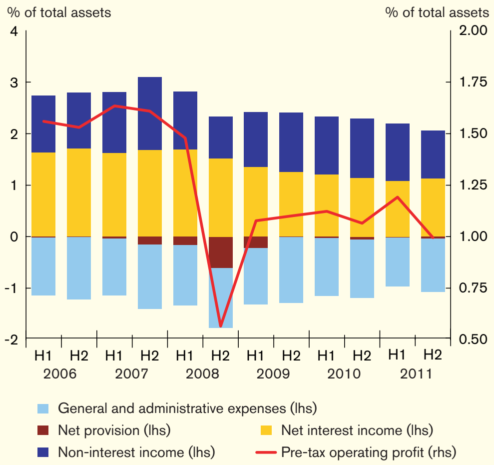
5. Banking sector performance

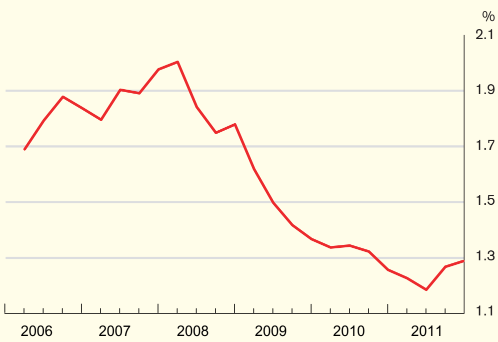
The banking sector remained robust in the second half, despite the continuing European sovereign debt crisis. Liquidity tightened somewhat during the review period. Although lately it appears to have eased slightly, given continued external uncertainties and the already high loan-to-deposit ratios, domestic liquidity conditions need to be closely monitored. Looking ahead, the domestic banking environment will likely continue to be affected by the European debt problem. Continued vigilance is warranted regarding possible spill-over effects of the debt crisis on the global banking system and the risk of a sudden outflow of funds.

Chart 5.1
Profitability of retail banks



Note: Semi-annually annualised figures.
Source: HKMA.

Chart 5.2
Net interest margin of retail banks



Note: Quarterly annualised figures.
Source: HKMA.

5.1 Profitability and capitalisation

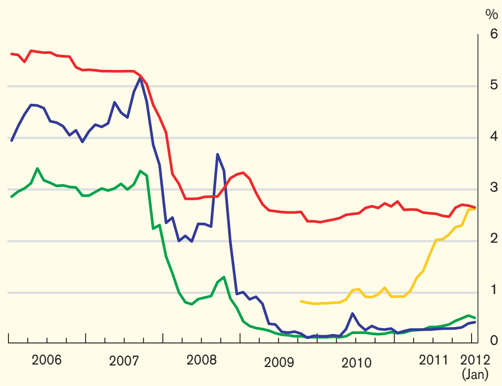
Profitability

Despite the weak global environment, retail banks[29] sustained a steady level of revenues in the second half, decreasing by only 0.5% from the first half (Chart 5.1). However, their aggregate pre-tax profits fell by 13.7%. While net interest income increased significantly by 9.3%, the gain was offset by lower non-interest income and higher operating costs. As a result, the return on assets edged down to 1% in the second half, from 1.2% in the first half.

The net interest margin (NIM) of banks improved further in the second half to average 1.28% (Chart 5.2), from 1.21% in H1, partly reflecting banks' move to raise their HIBOR-based mortgage interest rates. It is noteworthy that some banks have recently moved to reverse their previous raising of mortgage interest rates due to intense competition. How this may affect the NIM is yet to be seen.

[29] Throughout this chapter, figures for the banking sector relate to Hong Kong offices only, except where otherwise stated.

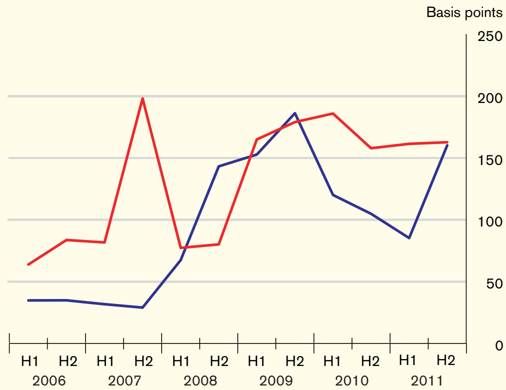
Chart 5.3
Interest rates



Notes:
(a) End of period figures.
(b) Period-average figures for approved loans.

Sources: HKMA and HKMA staff estimates.

Chart 5.4
Average pricing of syndicated loans



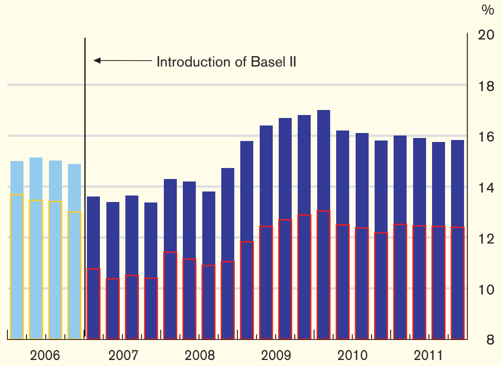
Note: The average pricing of syndicated loans is weighted by the loan amounts and it refers to the spread over the reference rate.

Source: HKMA staff estimates based on data from Bloomberg.

The average mortgage rate for HIBOR-based mortgages picked up significantly in the second half to almost match the rate for BLR-based mortgages (Chart 5.3). The share of BLR-based mortgages in newly approved mortgage loans increased to 59.7% in the second half and 93.6% in January 2012, compared with 9.9% in H1.

The composite interest rate, which reflects the average cost of funds of banks, increased since the second half by 18 basis points to 0.49% at the end of January 2012. The average pricing of syndicated loans also rose (Chart 5.4), with prices for Hong Kong dollar loans rising to 160 basis points above the reference rate in the second half, from 85 basis points in H1. These trends suggest that domestic liquidity tightened somewhat during the review period.

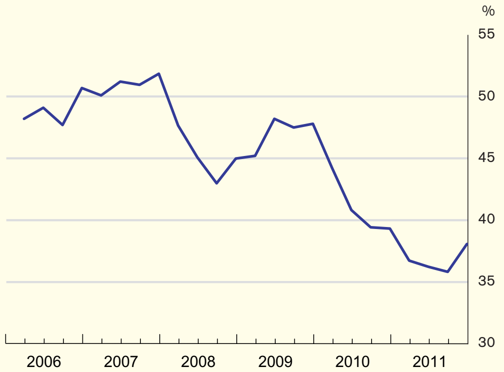
Chart 5.5
Capitalisation of locally incorporated AIs



Notes:
1. Consolidated positions.
2. With effect from 1 January 2007, a revised capital adequacy framework (Basel II) was introduced for locally incorporated AIs. The capital adequacy ratios from March 2007 onwards are therefore not directly comparable with those up to December 2006.

Source: HKMA.

Chart 5.6
Liquidity ratio of retail banks



Note: Quarterly average figures.

Source: HKMA.

Capitalisation

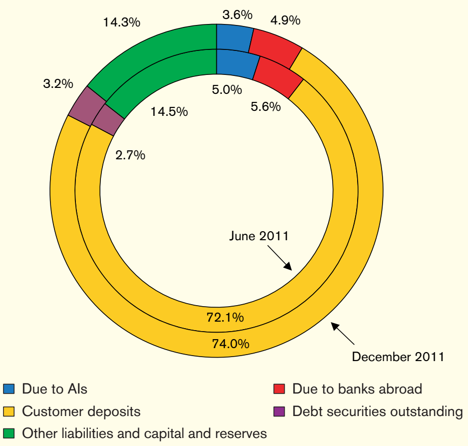
Capitalisation of the banking sector remained well above minimum international standards. The consolidated capital adequacy ratio of locally incorporated AIs was steady at 15.8% at the end of December, down marginally from 15.9% at the end of June 2011 (Chart 5.5), and the tier-one capital adequacy ratio (the ratio of tier-one capital to total risk-weighted assets) decreased slightly to 12.4%, from 12.5%.

The HKMA has started consulting the banking industry on the implementation of the new Basel III framework in Hong Kong. Given that banks in Hong Kong are well capitalised, traditionally placing significant reliance on common equity to meet their regulatory capital requirements, and that most of the Basel III regulatory adjustments are already required to be deducted from banks' capital base under Hong Kong's existing capital rules, Hong Kong banks should have little difficulty in meeting the higher capital requirements.

5.2 Liquidity and funding

Liquidity conditions of the banking system remained sound, with the average liquidity ratio rising slightly, having declined continuously since 2010 Q1. For retail banks, the ratio edged up to 38% in 2011 Q4, from 36.2% in 2011 Q2 (Chart 5.6), remaining well above the regulatory minimum of 25%.

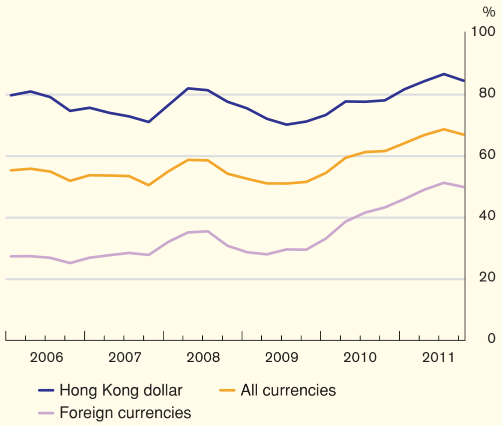
Chart 5.7
Liabilities structure of retail banks



Notes:
1. Figures refer to the percentage of total liabilities (including capital and reserves).
2. Debt securities comprise negotiable certificates of deposit and all other negotiable debt instruments.

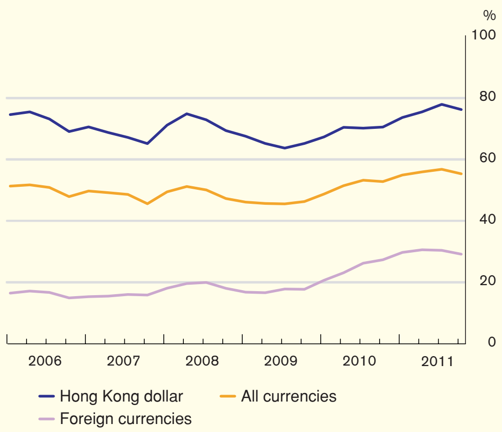
Source: HKMA.

Chart 5.8
Loan-to-deposit ratios of all AIs



Source: HKMA.

Chart 5.9
Loan-to-deposit ratios of retail banks



Source: HKMA.

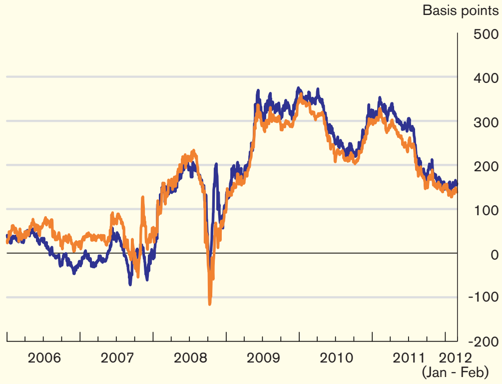
Customer deposits continued to be the primary funding source for retail banks. At the end of December, the share of customer deposits to banks' total liabilities rose to 74% from 72.1% at the end of June (Chart 5.7). As banks moved to offer higher interest rates to attract longer-term deposits in the second half, the share of time deposits to total customer deposits rose further from 41.2% at the end of June to 43.3% at the end of December. However, it remained significantly lower than the corresponding share of over 50% in 2008 and in years prior to that. This suggests the average maturity of deposits in retail banks may be relatively lower than in previous periods and hence their liquidity could be potentially affected more by the impact of capital outflows.

The Hong Kong dollar loan-to-deposit ratio stayed relatively high at 84.5% at the end of December, compared with 84.2% at the end of June (Chart 5.8). And the all currency loan-to-deposit ratio stood at 66.9% at the end of December, compared with 66.6% at the end of June. For retail banks, the Hong Kong dollar and all currency loan-to-deposit ratios also stayed at relatively high levels of 76.2% and 55.3% respectively at the end of December (Chart 5.9). Since early 2011, domestic liquidity conditions have shifted from a previously abundant level to a somewhat tighter level. Although lately local liquidity appears to have eased slightly, domestic liquidity conditions need to be closely monitored, given continued uncertainties in the external environment and the already high loan-to-deposit ratios.

Foreign currency position

The banking sector's capability to repay liabilities denominated in foreign currencies can be assessed by reference to the aggregate net open position of AIs for all foreign currencies. This position amounted to HK$24 billion at the end of December 2011, which was equivalent to 0.2% of total assets of AIs, suggesting that the overall exposure of AIs to foreign exchange risks may not be of significant concern.

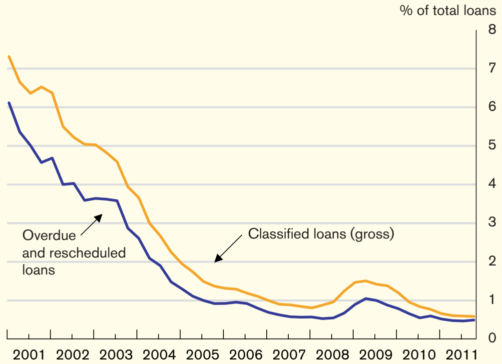
Chart 5.10
Term spreads of Hong Kong and US dollars



Note: Term spreads are defined as 10-year swap rates minus three-month money market rates of the respective currencies.

Source: HKMA staff estimates based on data from Bloomberg.

Chart 5.11
Asset quality of retail banks



Notes:
1. Classified loans are those loans graded as "sub-standard", "doubtful", or "loss".
2. Figures related to retail banks' Hong Kong office(s) and overseas branches.

Source: HKMA.

Table 5.A
Expectation of domestic loan demand in the next three months

(% of total respondents)	Mar 2011	Jun 2011	Sep 2011	Dec 2011
Considerably higher	0	0	0	0
Somewhat higher	62	38	14	19
Same	33	52	62	67
Somewhat lower	0	5	19	10
Considerably lower	5	5	5	5

Source: HKMA.

5.3 *Interest rate risk*

High spreads between the long- and short-term interest rates for the US dollar and Hong Kong dollar (Charts 5.10) are potential sources of interest rate risk to the banking system, since banks may be tempted to take higher interest rate risk by borrowing short-term funds to purchase long-term interest-bearing assets. A low interest rate environment makes these search-for-yield activities more appealing, potentially resulting in greater maturity mismatches and increased interest rate risk.

Although the spreads decreased somewhat during the review period, they remained well above the levels prevailing prior to the global financial crisis. Banks should be vigilant in monitoring and managing the potential mark-to-market loss for their financial investments, which could arise from changes in the yield spreads.

5.4 *Credit risk*

The asset quality of retail banks' loan portfolios remained steady, with the classified loan ratio falling to 0.59% at the end of December from 0.61% at the end of June 2011 and the ratio of overdue and rescheduled loans edging up to 0.49% from 0.48% (Chart 5.11).

The pace of credit growth moderated further in 2011 Q4 to 1% from a 4.4% increase in the previous quarter. Of the total, property-related lending[30] grew by 0.2%, following a 2.2% increase, and its share to total domestic lending remained high at over 47%. The slowdown in credit expansion partly reflected efforts by the HKMA urging banks to exercise restraint in their lending to ensure they have sufficient stable funding to support their loan growth.

Credit may continue to grow at a slow pace, according to the results of the HKMA Opinion Survey on Credit Condition Outlook in December. The results suggest that a majority of surveyed AIs expect domestic loan demand to remain the same in the next three months (Table 5.A).

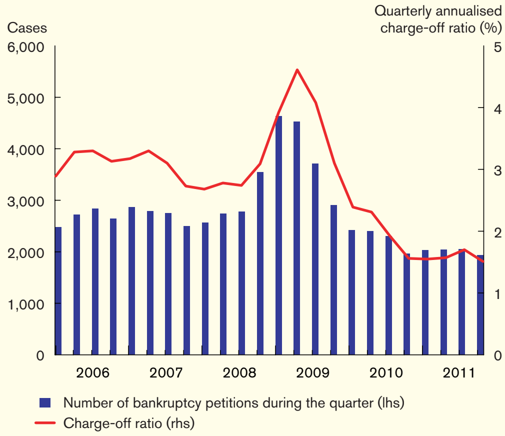
[30] Property lending includes mortgage loans and credit for building, construction, property development and investment.

Table 5.B
Half-yearly growth of loans to households of all AIs

(%)	2009		2010		2011	
	H1	H2	H1	H2	H1	H2
Mortgages	1.7	5.6	5.1	8.6	5.5	1.2
Credit cards	-9.6	5.7	-0.9	17.9	-1.4	15.9
Other loans for private purposes	-8.1	8.9	7.9	6.6	9.4	3.8
Total loans to households	-0.8	6.1	5.1	8.9	5.6	2.7

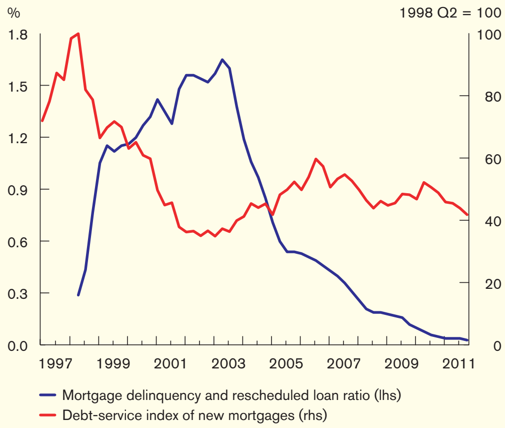
Source: HKMA.

Chart 5.12
Charge-off ratio for credit card lending and bankruptcy petitions



Sources: Official Receiver's Office and HKMA.

Chart 5.13
Delinquency ratio of banks' mortgage portfolios and household debt-service burden of new mortgages



Note: The calculation of the index is based on the average interest rate for BLR-based mortgages.

Sources: HKMA and HKMA staff estimates.

Household exposure

The growth of household loans[31] slowed further to 2.7% in the second half, from 5.6% in H1. The moderation in growth was primarily attributable to the slowdown in mortgage lending, resulting partly from the move by banks to raise mortgage lending rates and partly from the prudential measures introduced by the HKMA to tighten underwriting standards.[32] Other types of household lending registered a mixed performance. Credit card lending increased by 15.9% in the second half, after a 1.4% decline in H1, while the growth of other loans for private purposes slowed to 3.8% after a 9.4% growth (Table 5.B). In line with the recent slowdown in household loans, the level of household debt leverage, as measured by the ratio of household loans to GDP, edged down to 59.7% at the end of December, from 60.4% at the end of June.

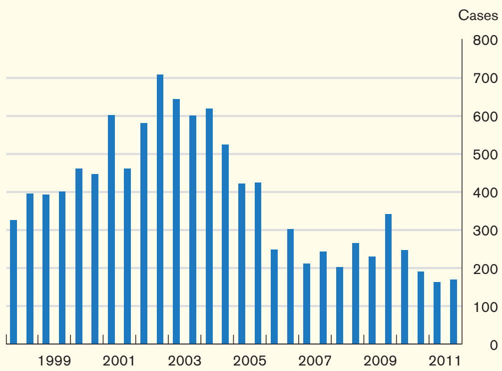
The credit risk of unsecured household loans continued to be well-contained, with the quarterly annualised charge-off ratio for credit card lending improving to 1.51% in 2011 Q4, from 1.57% in Q2 (Chart 5.12). The number of bankruptcy petitions decreased by 2.3% in the second half, having reduced by 4.3% in H1.

Various other indicators also suggest a moderate improvement in the credit risk of household loans. The delinquency and rescheduled loan ratio of banks' mortgage portfolios fell further to a record low of 0.03% at the end of December (Chart 5.13), and the debt-service index of new mortgages declined to 42 in 2011 Q4 from 46 in Q2. The improvement in the debt-service index mainly reflected a reduction in the size of the average mortgage loan. However, with the average contractual life of new mortgage loans at a high level of 284 months,

[31] Loans to households constitute lending to professional and private individuals, excluding those for business purposes. Mortgage lending accounts for a major proportion of household loans, while the remainder comprises mainly unsecured lending through credit card lending and other personal loans for private purposes. At the end of December, the share of household lending in domestic lending was 30.4%.

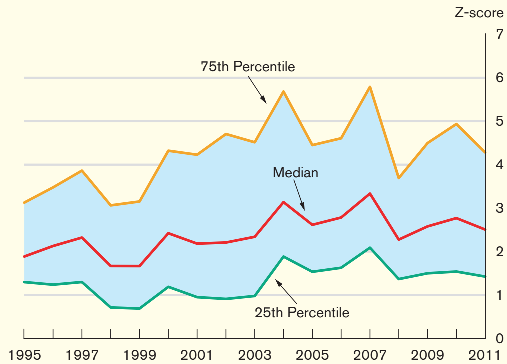
[32] The HKMA introduced additional prudential measures for property mortgage loans on 10 June 2011 requiring banks to further tighten underwriting standards for mortgage lending, subsequent to earlier measures implemented on 19 November 2010, 13 August 2010 and 23 October 2009. For details, see relevant press releases and circulars, which are available on the HKMA website.

Chart 5.14
Number of winding-up orders of companies



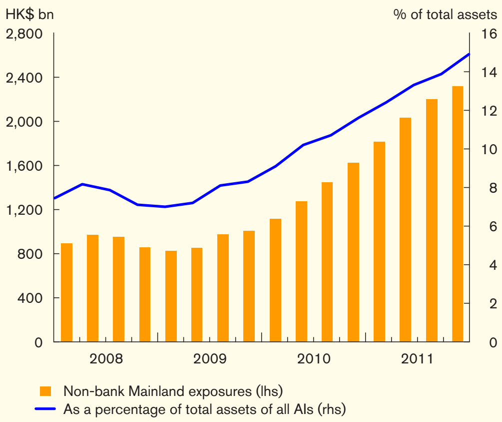
Source: Official Receiver's Office.

Chart 5.15
Altman's Z-score: A bankruptcy risk indicator of listed non-financial companies



Note: A lower Z-score indicates a higher likelihood of default.
Source: HKMA staff estimates based on data from Bloomberg.

Chart 5.16
Non-bank Mainland exposures of all AIs



Note: Figures include exposures booked in AIs' banking subsidiaries in Mainland China.
Source: HKMA.

the monthly repayments of these long tenor mortgage loans have become increasingly sensitive to a rise in interest rates. Mortgage rates have been on a moderate upward trend recently, and how this may impact on the debt-service burden of households should be closely watched.

Corporate exposure[33]

The growth of domestic loans to corporations[34] moderated in the second half to only 1.6%, after a 14.6% increase in H1. At the end of December, corporate loans accounted for 69.3% of domestic lending.

A number of indicators suggest a slight deterioration in the credit risk for banks' corporate lending. The number of compulsory winding-up orders of companies increased slightly to 170 in the second half, representing a 4.3% increase over the preceding six-month period (Chart 5.14). The Altman's Z-score[35], a credit risk measure based on accounting data, edged down slightly, indicating a mild deterioration in the financial health of the non-financial corporate sector (Chart 5.15).

Mainland exposure

The banking sector increased its credit exposure to Mainland-related business during the review period. The total non-bank Mainland exposure of all AIs rose to HK$2,318 billion (14.9 % of total assets) at the end of December, from HK$2,030 billion (13.3% of total assets) at the end of June (Chart 5.16). Of this, retail banks' non-bank Mainland exposure[36] increased to HK$1,573 billion (15.8% of total assets) from HK$1,427 billion (14.5% of total assets).

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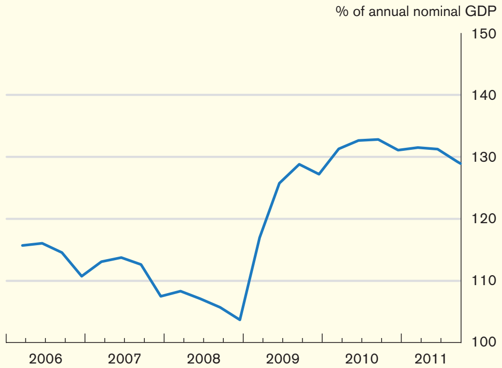
33 Excluding interbank exposures.

34 Loans to corporations comprise domestic lending except lending to professional and private individuals.

35 Altman's Z-score is a credit risk measure based on accounting data. It is a typical credit risk measure to assess the health of the corporate sector based on an array of financial ratios reported in companies' financial statements. The accounting ratios used to derive the Z-score are working capital/total assets, retained earnings/total assets, earnings before interest and taxes/total assets, market value of equity/book value of total liabilities, and sales/total assets.

36 Including exposures booked in retail banks' banking subsidiaries in Mainland China.

Chart 5.17
Credit-to-GDP ratio in Mainland China



Note: Credit-to-GDP ratio is defined as the ratio of claims on private sector to the sum of quarterly nominal GDP for the latest four quarters.

Sources: IMF International Financial Statistics and CEIC.

Chart 5.18
Distance-to-default index for the Mainland corporate sector

Note: Distance-to-default index is defined as the simple average of the distance-to-default values of non-financial constituent companies (i.e. excluding investment companies and those engaged in banking, insurance and finance) of the Shanghai Stock Exchange 180 A-share index.

Source: HKMA staff estimates.

The performance of Hong Kong banks will continue to be influenced by macroeconomic developments in Mainland China. While the credit-to-GDP ratio on the Mainland improved slightly to 127% at the end of December 2011, from 131% at the end of June, it remained significantly higher than the more normal level prevailing before the surge in credit expansion at the end of 2008 (Chart 5.17). Although market-based indicators continued to suggest stable credit risk in respect of the corporate sector on the Mainland, with the aggregate distance-to-default index[37] staying at a significantly more favourable level than prior to the global financial crisis (Chart 5.18), banks should remain vigilant about credit risk management.

Impact of the European sovereign debt crisis

While the support measures[38] introduced by policy makers have significantly reduced the risk of a major liquidity crisis in the near term, the deep-rooted structural problems remain unsolved. The ECB has identified several potential factors that may trigger further contagion risk. In particular, any political uncertainties in vulnerable countries, combined with fiscal consolidation lagging behind EU recommendations and programme plans, have been regarded as the most important factor.[39]

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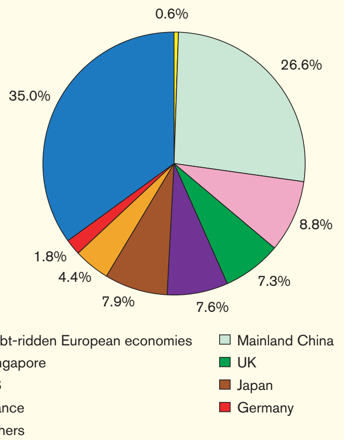
37 The distance-to-default is a market-based default risk indicator based on the framework by R. Merton (1974), "On the pricing of corporate debt: the risk structure of interest rates", *Journal of Finance*, Vol. 29, pages 449 - 470, in which equity prices, equity volatility, and companies' financial liabilities are the determinants of default risk. In essence, it measures the difference between the asset value of a firm and a default threshold in terms of the firm's asset volatility.

38 For details, please refer to Section 2.2 of the Report.

39 Other factors include: (1) negative news on euro area banks' profitability and solvency; (2) any further deterioration of the credit ratings of euro area sovereigns and banks, or from the activation of higher margin calls or collateral requirements; (3) the potential for any lingering uncertainties about details relating to private sector involvement in Greek sovereign bonds; and (4) implementation risk for the new fiscal compact and the effective size of the European Financial Stability Facility. For details, see *Financial Stability Review*, published by the ECB on December 2011.

Chart 5.19
External claims of the Hong Kong banking sector on major economies (all sectors) at the end of December 2011



Source: HKMA.

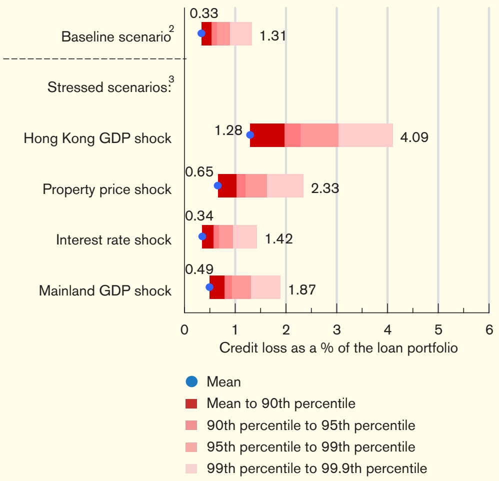
Given that the exposure of the Hong Kong banking sector to banks in the UK, France and Germany is not immaterial (Chart 5.19), and these banks in turn have significant exposures to the debt-ridden European economies, the possible contagion risk and its implications for banks in Hong Kong merit close attention.

The UK Independent Commission on Banking recently proposed a ring-fencing reform to improve stability of the UK banking system.[40] The proposal, if adopted, would lead to higher credit risk in respect of interbank lending from Hong Kong to the UK, as the UK Government will cease providing guarantees. The reform would reinforce the existing pattern that interbank lending from Hong Kong plays a minor role in funding UK banks in normal times, but a much stronger role in times of stress. Given the large presence of UK-incorporated banks in Hong Kong, if the proposal is adopted, vigilance would be required for any sharp increase in interbank lending from Hong Kong to the UK due to heightened uncertainties in Europe.

Box 4 shows that if a euro zone crisis-led recession occurred in Hong Kong, it would inevitably lead to higher credit losses for local banks. In addition, the de-leveraging pressures for European banks would affect the availability of local credit. While results of the stress tests show that the loan loss severity, even in extreme cases, would remain much lower than the actual loss registered after the Asian financial crisis, and the impact on liquidity would be significantly less severe than what occurred during the global financial crisis of 2008-09, continued vigilance is required about possible spill-over effects of the debt crisis on the global banking system and the risk of a sudden outflow of funds.

[40] For details, see *Final Report* published by the UK Independent Commission on Banking on 12 September 2011.

Chart 5.20
The mean and value-at-risk statistics of simulated credit loss distributions[1]



Notes:
1. The assessments assume the economic conditions in 2011 Q4 as the current environment. The Monte Carlo simulation method is adopted to generate the credit loss distribution for each scenario.
2. Baseline scenario: no shock throughout the two-year period.
3. Stressed scenarios:
   Hong Kong GDP shock: reductions in Hong Kong's real GDP by 2.3%, 2.8%, 1.6%, and 1.5% respectively in each of the four consecutive quarters starting from 2012 Q1 to 2012 Q4.
   Property price shock: Reductions in Hong Kong's real property prices by 4.4%, 14.5%, 10.8%, and 16.9% respectively in each of the four consecutive quarters starting from 2012 Q1 to 2012 Q4.
   Interest rate shock: A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. 2012 Q1), followed by no change in the second and third quarters and another rise of 300 basis points in the fourth quarter (i.e. 2012 Q4).
   Mainland GDP shock: Slowdown in the year-on-year annual real GDP growth rate to 4% in one year.

Source: HKMA staff estimates.

Macro stress testing of credit risk [41 & 42]

Results of the latest macro stress testing on retail banks' credit exposure suggest that the Hong Kong banking sector remains resilient and should be able to withstand rather severe macroeconomic shocks, similar to those during the Asian financial crisis.

Chart 5.20 presents the simulated future credit loss rate of retail banks in 2013 Q4 under four specific macroeconomic shocks[43] using information up to 2011 Q4.

The expected credit losses for retail banks' aggregate loan portfolios two years after the different hypothetical macroeconomic shocks are estimated to be moderate, ranging from 0.34% (interest rate shock) to 1.28% (Hong Kong GDP shock).

Taking account of tail risk, banks' maximum credit losses (at the confidence level of 99.9%) under the stress scenarios range from 1.42% (interest rate shock) to 4.09% (Hong Kong GDP shock), which are significant, but smaller than the loan loss of 4.39% following the Asian financial crisis.[44]

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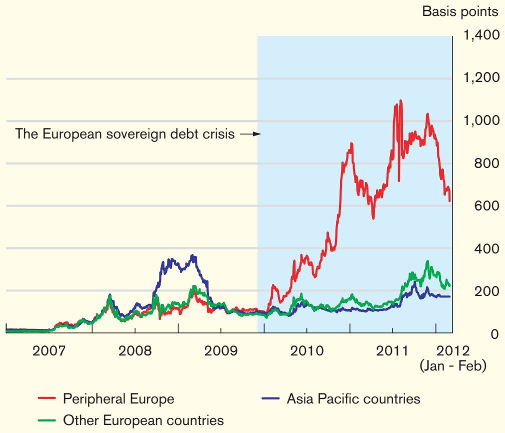
41 Macro stress testing refers to a range of techniques used to assess the vulnerability of a financial system to "exceptional but plausible" macroeconomic shocks. Details of the model adopted in this exercise can be found in J. Wong et al. (2006), "A framework for stress testing banks' credit risk", *Journal of Risk Model Validation*, Vol. 2(1), pages 3 - 23. An updated framework is used for the current estimations.

42 All estimates of credit loss for the overall loan portfolio of Hong Kong banks presented in this Report are based on a revised stress testing framework. They are not strictly comparable to those estimates from the past framework that appeared in previous Reports prior to the September 2011 issue due mainly to different definitions of credit losses in these two frameworks. Specifically, credit losses in two years after any shock under the revised framework are measured by the estimated specific provision ratio at the end of the second year plus 50% of the estimated specific provision ratio at the end of the first year after the shock, while credit loss estimates from the past framework are derived based on an estimated delinquency ratio at the end of the second year multiplied by a loss-given-default estimate, which is determined by the simulated property price change over the two-year horizon.

43 These shocks are calibrated to be similar to those that occurred during the Asian financial crisis, except the Mainland China GDP shock.

44 The credit loss to banks two years after the Asian financial crisis was estimated to be about 4.39%.

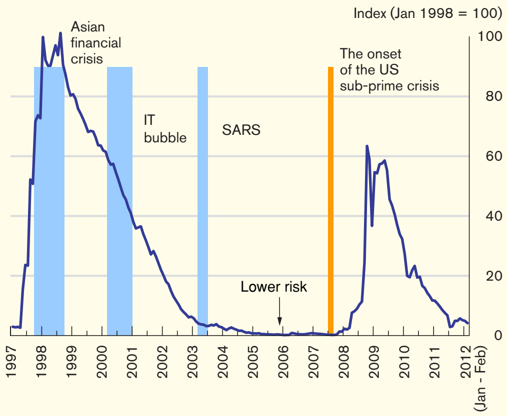
Chart 5.21
Credit default swap spreads of banks in Europe and Asia



Notes:
1. Median of 5-year CDS spreads of the respective groups
2. Peripheral Europe includes Greece, Ireland, Italy, Portugal and Spain.

Source: Bloomberg.

Chart 5.22
The banking distress index



Source: HKMA staff estimates based on data from Bloomberg.

5.5 Systemic risk to the banking system

While the CDS spreads for European banks remained large, as the European sovereign debt crisis dragged on, the corresponding spreads for Asian banks stayed relatively small (Chart 5.21), suggesting the systemic risk to the banking sectors in Asia, so far, has not been severely affected.

In Hong Kong, the banking distress index, a market-based systemic risk indicator for the local banking sector, increased slightly to 4.1 in February from 3.1 in August 2011 (Chart 5.22). However, the risk of contagion in the banking system remained low and the probability of an occurrence of multiple bank defaults is small. This optimistic market view was broadly consistent with the latest assessment result of the composite early warning system.[45] The estimated banking distress probability remained within the range of the low fragility category, indicating the banking sector remained stable and resilient.[46]

The domestic banking environment will continue to be affected by the European debt problem. Continued vigilance is warranted regarding possible spill-over effects of the debt crisis on the global banking system and the risk of a sudden outflow of funds.

Key performance indicators of the banking sector are provided in Table 5.C.

[45] The composite early warning system is capable of estimating banking distress probability based on 10 leading indicators. These include macroeconomic fundamentals, currency crisis vulnerability, default risk of banks and non-financial companies, asset price misalignments, credit growth, and the occurrence of banking distress in other Asia-Pacific economies. For details, see J. Wong et al. (2010), "Predicting banking distress in the EMEAP economies", *Journal of Financial Stability*, Vol. 6(3), pages 169 - 179.

[46] The composite early warning system is a four-level risk rating system. A. Demirgüc-Kunt and E. Detragiache (2000), "Monitoring Banking Sector Fragility: A Multivariate Logit Approach", *World Bank Economic Review*, Vol. 14(2), pages 287 - 307, has been followed in the selection of the upper bounds of each of the four fragility classes so that type I error associated with the bounds are 10%, 30%, 50% and 100% respectively.

Table 5.C
Key performance indicators of the banking sector[1] (%)

	Dec 2010	Sep 2011	Dec 2011
Interest rate			
1-month HIBOR[2] (quarterly average)	0.22	0.21	0.24
3-month HIBOR (quarterly average)	0.29	0.27	0.31
BLR[3] and 1-month HIBOR spread (quarterly average)	4.78	4.79	4.76
BLR and 3-month HIBOR spread (quarterly average)	4.71	4.73	4.69
Composite interest rate[4]	0.21	0.36	0.53
		Retail banks	
Balance sheet developments[5]			
Total deposits	1.9	1.0	2.9
Hong Kong dollar	-2.2	-0.8	3.0
Foreign currency	8.4	3.3	2.8
Total loans	1.1	2.5	0.3
Domestic Lending[6]	-1.2 r	1.5 r	-1.3
Loans for use outside Hong Kong[7]	18.8 r	8.5 r	9.5
Negotiable instruments			
Negotiable certificates of deposit (NCD) issued	28.5	19.7	5.6
Negotiable debt instruments held (excluding NCD)	0.0	-0.2	2.3
Asset quality[8]			
As percentage of total loans			
Pass loans	97.95	98.21	98.29
Special mention loans	1.28	1.19	1.12
Classified loans[9] (gross)	0.77	0.60	0.59
Classified loans (net)[10]	0.45	0.35	0.35
Overdue > 3 months and rescheduled loans	0.60	0.47	0.49
Profitability			
Bad debt charge as percentage of average total assets[11]	0.03	0.03	0.03
Net interest margin[11]	1.32	1.23	1.25
Cost-to-income ratio[12]	49.9	45.9	46.8
Liquidity ratio (quarterly average)	39.3	35.8	38.0
		Surveyed institutions	
Asset quality			
Delinquency ratio of residential mortgage loans	0.01	0.01	0.01
Credit card lending			
Delinquency ratio	0.20	0.18	0.19
Charge-off ratio — quarterly annualised	1.56	1.70	1.51
— year-to-date annualised	1.91	1.56	1.49
		All locally incorporated AIs	
Capital adequacy ratio (consolidated)	15.8 r	15.7	15.8

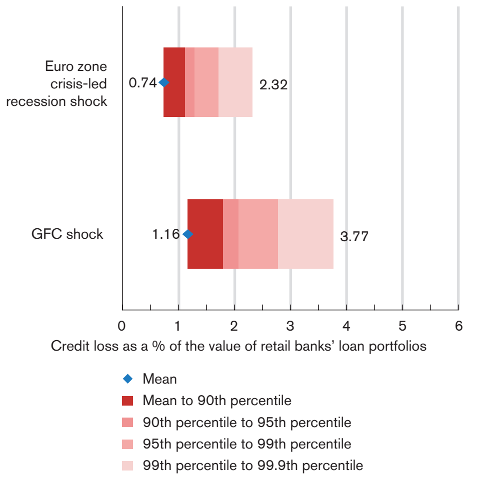
Notes:

1. Figures are related to Hong Kong office(s) only except where otherwise stated.
2. With reference to the Hong Kong dollar Interest Settlement Rates released by the Hong Kong Association of Banks.
3. With reference to the rate quoted by The Hongkong and Shanghai Banking Corporation Limited.
4. The composite interest rate is a weighted average interest rate of all Hong Kong dollar interest-bearing liabilities, which include deposits from customers, amounts due to banks, negotiable certificates of deposit and other debt instruments, and Hong Kong dollar non-interest-bearing demand deposits on the books of banks. Further details can be found in the HKMA website.
5. Quarterly change.
6. Loans for use in Hong Kong plus trade finance.
7. Includes "others" (i.e. unallocated).
8. Figures are related to retail banks' Hong Kong office(s) and overseas branches.
9. Classified loans are those loans graded as "substandard", "doubtful" or "loss".
10. Net of specific provisions/individual impairment allowances.
11. Year-to-date annualised.
12. Year-to-date figures.

r Revised figure.

Box 4
A stress-testing analysis of the impact of the European sovereign debt crisis on the Hong Kong banking sector

Chart B4.1
Simulated credit loss distribution of the Hong Kong banking sector



Notes:
1. The assessment assumes the economic conditions in 2011 Q4 as the current environment. The Monte Carlo simulation method is adopted to generate the credit loss distribution for each scenario.
2. **Euro zone crisis-led recession scenario**: the annual growth rate of Hong Kong's real GDP in 2012 falls by 4.5 percentage points below a baseline scenario.
3. **GFC scenario**: quarter-on-quarter growth rate of Hong Kong's quarterly real GDP is assumed to be -1.0%, -1.1%, -2.2%, and -3.5% respectively in each of the four consecutive quarters starting from 2012 Q1.

Source: HKMA staff estimates.

Recent increases in the pressure for European banks to de-leverage may signal that the unresolved European sovereign debt crisis has already threatened the loan supply of the European banking sector. This development points to weaker growth prospects for the euro area, raising concerns about the spill-over effect on the global economy. The large presence of European banks in Hong Kong also suggests that significant de-leveraging on their part could affect credit availability and fund flows within the Hong Kong banking sector. This box examines the implications for the credit and funding risks of banks in Hong Kong using stress testing analysis.

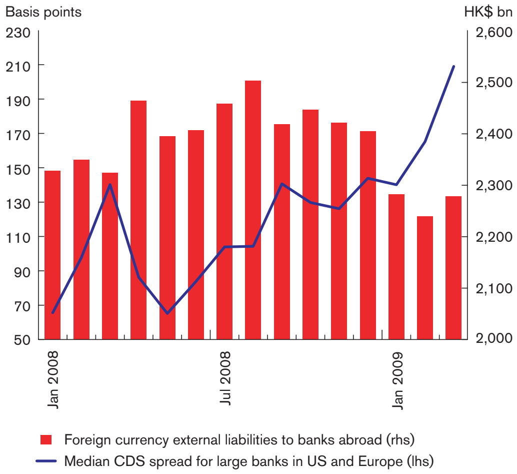
Macro stress-testing of credit risk

The major channel through which the credit risk of the Hong Kong banking sector may be affected by the European sovereign debt problem is through its impact on Hong Kong's economic growth. A recent analysis by the International Monetary Fund considered a hypothetical euro zone crisis-led recession scenario.[47] Here, we draw on the scenario specification from the IMF analysis by assuming that the annual growth rate of Hong Kong's real GDP in 2012 will fall by 4.5 percentage points *below a baseline scenario* as a result of a global economic slowdown. The impact of this stressed scenario in terms of the potential credit loss of the Hong Kong banking sector is then assessed by the macro stress-testing framework[48] using latest information up to the end of 2011. Chart B4.1 presents the simulated credit loss in 2013 Q4 (i.e. two years after the beginning of the shock) for the euro zone crisis-led recession scenario along with an historical stressed scenario, which assumes that the actual four consecutive quarter-on-quarter falls in Hong Kong's real GDP during the 2008-09 global financial crisis (GFC) were to occur from 2012 Q1 to 2012 Q4.

[47] See International Monetary Fund (2011) "People's Republic of China – Hong Kong Special Administrative Region – 2011 Article IV Consultation Discussion".

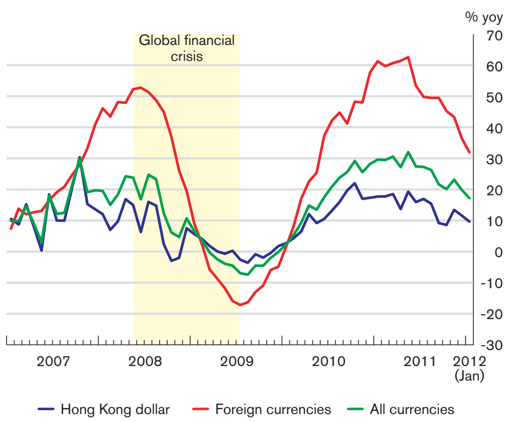
[48] For details, see "Macro stress testing of credit risk" Sub-section of Section 5.4.

Chart B4.2
Hong Kong banking sector's foreign currency external liabilities to banks during the global financial crisis of 2008-09



Note: Locational basis.
Sources: Bloomberg, HKMA and staff estimates.

Chart B4.3
Credit growth of the Hong Kong banking sector during the global financial crisis of 2008-09



Source: HKMA.

Under this scenario, the average credit loss rate of retail banks in Hong Kong would increase to 0.74%. The tail risk, which is proxied by the estimated credit loss rate at the 99.9% confidence level, would be 2.32%, considerably smaller than the estimated impact of the GFC scenario (3.77%) and the actual credit loss rate of 4.39% after the Asian financial crisis.[49] The stress-testing result suggests that the impact of such a recession on the credit risk of the Hong Kong banking sector would be manageable.

An assessment of fund flows and foreign currency lending

One persistent stress factor affecting the European banking sector is the concern about counterparty risk which arises from uncertainty over the potential losses on banks' holdings of problem sovereign debt. Heightened counterparty risk, as evidenced in the GFC, could lead to sharp reductions in the supply of cross-border interbank funds. In fact, Hong Kong's experience during the GFC indicates there were significant withdrawals of foreign currency (FC) funding by distressed banking sectors where banks generally were exposed to significant liquidity risk (Chart B4.2). This partially contributed to an apparent reduction in FC lending growth in Hong Kong (Chart B4.3). The effect on Hong Kong dollar lending, by contrast, was much more moderate, as Hong Kong dollar loans are mainly funded by local retail deposits, which are much more stable.

Based on that experience in the GFC, if European banks were to withdraw their cross-border interbank funds, as a result either of de-leveraging or elevated counterparty risk in the euro area, there may be a significant impact on FC lending in Hong Kong given the large presence of European banks. To estimate the impact, an empirical model is specified to examine the determinants of FC lending of the Hong Kong banking sector. The model is estimated using the Engle-Granger method based on monthly data for the period January 2003 to December 2011. The model suggests that reductions in FC customer deposits and FC interbank borrowing from abroad, lower world GDP growth, increases in FC interbank lending to abroad and narrower FC lending rate spreads between

[49] See footnote 44.

Table B4.A
The determinants of foreign currency lending to non-bank customers

Variables	Estimated results
FC customer deposits	• With regard to supply factors, FC customer deposits are estimated to have long-run and short-run impacts on FC lending. • A 1% decrease in FC customer deposits would reduce FC lending by 0.5% and 2.3% in the short- and long-run respectively.
FC interbank borrowing from abroad	• Apart from customer deposits, FC interbank borrowing from abroad is estimated to be a significant supply factor of FC lending. • A decline in FC interbank borrowing from abroad by 1% would reduce FC lending of the Hong Kong banking sector by 0.2% in the short-run and by 0.6% in the long-run. • The relatively small estimated impact partially reflects diverse business models of foreign banks. In particular, some foreign banks position their Hong Kong offices as a liquidity management centre to allocate intra-group funding rather than a lending arm.
World GDP	• For demand factors, FC lending of the Hong Kong banking sector is found to be positively related to global economic activities (measured by world GDP). • A fall in the world GDP by 1% would reduce FC lending by around 1.8% in the short run.
FC interbank lending to abroad	• FC interbank lending to abroad, a substitute for FC customer lending in banking assets, is estimated to have negative long- and short-run impacts on FC lending. • An increase in FC interbank lending to abroad by 1% would reduce FC customer lending by 0.2% in the short-run and 1.7% in the long-run.
The FC lending rate differential between the Mainland and Hong Kong	• FC lending in Hong Kong is estimated to be partially driven by FC lending rate differentials between the Mainland and Hong Kong. • The lending rate differential, proxied by 1-year US dollar lending rate on the Mainland minus the 1 year US dollar LIBOR, is estimated to have a positive short-run impact on FC loans in Hong Kong. • The estimation result, however, suggests that a reduction in the lending differential by one percentage point would only reduce FC customer lending slightly by around 0.02%.

the Mainland and Hong Kong banking sectors[50], would lead to slower FC lending growth in Hong Kong. Only lagged terms of FC customer deposits, FC interbank borrowing from abroad and FC interbank lending to abroad are considered as explanatory variables in the model so that potential endogeneity problems could be avoided.[51] Table B4.A summarises the estimation result.

A stress-testing exercise is conducted using the estimated model. We specify a hypothetical stressed scenario by assuming that there is a drastic increase in the median credit default swap (CDS) spread for European banks[52], which could be taken to occur as a result of (i) renewed concerns about the potential losses on European banks' holdings of sovereign debt or (ii) the knock-on effect of further sovereign credit rating downgrades for European countries.

In response to the increased difficulty in borrowing external funds due to heightened default risk among European banks, we assume that European banks repatriate their cross-border interbank funds. The extent to which they withdraw their interbank funds from Hong Kong is estimated using a negative empirical relationship between the median CDS spread for international banks and the Hong Kong banking sector's FC external liabilities to banks observed during the GFC[53], with an assumption that the maximum amount

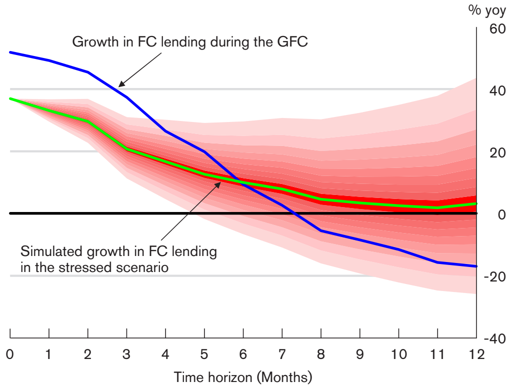
50 The positive relationship partly reflects the US dollar funding needs of Mainland corporations in Hong Kong. Since the US dollar lending rate on the Mainland can differ significantly from that in the international market (including Hong Kong) due to the Mainland's capital account restrictions, a higher US dollar lending rate on the Mainland than that in Hong Kong might encourage Mainland corporations to borrow their US dollar funding from Hong Kong.

51 A general-to-specific modelling approach is adopted in that one-month to three-month lags of the variables are included in the initial model. The final model includes only those lagged terms that are statistically significant.

52 We assume that the median CDS spread for European banks increases from the current level of 250 basis points to 410 basis points. The magnitude of increase is consistent with the 95% quantile based on the generalised extreme value distribution estimated using data on the median CDS spread of the selected large European banks.

53 Using monthly data for the period January 2008 to March 2009, a negative empirical relationship between the median CDS spread (in basis points) of selected large banks in US and Europe (x) and the Hong Kong banking sector's foreign currency external liabilities to banks (y) is found (i.e. $y = -0.0044x + 0.8311$). All estimated coefficients are statistically significant at the 1% level.

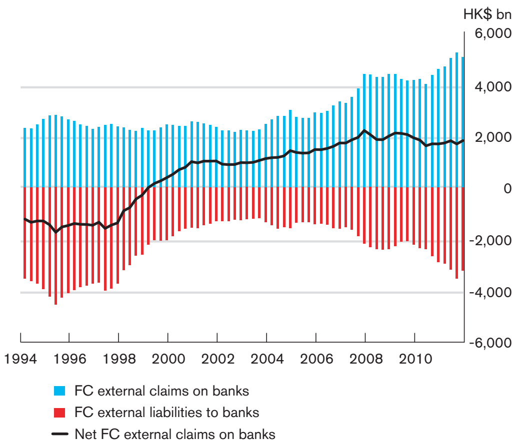
Chart B4.4
Simulated paths of year-on-year growth in foreign currency lending in the stressed scenario



Notes:
1. FC external liabilities to European banks are assumed to be negatively correlated with the median CDS spread of selected large European banks based on an empirical relationship shown in footnote 53, with an assumption that the maximum amount of FC interbank outflow is limited by the amount of FC external liabilities to European banks maturing in one month or less (i.e. a liquidity shock lasting for one month).
2. Annual world GDP growth falls by three percentage points below a baseline scenario.
3. Hong Kong banking sector's FC external liabilities to non-European banks, FC external claims on banks and FC customer deposits remain unchanged.
4. The FC lending rate spread remains constant.
5. The blue line represents the yoy growth rate of FC lending for the period August 2008 to July 2009.
6. The fan chart shows the possible range of future value in the stressed scenario (i.e. the lighter the colour, the less is the likelihood to occur).

Source: HKMA staff estimates.

Chart B4.5
Hong Kong banking sector's foreign-currency external claims on and liabilities to other banking sectors



Notes:
1. Locational basis.
2. Net claims are defined as external claims minus external liabilities.

Source: HKMA.

of FC interbank outflow is limited by the amount of external liabilities to European banks maturing in one month or less (i.e. a liquidity shock lasting for one month). To be consistent with the euro zone crisis-led recession scenario in the previous section, a three percentage-point decline in world GDP growth from a baseline scenario[54] is also assumed.

Chart B4.4 presents a fan chart showing the simulated impact on FC lending in Hong Kong along with the actual change registered during the GFC. Major assumptions in the simulation are shown in the notes under the chart. The result suggests that in the face of severe outflows of interbank funds by European banks, coupled with a global economic slowdown, FC lending in Hong Kong is expected to decelerate from the current year-on-year growth rate of 37% to around 3% in the next one-year horizon (the green line). This compares with the more drastic slowdown from 52% to -17% registered during the GFC (the blue line).

Although the fan chart indicates that a more severe slowdown in FC lending than that observed during the GFC remains possible statistically, in reality the chance is likely to be small for two reasons. First, in the stressed scenario, we assume that interbank lending to abroad by Hong Kong banks remains unchanged. Such exposure, however, may be reduced in times of stress, implying that more domestic FC funding should become available in the domestic market to fill the credit supply gap left by European banks. Secondly, and more importantly, the Hong Kong banking sector is a net FC lender in the global banking system (Chart B4.5), suggesting that fundamentally FC lending in Hong Kong is less reliant on overseas funding.[55]

[54] This assumption of a three percentage point decline in world GDP growth from a baseline scenario, which is based on the downside scenario discussed in the IMF's World Economic Outlook (September, 2011), is consistent with the euro zone crisis-led recession scenario in the previous section of this box.

[55] It should be noted that this stress-testing result is for the banking system as a whole, which does not exclude the possibility that some individual banks may experience more credit loss and/or liquidity difficulties than the average bank.

In summary, this stress-testing exercise shows that a euro zone crisis-led recession in Hong Kong, if it occurred, would inevitably lead to higher credit losses in the Hong Kong banking sector, but the loss severity, even in extreme cases, would remain much lower than the actual loss registered after the Asian financial crisis. In the event of drastic outflows of interbank funding by European banks, foreign currency lending growth in Hong Kong would decelerate. However, the impact would be significantly less severe than that occurred during the 2008-09 global financial crisis. Sufficient domestic funding would remain supportive of adequate credit supply in the economy. Notwithstanding the stress-testing results, continued vigilance should be maintained with regard to the possible spill-over effects of the crisis on the global banking system and the risk of a sudden outflow of funds.