(0.034)	(0.024)	(0.023)
Real Interest Rate	0.065 *	0.051	0.080 **	0.073 **
	(0.034)	(0.033)	(0.023)	(0.023)
Asian Syndicated Loans Arranged By	0.003	0.002	--	--
HK Banks For Use Outside HK	(0.002)	(0.002)	--	--
Herfindahl-Hirschman Index	-43.536	--	--	--
	(36.121)	--	--	--
Adjusted R-squared	0.837	0.844	0.836	0.848
DW Statistics	1.924	1.972	1.926	1.996
Number of Observations	134	134	134	134
Number of Banks	14	14	14	14

(Continued on next page)

Table 6. Determinants of Bank Profitability (continued)

Dependent Variable: Operating Profit Before Tax/Total Assets

Sample Period: 1992 – 2002

	Regression Results				
	(3)		(4)		(5)
Independent Variables	**Fixed Effects**	**Random Effects**	**Fixed Effects**	**Random Effects**	**Common Intercept**
Constant	--	1.254 *	--	1.270 *	2.641 **
	--	(0.705)	--	(0.766)	(0.360)
Bank Characteristics					
Equity Capital/Total Assets	--	--	--	--	--
	--	--	--	--	--
Loans/Total Assets	--	--	--	--	--
	--	--	--	--	--
Customer Deposits/Total Assets	--	--	--	--	--
	--	--	--	--	--
Provisions/Total Loans	-0.073 **	-0.087 **	-0.079 **	-0.087 **	-0.090 **
	(0.024)	(0.023)	(0.025)	(0.023)	(0.026)
Non-interest Expenses/Total Assets	-0.791 **	-0.670 **	-0.788 **	-0.668 **	-0.650 **
	(0.076)	(0.065)	(0.076)	(0.065)	(0.058)
Non-interest Income/Gross Income	0.037 **	0.037 **	0.035 **	0.037 **	0.018 *
	(0.010)	(0.009)	(0.010)	(0.009)	(0.009)
Taxes/Operating Profit Before Tax	--	--	--	--	--
	--	--	--	--	--
Loans (in log)	-0.291 *	0.034	--	--	--
	(0.150)	(0.048)	--	--	--
Customer Deposits (in log)	--	--	-0.331 *	0.030	--
	--	--	(0.172)	(0.050)	--
Mainland-owned Bank Dummy	--	--	--	--	-0.797 **
	--	--	--	--	(0.180)
Local Bank Dummy	--	--	--	--	-0.410 **
	--	--	--	--	(0.146)
Macroeconomic Indicators					
Real GDP Growth Rate	0.031 **	0.042 **	0.032 **	0.042 **	0.040 **
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
CPI Inflation	0.121 **	0.122 **	0.110 **	0.124 **	0.082 **
	(0.024)	(0.024)	(0.024)	(0.023)	(0.025)
Real Interest Rate	0.099 **	0.081 **	0.092 **	0.083 **	0.044 *
	(0.025)	(0.024)	(0.024)	(0.023)	(0.025)
Asian Syndicated Loans Arranged By	--	--	--	--	--
HK Banks For Use Outside HK	--	--	--	--	--
Herfindahl-Hirschman Index	--	--	--	--	--
	--	--	--	--	--
Adjusted R-squared	0.840	0.845	0.840	0.845	0.763
DW Statistics	1.925	1.967	1.913	1.971	1.239
Number of Observations	134	134	134	134	134
Number of Banks	14	14	14	14	14

Sources: Primark and HKMA staff calculations.
Notes: Numbers in bracket are standard errors.
* Significant at the 10 percent level.
** Significant at the 1 percent level.

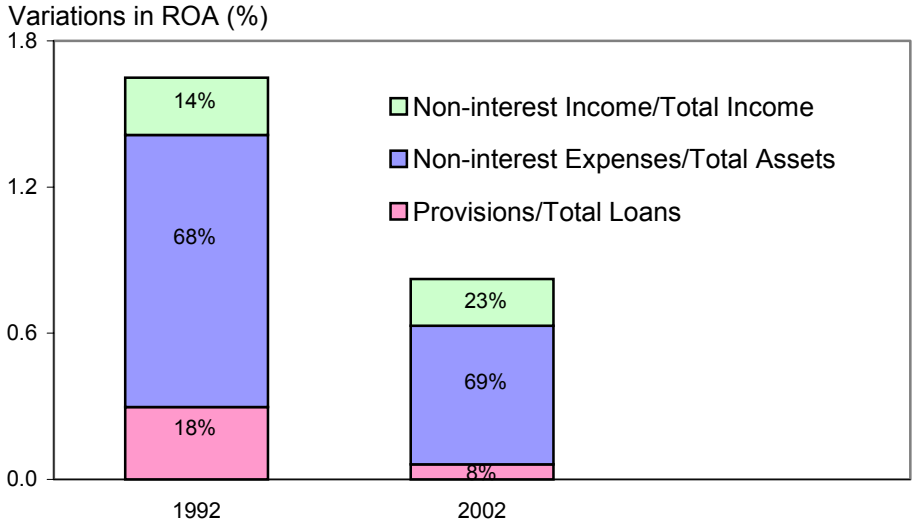
IV. Implications

Based on the estimated coefficients in Table 6 (under model 2, fixed effects), we attribute changes in profitability across banks and over time to its bank-specific and macroeconomic determinants (Charts 7-8).[12]

Over our sample period, differences in profitability between banks appear to have diminished, and the importance of bank-specific factors in determining profitability has changed. In 1992, a bank with loan loss provision and non-interest expenditure ratios one standard deviation below the mean, and a non-interest income ratio one standard deviation above the mean, would have achieved an ROA of 1.6 percentage point (or 110 percent) higher than the average bank (Chart 7). In 2002, the same bank would get an ROA of 0.8 percentage point (or 60 percent) higher than an average bank in that year. The decline in the differential suggests that banks' performance has become more homogeneous over time. In addition, the relative importance of bank-specific factors in determining profitability has changed over time. The operational efficiency measured by non-interest expenditure ratio remains the most important factor in determining performance, accounting for over 2/3 of the difference in profitability between banks. Nonetheless, the effect of credit quality has declined, possibly reflecting a general improvement in credit risk management and more effective supervision. At the same time, income diversification has become more important. These changes imply that, while controlling operating expenditure remains the most important task for bank management, banks increasingly have to compete by expanding into non-interest income generating business to become more profitable. Results are similar if differences among banks are measured by the maximum and minimum observed values instead of the standard deviations from the mean.

[12] Despite efforts to model bank-specific characteristics by using data from individual banks, important factors such as ownership structure may be omitted. By using the fixed effect models, part of the idiosyncrasy could be captured by the different intercepts for each bank.

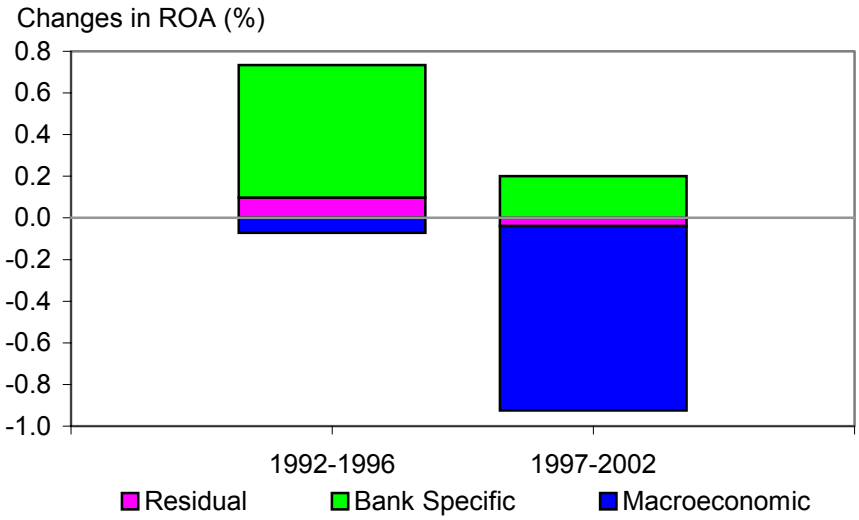
Chart 7. Factors Contributing to the Variance in Profitability Across Banks



Sources: Primark and HKMA staff calculations.
Note: Based on one standard deviation from the mean of variables.

The macroeconomic environment has played a central role in affecting bank profitability in recent years. Between 1992 and 1996, the average ROA rose by 0.7 percentage points. Changes in an average bank's characteristics accounted for 96 percent of the improvement, driven by more efficient operations, as reflected in a sharp drop in the ratio of non-interest expenditure to total assets and an improvement in asset quality (Chart 8). Macroeconomic influences played a much smaller role in determining banks' profitability over this earlier period. The negative effect on profitability from lower inflation was offset by higher real interest rates, while the slowdown in real GDP exerted a small negative effect on profitability. By contrast, macroeconomic factors seem to explain much of the decline in the average ROA of 0.7 percentage points between 1997 and 2002. Deflation made the largest contribution to declining profitability. This was only partly offset by banks' efforts to respond to the adverse operating environment by diversifying into non-interest income business.

Chart 8. Factors Contributing to Changes in Profitability Over Time



Sources: Primark and HKMA staff calculations.

Looking forward, bank profitability should improve as the economy recovers. Table 7 presents three scenarios for future banks' profitability, a high, medium and low outturn, based on different assumptions about macroeconomic variables and using 2002 as the base year (Chart 9).

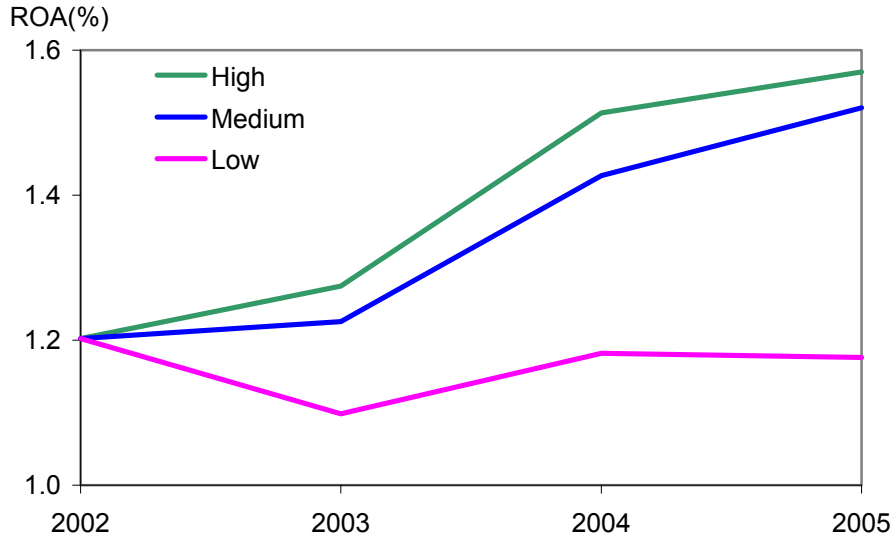
Table 7. Assumptions on Macroeconomic Variables under Different Scenarios

	Scenarios								
	Real GDP Growth Rate			CPI Inflation			Interest Rates[4]		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
High[1]	3.0	3.0	3.0	-1.5	1.0	1.0	1.7	3.5	4.2
Medium[2]	2.2	3.1	3.4	-2.0	-1.4	-0.7	1.7	3.5	4.2
Low[3]	1.5	1.5	1.5	-3.0	-3.0	-3.0	1.7	3.5	4.2

Notes:
1 Based on the assumptions in the March 2003 Budget.
2 Based on the May IMF staff projections.
3 Provisions for loan losses are assumed to increase by one standard deviation from 2002 each year, as persistent deflation raises real interest rates to high levels.
4 Six-month US dollar LIBOR from IMF, April 2003 WEO.

Under both the medium and high growth scenarios, average bank profitability should recover by 2005, to a level equal to the average ROA achieved over the last ten years. Only under the low growth scenario would profitability be stagnant at the 2002 level in the medium term.

Chart 9. Prospects for Bank Profitability



Sources: Primark and HKMA staff calculations.

V. CONCLUSIONS

A profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system. This study attempts to quantify factors affecting the profitability of banks in Hong Kong. In terms of bank-specific factors, operational efficiency is the most important factor in explaining differences in profitability across the banks in our sample, implying that cost control remains a key task for bank management. In recent years, the pressures on banks' profitability from their more traditional lending business have intensified, causing them to diversify into non-interest income generating business to remain competitive.

In addition to bank-specific factors, macroeconomic developments have an important effect on banks' profitability post-Asian Financial Crisis. The deterioration in profitability in recent years is mainly attributable to changes in the macroeconomic environment in Hong Kong, and, in particular, the persistent deflation in general prices. Looking forward, bank profitability should improve with the macroeconomic environment.

Box 1. Banking Sector Reforms in Hong Kong

Following the 1998 HKMA banking sector consultancy study and public consultation, the HKMA has implemented a series of reform measures. The major objective is to enhance efficiency and competition in the banking sector, through eliminating regulatory barriers, improving the regulatory and supervisory framework, and increasing the level of transparency.

To enhance market competition, major policy initiatives undertaken included granting restricted licence banks access to the Real Time Gross Settlement (RTGS) system, deregulation of the remaining Interest Rate Rules (IRRs), relaxation of the one branch policy for foreign banks, and relaxing the market entry criteria. While these regulations were devised to promote banking sector stability in the past, they became inappropriate and inconsistent in the current market conditions. In view of the increased involvement in securities transactions by restricted licence banks, the HKMA has granted them access to the RTGS system since 1999 on the same ground as licensed banks to enhance settlement efficiency. As part of the effort to promote competitive market forces, the remaining IRRs—interest rate ceilings on time deposits of less than seven days, and all current and savings account IRRs—were deregulated in two phases and completed in July 2001. To provide a level playing field for local and foreign participants, the restriction on branching capabilities—one-building restriction—was partially relaxed to three-building condition in 1999, followed by a complete removal of any limitation on the number of branch and office for foreign banks in 2001. In view of the ongoing consolidation in the banking sector and the strengthened banking supervisory system, the market entry criteria have been relaxed since 2002. These included reducing the asset size criterion for foreign banks as well as reducing the requisite period of operation as a restricted licence bank and deposit-taking company, with the aim of attracting a broader range of domestic and international institutions to conduct banking business in Hong Kong.

To strengthen the safety and soundness of the banking system, several reform measures were implemented, including clarifying HKMA's role as the lender of last resort (LOLR), adopting a more formalised risk-based supervisory approach, and improving the financial disclosure requirements for banks. The HKMA clarified its role as the LOLR through the issuance of a policy statement in 1999, which specified the resources available for the HKMA to take on this role, compatibility of LOLR with the currency board system, preconditions for LOLR support and eligible instruments for LOLR purposes. To address the increased complexity and level of risk in the banking environment,

the HKMA has implemented a formal risk-based supervisory regime to develop institution-specific supervisory strategies. In addition, the HKMA has raised the financial disclosure standards by banks as part of the continued effort to improve market discipline.

Efforts are also being made to establish an explicit deposit insurance scheme and a commercial credit reference agency. While depositor protection exists in the form of the priority payment scheme in the event of a bank failure—depositors are entitled to receive priority for their deposits up to a certain amount under the Companies Ordinance, explicit deposit insurance scheme is not available. The establishment of a deposit insurance scheme (DIS) can help enhance depositor protection, and bring Hong Kong in line with international practices. Good progress was made on finalising the implementation of the DIS. To provide banks with better customer information and improve access to loans by small and medium enterprises, a working group comprising representatives from the banking, corporate and government sectors has been formed to set up a commercial credit reference agency (CCRA) in Hong Kong. The CCRA is in the final stage of preparation.

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