HONG KONG MONETARY AUTHORITY
香港金融管理局

HALF-YEARLY MONETARY AND FINANCIAL STABILITY REPORT

March 2016

This Report reviews statistical information between the end of August 2015 and the end of February 2016.

Half-Yearly Monetary and Financial Stability Report
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1. Summary and overview

Global financial markets experienced a sharp correction at the start of 2016 before stabilising more recently. Looking ahead, increased risk of a sharper global economic slowdown, lingering concerns over the scope and effectiveness of major central banks' monetary policy in supporting growth and continued weakness of oil and commodity prices are likely to keep market volatility elevated. The global economic outlook will hinge on the extent to which continued financial market volatility spills over to real economic activities, while the prospects for the emerging market economies also depend crucially on the strength of the US dollar.

The Hong Kong dollar exchange rate eased in early 2016, reflecting normal workings in accordance with the design of the Linked Exchange Rate System following the US interest rate hike as well as heightened uncertainties in the economic and financial environment. Loan growth decelerated in the second half of 2015 while the residential property market softened. Looking ahead, banks in Hong Kong are likely to face the challenge of more volatile interest rates and possible capital outflows amid normalisation of US interest rates. This coupled with the potential global economic slowdown and financial market turbulence could put increasing pressure on the credit quality of banks' assets in general.

The external environment

A sudden jump in risk aversion gripped global financial markets at the start of the year with global equity prices plunging sharply, oil prices dropping to a 12-year low, and emerging market currencies continuing to come under pressure. The global financial market turbulence reflects investors' re-pricing of risk, as factors that used to support the valuation-rich financial markets are waning. As the US Federal Reserve (Fed) has started its interest rate hike cycle and the economic slowdown in major emerging market economies (EMEs) continues, fears of loss of global growth engine and reversal of liquidity support have led to broad-based market sell-offs. With EMEs contributing almost 80% of global GDP growth over the past few years, global economic prospects are likely to hinge on how EMEs perform at the margin. The slowdown in major EMEs, particularly Mainland China, together with lacklustre growth in both Europe and Japan means that the US economy alone is unlikely to lift global growth, and the risk of a sharper global growth slowdown has increased.

Meanwhile, there are increasing concerns over the effectiveness and scope of monetary policy of major central banks in supporting the fragile economy. As the European Central Bank and the central bank in Sweden are taking their interest rates deeper into negative territory, the Bank of Japan has joined them in adopting negative interest rate policy. While the objective of the

policy is to reduce the cost of borrowing and drive demand for loans and encourage investment and consumer spending, the increasing adoption of negative interest rates by major central banks triggered sharp global equity market sell-offs, particularly in the banking sector. Markets saw the resort to negative interest rate policy by major central banks as a sign that global monetary easing policies might have run their course. On the other hand, there were also concerns that negative interest rates would dent banks' net interest margins which have already been under pressure in part due to the prolonged low interest rate environment. In the US, although markets have now priced in an even flatter path of the Fed's interest rate hikes, the pace of future rate hikes remains uncertain as the US inflation outlook is subject to opposite forces at play. While continued softening of energy and commodity prices could put downward pressure on US inflation, core services inflation which has a higher weight in households' consumption basket, is seeing a continued uptrend amid the buildup of domestic demand pressure.

In Mainland China, economic growth moderated in the second half of 2015, with deleveraging in overcapacity sectors and housing inventory overhang continuing to weigh on growth, offset by still solid consumption and accelerated infrastructure spending. On the supply side, the vibrant expansion of the service sector has rendered vital support to economic activities as the economy is moving towards a more balanced growth model. Box 1 (see page 27) discusses recent developments in the service sector and its contribution to output and employment growth.

The Mainland equity and foreign exchange markets have seen heightened volatility recently. The normalisation of US interest rates and uncertainties surrounding the Mainland economic outlook have intensified outflow pressures on the Mainland since the second half of 2015. The renminbi depreciated by 5.6% against US dollar since end-July last year until end-January this year before stabilising in February. While the recent increase in outflow pressure has been partly driven by cross-border outflows, it also reflected asset-liability rebalancing by Mainland residents. To offset the impact of capital outflows on liquidity conditions, the PBoC injected liquidity into the banking system through reverse repo, and cut the reserve requirement ratio by 50 basis points in March. Meanwhile, risk-off sentiment in the equity market and low exchange repo rates have boosted leveraged activities in the corporate bond market, raising concerns over mispricing of credit risks. Box 2 (see page 33) analyses leveraged activities in the Mainland corporate bond market and assesses their risk to financial stability.

In East Asia[1], growth momentum remained weak in the fourth quarter of 2015. Export growth remained lacklustre in the region, while domestic demand in many regional economies has continued to slow. In the face of sharper economic slowdown, some regional central banks have eased their monetary policy despite the risk of triggering further capital outflows. Going forward, the region's prospects are likely to hinge on the pace of US interest rate hikes, the strength of the US dollar, commodity price trends and growth in major export markets, and how these factors interact with domestic vulnerabilities such as high private-sector indebtedness and stretched asset markets to affect economic growth and financial stability.

[1] East Asian economies refer to Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan and Thailand.

The domestic economy

Hong Kong's economic growth slowed further towards the end of 2015, with the quarter-on-quarter real GDP growth dropping to a paltry 0.2% in the fourth quarter from about 0.6% in the first three quarters. On the domestic front, private consumption growth eased noticeably amid weaker consumer confidence, corrections in asset prices, and softer financial services demand. While inventory destocking decreased, gross capital formation was dragged by slower progress in public projects and weak business sentiment. On the external front, exports of goods picked up somewhat, whereas exports of services continued to contract due to the downturn in inbound tourism and moderation in financial services activities. With import growth rebounding, net exports became a drag on GDP growth in the fourth quarter.

CCPI inflation has been on a downward trend since 2012, although sequential inflationary pressure has picked up in the second half of 2015 and early 2016 due to volatile food prices and dissipation of special fuel rebate in electricity. On a year-on-year basis, the underlying inflation rate remains largely steady. Looking ahead, inflationary pressure will likely remain contained, in view of the soft import price inflation, moderation in housing rentals and the modest local growth momentum.

The Hong Kong economy is expected to remain soft in 2016 amid the US monetary policy normalisation, continued slowdown in global growth and heightened volatilities in international financial markets. Domestically, rises in interest rates and corrections in asset prices will weigh on private consumption and investment. Box 3 (see page 41) examines the impact of interest rate hikes on private consumption. Externally, exports of goods and services will face headwinds from the lacklustre global economic environment and continued weakness in inbound tourism. With subpar local economic activities, the unemployment rate is expected to face some upward pressure going forward. For 2016 as a whole, the Government forecasts the real GDP growth in the range of 1–2%, while the market consensus forecast is 1.8%.

Monetary conditions and capital flows

The Hong Kong dollar exchange rate, having stayed close to the strong-side Convertibility Undertaking (CU) throughout the second half of 2015, weakened in early 2016. The strong-side CU was repeatedly triggered in September and October 2015 due in part to conversions of the offshore renminbi into the Hong Kong dollar. Moving into 2016, however, the Hong Kong dollar exchange rate eased. The widening of spreads between Hong Kong dollar and US dollar interest rates after the lift-off in US interest rates, as well as the sell-off in the Hong Kong equity market, the increased volatility of the renminbi exchange rate, the less optimistic market outlook for the Hong Kong and Mainland economies and the general weakness in Asian currencies have dampened the demand for the Hong Kong dollar. Following the stabilisation of global risk sentiment, the Hong Kong dollar exchange rate steadied within a range of 7.7668 to 7.7905 in February, having eased to beyond 7.8 briefly in mid-January. The weak-side CU level of 7.85 has not been touched.

The Hong Kong dollar interbank market continued to function normally. HIBORs continued to stay at relatively low levels, notwithstanding some pick-up in term rates in recent weeks amid heightened financial market volatilities. Following the increase in the target

range for the US Federal Funds Rate from 0–0.25% to 0.25–0.5% in December 2015, the HKMA adjusted upward the Base Rate for its Discount Window accordingly from 0.5% to 0.75%.

Going forward, the timing and magnitude of increases in Hong Kong dollar interest rates will hinge on the timing, speed and size of fund outflows which are subject to changes in various factors including the Hong Kong dollar-US dollar interest rate differentials, the global macro-financial outlook, as well as market sentiment. Given the likely gradual pace of US interest rate hikes and a sizable Hong Kong dollar Monetary Base, the adjustment in Hong Kong dollar interest rates should not be too rapid. In the event of fund outflows, when the Hong Kong dollar exchange rate weakens to 7.85, the HKMA will buy Hong Kong dollars against US dollars. The Monetary Base will shrink as a result, pushing up Hong Kong dollar short-term (overnight) interest rates to levels closer to their US dollar counterparts. This is an inevitable step in the normalisation process of Hong Kong dollar interest rates, reflecting normal workings in accordance with the design of the Linked Exchange Rate System.

With a lacklustre global economic environment and heightened exchange rate volatilities, total loans contracted by an annualised rate of 3.7% in the second half of 2015, dragging the full-year growth to 3.5% from 12.7% in 2014. In particular, both loans for use in Hong Kong and outside Hong Kong declined, with the latter reflecting partly the slowdown in Mainland-related borrowings. By currency, both Hong Kong dollar and foreign currency loans dropped, with the latter being partly driven by the repayment of US dollar loans in response to the weakening in renminbi exchange rate. Meanwhile, total deposit growth slowed, with both Hong Kong dollar and renminbi deposits contracting, whereas US dollar deposits picked up strongly. As such, the Hong Kong dollar loan-to-deposit ratio decreased from 79.9% at end-June 2015 to 78.2% at end-2015, and the US dollar loan-to-deposit ratio decreased notably from 88.6% to 76.1% over the same period.

Amid increased market concerns about the US interest rate normalisation and the prospect for the Mainland economy, both the onshore (CNY) and offshore (CNH) renminbi exchange rates weakened, with the discount of the CNH vis-à-vis its onshore counterpart once widening to about 1,500 pips in early January. The overnight CNH HIBOR fixing also surged to a high of 66.8% in mid-January on tightened liquidity conditions. Both the CNY and CNH renminbi exchange rates have stabilised recently, with the discount of the CNH over CNY narrowing to virtually zero at the end of February. Meanwhile, tightness in the CNH interbank market has also eased somewhat. In view of the recent high volatility in both the CNY and CNH renminbi exchange rates, Box 4 (see page 53) studies the main drivers of the CNH-CNY spread before and after the change of the renminbi central parity fixing mechanism.

Changes in market expectation of the renminbi exchange rate led to a consolidation in Hong Kong's renminbi liquidity pool (including outstanding renminbi customer deposits and certificates of deposits) in the second half of 2015. That said, other offshore renminbi business areas, such as renminbi trade settlement, renminbi bank loans, and the average daily turnover of renminbi real time gross settlement (RTGS), continued to grow at a solid pace. Looking ahead, while Hong Kong's offshore renminbi business may be affected by uncertainty over the macro-financial development in Mainland in the near term, it will continue to benefit from the Mainland's capital account liberalisation and the internationalisation of the renminbi in the long run.

Asset markets

Reflecting concerns about global economic slowdown, the Hong Kong equity market fluctuated widely and experienced a sharp correction during the review period. Last year, after a turbulent summer break investors regained some confidence at the start of the fourth quarter. However, the market came under pressure again towards the end of 2015 amid renewed weakness of oil and commodity prices, and increased risks of a global slowdown. Looking ahead, uncertainties over the global economy, the pace of US monetary normalisation and volatility of oil and commodity prices are likely to keep investors on the sideline. Therefore, despite the attractive valuation compared to other markets in the region, the local equity market is unlikely to have a smooth ride over the remainder of the year.

The Hong Kong dollar debt market maintained its steady growth in 2015 despite a major risk-reappraisal in global bond markets. While new debt issuance by the local private sector fell during the year, it was more than offset by the growth in public sector issuance. Meanwhile, after a period of rapid growth, the offshore renminbi debt market in Hong Kong posted the first annual decline since 2007. In the near term, the road ahead is expected to remain challenging due to escalated volatility and uncertainty in global financial markets, and regulatory changes that may make it easier for Mainland corporations to tap the onshore bond market. Further out, however, the picture may turn more positive, in particular if the inclusion of the renminbi in the Special Drawing Rights basket can boost the demand for assets denominated in the currency.

The residential property market has softened since the second half of 2015 amid weaker market sentiment. In particular, housing transactions dropped by 26% in the second half, with average monthly secondary-market transactions falling to a historical low, while the average monthly primary-market transactions only dropped slightly as property developers pushed more new properties for sale during the period. Housing prices also registered some declines, with the Centa-City Leading Index dropping by 13.2% from its peak in September. That said, housing affordability was still stretched, with both the price-to-income ratio and the income gearing ratio staying at high levels. Meanwhile, signs of consolidation also emerged in the non-residential property market, with prices falling across market segments since the last quarter.

Banking sector performance

Retail banks registered lower profit in the second half of 2015, with their pre-tax operating profit reducing by 15.5% and return on assets receding to 0.97%. The decline in profit was mainly due to lower non-interest income, while rises in operating costs and higher loan impairment charges were also relevant. Meanwhile, the banking sector witnessed the first contraction in loan book since the global financial crisis.

Nevertheless, the banking sector entered 2016 in a strong position. In particular, banks' asset quality remained sound despite slight deterioration in the second half of 2015. Banks' capital and liquidity positions, as measured by Basel III standards, were structurally robust and strengthened further. The consolidated capital adequacy ratio of locally incorporated authorized

institutions (AIs) increased to 18.3% at the end of 2015. The average Liquidity Coverage Ratio for category 1 institutions rose to 142.9%, while the average Liquidity Maintenance Ratio for category 2 institutions also increased to 53.9%. All of these ratios were well above their regulatory minimums. In addition, the countercyclical capital buffer, which will rise to 1.25% of total risk-weighted assets with effect from 1 January 2017 from the current 0.625%, would enhance banks' resilience against systemic risks.

In an attempt to provide a more comprehensive and realistic assessment on key vulnerabilities of banks, Box 5 (see page 77) presents a modified macro stress-testing framework with macro-financial feedback linkages. We show in a stress-scenario analysis that through the interaction between the financial and real sectors, an initial macro shock could be amplified and translated into a sharper rise in banks' classified loan ratios. One implication for the current juncture is that while the recent deterioration in asset quality is not alarming, banks should remain vigilant and prepare for the possible worsening of asset quality associated with the macro-financial feedback effect.

Looking ahead, the banking sector faces challenges on various fronts. Banks should pay close attention to the impacts of more volatile interest rates and possible capital outflows amid normalisation of US interest rates. This coupled with the potential global economic slowdown and financial market turbulence could put increasing pressure on the credit quality of banks' assets in general.

In view of the rising corporate leverage and debt-servicing burdens, the credit risk of corporate exposure may increase further. Banks should maintain prudent credit risk management in this more challenging operating environment.

The *Half-yearly Report on Monetary and Financial Stability* is prepared by the staff of the Research Department of the Hong Kong Monetary Authority.

2. Global setting and outlook

Global financial markets plummeted at the start of the year on deepening concerns about the health of the global economy and fears of reversal of liquidity support after the US interest rate lift-off. Looking ahead, while market sentiment has recently improved, global economic and financial market uncertainties are set to remain elevated, clouded by risks emanating from US monetary normalisation, slowdown in emerging market economies as well as persistent decline in oil and commodity prices. In the face of the continued emerging market slowdown and sluggish growth in both Europe and Japan, it is unlikely that the US economy can single-handedly propel the global economy and the risk of a sharper global slowdown has increased.

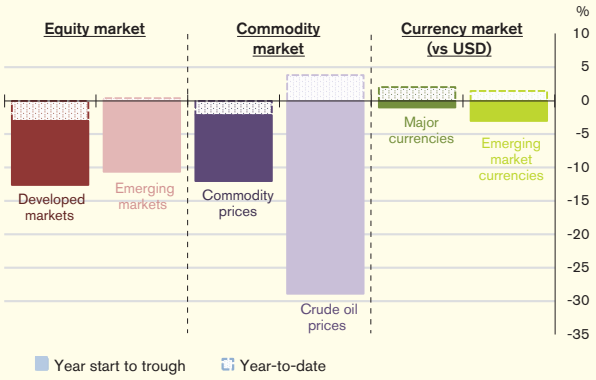
In East Asia, growth momentum weakened as financial conditions tightened along with immense selling pressure in the financial markets and intensified capital outflows early this year while external demand remained subdued. Despite resilience of the East Asian economies relative to the 1990s and to many other emerging market economies, the region will likely continue to face a multitude of risks and challenges ahead.

In Mainland China, economic growth moderated in the second half of 2015, with deleveraging in overcapacity sectors and housing inventory overhang continuing to weigh on growth, offset by still solid consumption and accelerated infrastructure spending. On the supply side, the vibrant expansion of the service sector has rendered vital support to economic activities as the economy is moving towards a more balanced growth model. The government will focus on supply-side reform this year to promote economic restructuring. On the financial front, amid the weakening of the renminbi against US dollar, capital outflows increased in the second half of last year, in part reflecting asset-liability rebalancing by Mainland residents. With the stabilisation of the renminbi exchange rate, the decline in foreign reserves has moderated recently.

2.1 External environment

Global financial markets plummeted at the start of the year before stabilising recently. At one point, global equity prices plunged sharply with oil prices dropping to a 12-year low and emerging market (EM) currencies continuing to come under pressure (Chart 2.1).

Chart 2.1
Recent volatility in the global financial markets

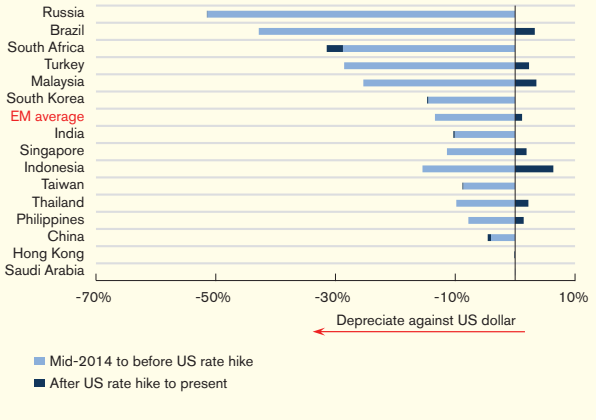


Note: "Year-to-date" represents the percentage change from the start of the year to present. "Year start to trough" represents the percentage change from the start of the year to the recent trough. The dates when markets hit a bottom were 11 February for developed equity markets and commodity prices, 20 January for crude oil prices and emerging market currencies, 21 January for emerging market equity markets and 29 January for major currencies.

Source: Bloomberg.

The high market volatility reflects a continued re-pricing of risks as factors that used to support the valuation-rich financial markets, such as expectations of abundant global liquidity and strong growth in emerging market economies (EMEs) perpetually supporting global growth, have begun to wane. Indeed, while financial markets initially reacted calmly to the US Federal Reserve's (Fed) first interest rate hike in nine and a half years in December last year, EM currencies have actually long been under pressure and already depreciated sharply since 2014 in the face of a strong US dollar in anticipation of the looming US monetary normalisation and ongoing slowdown in EMEs (Chart 2.2).

Chart 2.2
Emerging Market currencies



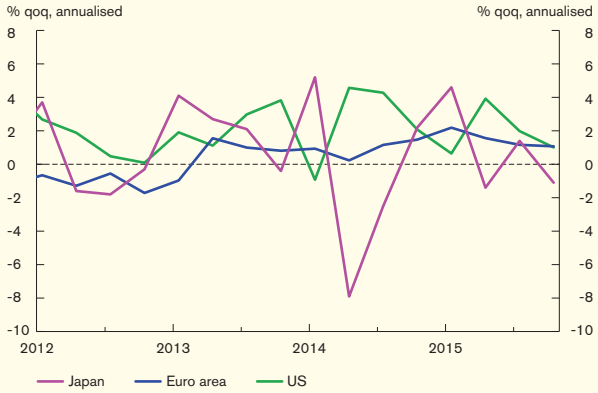
Source: Bloomberg.

Going forward, while market sentiment has recently improved, global economic and financial market uncertainties are set to remain elevated with the outlook of EMEs hinging on the extent of the slowdown in major export markets, movement of the US dollar and weakness in oil and commodity prices. With EMEs contributing almost 80% of global growth since the global financial crisis and accounting for almost 60% of world GDP, the slowdown in EMEs would pose a significant drag on the global economy. This could lead to negative spill-over effects on advanced economies not only through trade but also via financial channels as the recent equity market sell-offs in advanced economies on concerns about global growth did cause significant tightening in financial conditions.

In the face of the slowdown in EMEs, it is unlikely that the strengthening US economy can single-handedly propel the global economy when growth in both Europe and Japan remains sluggish. In the US, real GDP growth slowed sharply to 1% quarter on quarter (annualised) in the fourth quarter of 2015, down from 2% recorded in the previous quarter. However, the slowdown appears to be temporary as activities and employment continued to hold up going into early 2016. Indeed, the unemployment rate fell to 4.9% in February, just above the Fed's median estimate of the natural rate at 4.8%. By contrast, real GDP growth in the euro area continued to remain modest at 0.3% quarter on quarter in the fourth quarter of 2015, the same pace as in the prior quarter. The unemployment rate edged down recently but remained high at 10.3% in January. Similarly, in Japan, although the sharp upward revision to the third quarter real GDP growth to +0.3% quarter on quarter (up from -0.2%) suggests the Japanese economy did not fare as badly as previously thought, the

economy contracted again in the fourth quarter, by 0.3%, as real consumer spending plunged (Chart 2.3).

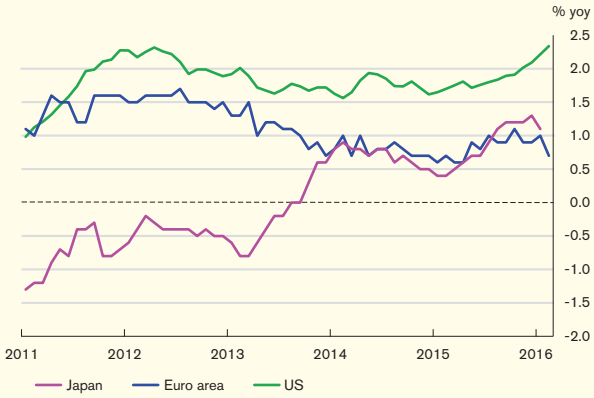
Chart 2.3
Real GDP growth of major advanced economies



Source: Bloomberg.

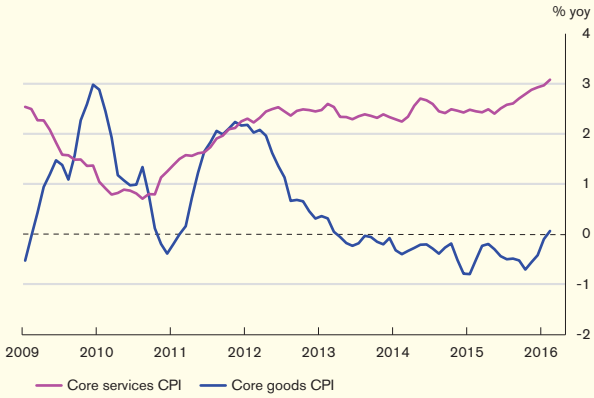
Headline inflation remained subdued across major advanced economies but core consumer price index (CPI) inflation has continued to rise in the US (Chart 2.4). As a result of the stronger recovery, core CPI inflation (excluding food and energy) in the US continued to edge higher to 2.3% in February. Underlying the increases in US core CPI is the persistent divergence between core services and core goods inflation with the former being driven up by the strengthening of domestic demand and diminishing economic slacks while the latter is being weighed down by prior falls in energy and import prices (Chart 2.5). Nevertheless, the recent uptick in core goods inflation suggests such divergence may be narrowing. In Japan, the "new core" inflation (excluding fresh food and energy) remained subdued at 1.1% in January and has remained below the Bank of Japan's (BoJ) 2% target ever since it was introduced back in January 2013. Meanwhile, core inflation (excluding food and energy) in the euro area has also recently fallen back to 0.8% in February amid the modest recovery.

Chart 2.4
Core CPI inflation in major advanced economies



Sources: CEIC and Datastream.

Chart 2.5
Core goods and core services inflation in the US

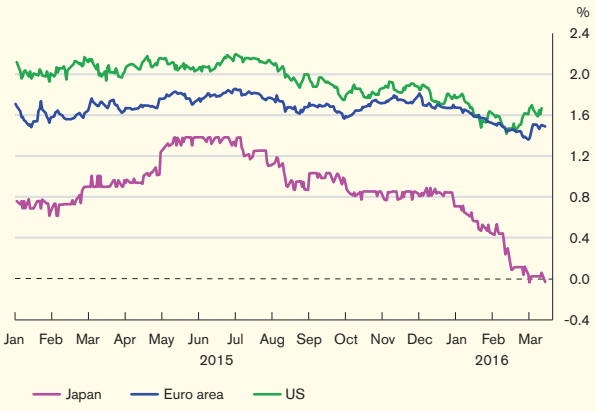


Source: CEIC.

In response to the slowing global growth and below-target inflation, many central banks in advanced economies have continued to indicate further monetary policy support. Nevertheless, there are now increasing concerns about the scope of further monetary easing and their effectiveness in supporting global growth and the financial markets. In particular, the increased popularity of negative interest rates pursued most recently by the BoJ, following experiences of other central banks across Europe, has raised market concerns that quantitative (and qualitative) easing might have reached its practical and effectiveness limit. On the other

hand, the recent banking sector sell-offs in the equity markets amid concerns over the adverse impact of negative rates on banks' net interest margins, also suggest there likely exists a lower bound for negative interest rates before its side effects would render further cuts prohibitive. As such, markets appear to have priced in the inability of major central banks to support the global economy and to turn around the continued subdued trend in inflation with the longer-term inflation expectations continuing to trend downwards (Chart 2.6). The fall in US longer-term inflation expectations in part reflects concern about the negative feedback from recent global economic developments and market volatilities to the US economy, with markets now only pricing in one to two US rate hikes in the next 18 months. Nevertheless, the pace of future rate hikes remains highly uncertain as domestic and external forces are at play to shape the US inflation outlook.

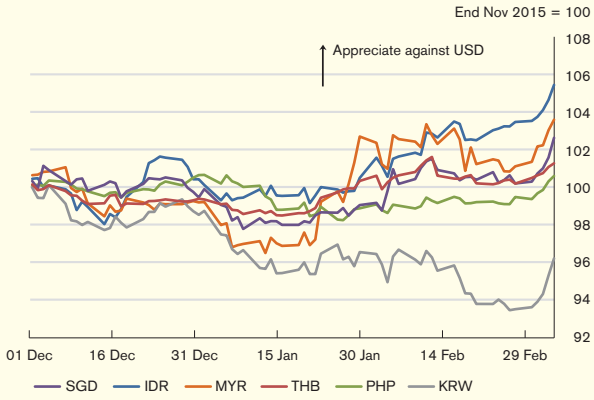
Chart 2.6
Inflation expectations in major advanced economies



Note: Data used for the US is the 5-year/5-year forward inflation expectation rate. Data used for the euro area is the inflation-linked swap rate at 5-year forward 5-year ahead. Data used for Japan is the 5-year/5-year inflation swap rate.
Sources: Bloomberg, Datastream and St Louis Fed.

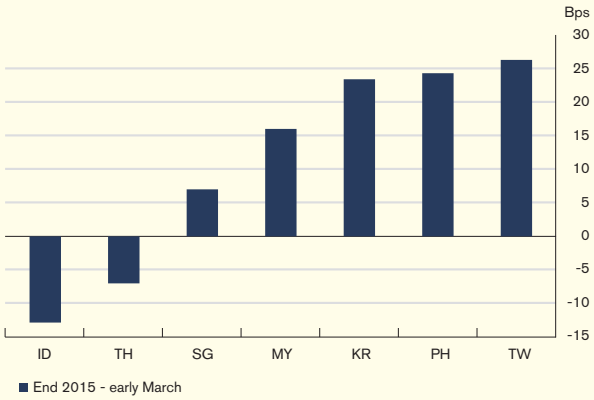
In East Asia[2], financial markets have experienced sharp sell-offs and capital outflow pressures have intensified in the first few weeks in 2016 amid growing concerns over global economic outlook. A number of regional currencies experienced renewed weakness against the US dollar (Chart 2.7) in January before stabilising in February, while equity markets in the region also faced increased selling pressure. Sovereign bond spreads over US Treasuries have widened for most regional economies as well (Chart 2.8). The slump in oil prices has added to market volatilities as it raised concerns over the economic outlook of commodity exporters.

Chart 2.7
Asia: Exchange rate against US dollar



Source: Bloomberg.

Chart 2.8
Asia: Change in yield spread of the 10-year sovereign bond

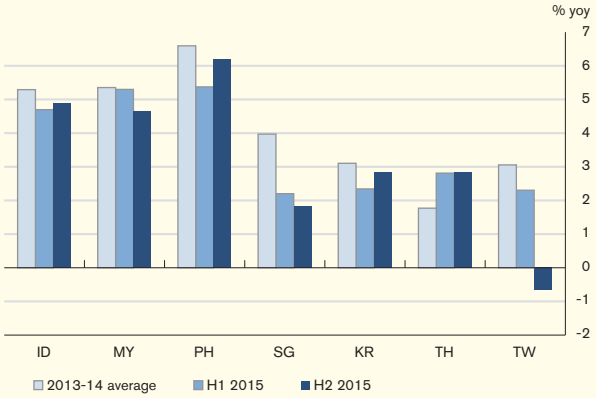


Note: Yield spread over the 10-year US Treasuries.
Source: CEIC.

[2] East Asian economies refer to Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan and Thailand.

With capital outflows and downward pressures on asset prices leading to a tightening of financial conditions, domestic demand in many regional economies has softened. At the same time, exports remained lacklustre against the backdrop of subdued demand from major advanced markets, particularly as the expected positive contribution from the recovery of the US economy to the region's exports has yet to be seen. Against this background, most regional economies experienced moderation in growth performance in 2015 (Chart 2.9).

Chart 2.9
Asia: Real GDP growth



Source: CEIC.

Amidst weakening growth momentum and heightened financial market volatilities, regional central banks are facing an increasingly difficult dilemma in their conduct of monetary policy, having to strike a delicate balance between bolstering growth on one hand and preventing further escalation of capital outflow pressures on the other hand. While a few regional central banks[3] have recently cut their policy rates, most other regional central banks are keeping their policy rates unchanged.

Going forward, the East Asian region will likely face a multitude of risks and challenges. In the near term, while the region's external sector performance will likely continue to be clouded by persistent weakness in global demand, increased risk of a sharper-than-expected global economic slowdown, as well as uncertainties over the pace of monetary policy normalisation in the US and oil and commodity price movements, may also give rise to heightened global financial market volatilities and tighter financial conditions in emerging markets that could pose further downward pressure on growth and capital flows in the region.

The question is how resilient the regional economies are in the face of the current bouts of financial turbulence. Compared to the 1990s, the East Asian region is enjoying stronger external positions, larger stockpile of foreign exchange reserves, as well as fewer currency and maturity mismatches in foreign liabilities. The exchange rate regimes across Asia are also more flexible nowadays, which may serve as a shock absorber in case of capital outflows. A number of regional economies have put in place macro-prudential policy measures to contain the build-up of vulnerabilities which should act as a buffer against future shocks. Nonetheless, the region faces a number of risks that were unseen before:

First, given the unprecedented large scale capital inflows accumulated over the past few years, there could be more capital outflows to come. Up to the third quarter of 2015, only 18% of the US$1.68 trillion cumulative capital inflows to emerging Asian economies since 2009 have exited the region based on balance of payments statistics.[4] The size of potential capital outflows could therefore be significant and may result in disruptive unwinding of financial imbalances.

[3] The central banks of Taiwan and Indonesia respectively lowered their policy interest rates by 12.5 basis points (to 1.625%) in December 2015 and by 75 basis points in total (to 6.75%) in January, February and March 2016.

[4] These emerging Asian economies include Mainland China, Hong Kong, Indonesia, the Philippines, Singapore, South Korea and Thailand.

Second, the financial imbalances in the region built up over the past few years remain a source of vulnerability. In particular, corporate bond issuance in the region has been robust in the past few years, while household debts in some parts of the region also remain elevated. At the same time, the significant amount of US dollar denominated liabilities in the region also suggest that a weakening of regional currencies may put pressures on the repayment ability of borrowers. These factors could continue to pose challenges to the stability of the regional financial system.

Third, the external and domestic environment faced by emerging Asian economies is much less supportive than that in the 1990s. Compared to the 1990s, the Asian exporters are now facing stronger headwinds amid the secular slowdown in major export markets, while domestic demand in many Asian economies is also weakening amid a tightening of financial conditions. In the longer term, it also appears that potential growth in the Asian region has been diminishing, against the background of demographic changes, supply-side bottleneck and a secular slowdown in major export markets.

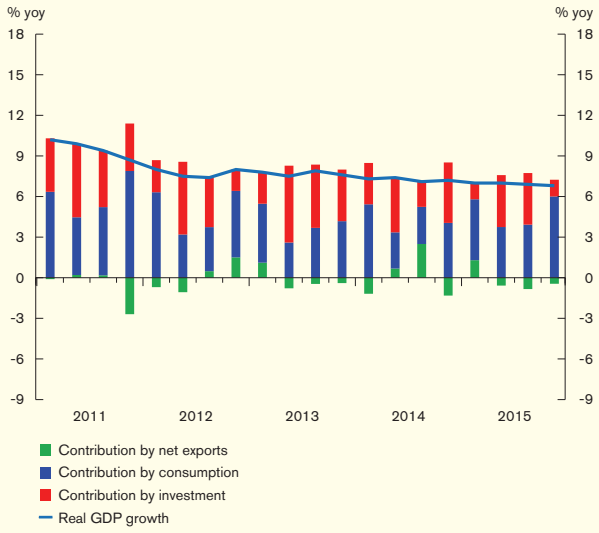
The Asian region's prospect would therefore hinge on the pace of US interest rate hikes, the strength of the US dollar, commodity price trends and growth in major export markets, and how these factors interact with domestic vulnerabilities such as high private-sector indebtedness and stretched asset markets to affect economic growth and financial stability.

2.2 *Mainland China*

Real sector

Economic growth continued to slow in Mainland China, with real GDP growth easing from 6.9% year on year in the third quarter to 6.8% in the fourth quarter of 2015 (Chart 2.10). Among major components, consumption remained solid and continued to be the major growth driver during the period. While accelerated public spending on infrastructure projects and accommodative monetary policies extended some support to investment growth, private business spending remained sluggish amid weakness in the manufacturing sector and lacklustre property markets. For the year as a whole, the Mainland economy expanded by 6.9% in 2015, in line with the government target of around 7% growth.

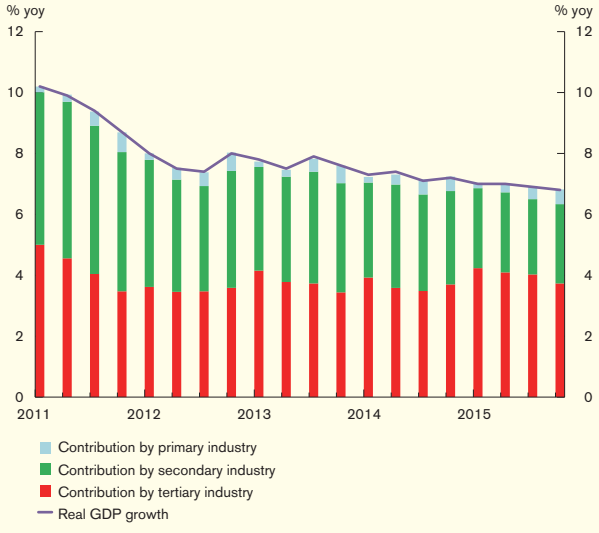
Chart 2.10
Mainland China: contribution to GDP growth by demand component



Sources: CEIC, NBS and HKMA staff estimates.

In value added terms, services continued to outperform manufacturing as the most important contributor to economic expansion. Growth of the secondary industry remained weak in the fourth quarter, despite having rebounded on the interest rate cut and targeted supportive measures to small and medium-sized enterprises. In comparison, the tertiary industry continued to expand at a robust pace in the last quarter of 2015 and contributed about 58% of GDP growth for the whole year, up from around 51% in 2014 (Chart 2.11). Detailed analysis suggests that *wholesale & retail trade* was the most important service segment in terms of contribution to output growth and job creation. Box 1 discusses the potential drivers and bottlenecks for service sector development by examining in greater details the performance of different service segments.

Chart 2.11
Mainland China: contribution to GDP growth by industry



Sources: CEIC, NBS and HKMA staff estimates.

Looking ahead, downward pressures on growth remained amid the ongoing adjustments in the housing market and the manufacturing sector. In particular, restructuring in overcapacity

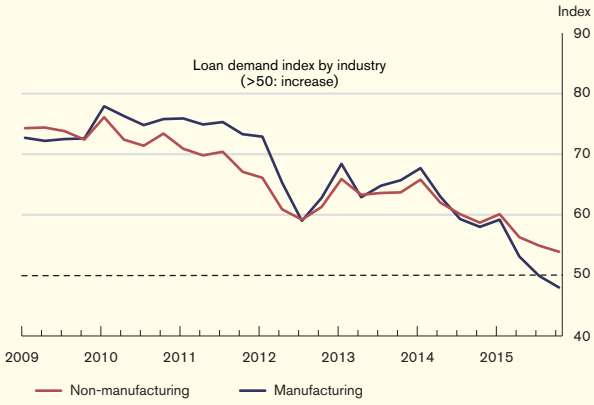
industries would likely continue to weigh on industrial production and labour hiring. The ongoing destocking in the property market especially in lower-tier cities would also remain a drag on real estate sector investment. On the external front, uncertainty in the near-term prospects of the global economy would further exert pressures on Mainland's export performance. In view of increased uncertainty for the economic outlook, the government set this year's economic growth target at between 6.5% and 7%. Latest forecasts by market analysts suggest that real GDP growth would moderate further to 6.4% for 2016.

Upward price pressures remained modest against the background of lukewarm economic conditions. Consumer price inflation eased somewhat from 1.7% year on year in the third quarter to 1.5% in the fourth quarter of 2015, as food prices increased at a slower pace. Meanwhile, producer prices remained on the downward trajectory and fell by 5.9% year on year in the last quarter of 2015, in part due to the sharp decline in international commodity prices as well as sluggish investment demand and overcapacity problems in the manufacturing sector.

Bank lending and asset quality

Less favourable business environment and softening corporate profitability continued to weigh on loan demand. The survey conducted by the People's Bank of China (PBoC) shows a broad-based weakening in loan demand by large and small business owners. Breakdown by industry shows that the loan demand index in the manufacturing sector has dropped below the dividing line of 50, as falling producer prices and sluggish external demand weighed on the confidence of factory owners (Chart 2.12). Amid increased uncertainties over global and domestic economic outlook, the borrowing needs of corporates seem to remain weak as business owners hold back their investment plan.

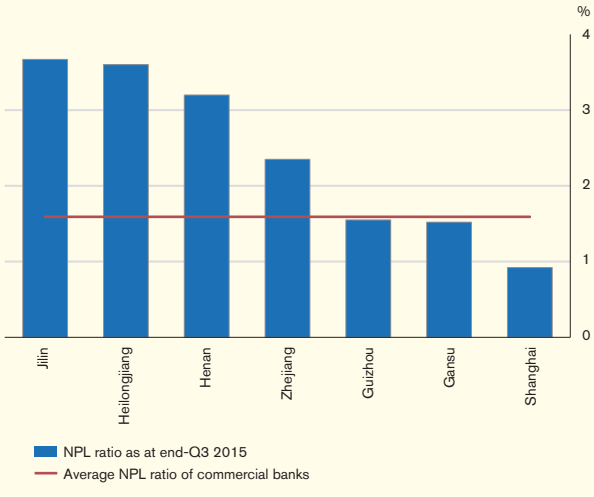
Chart 2.12
Mainland China: Loan demand index by industry



Sources: CEIC and PBoC.

On the supply side, banks are becoming more cautious in loan approvals as asset quality is increasingly under pressure. Non-performing loans (NPLs) of commercial banks picked up to RMB1.3 trillion at the end of 2015, some 50% higher than at the end of 2014. Meanwhile, the NPL ratio also edged up to 1.67% from 1.25%. Breakdown of NPLs by province shows that bank asset quality deteriorated in provinces where heavy industries are concentrated as overcapacity and falling commodity prices have weakened repayment ability of companies in resources and energy related sectors. This can be seen from the relatively high NPL ratio in Jilin, Heilongjiang and Henan provinces, standing at over 3% in the third quarter of 2015 (Chart 2.13).

Chart 2.13
Mainland China: NPL ratio of banks by province



Source: CBRC.

Amid economic headwinds, bank asset quality is expected to weaken this year as the portion of special mention loans picked up noticeably from 3.1% at end-2014 to 3.8% at end-2015. Special mention loans refer to loans that are less than 90 days overdue, which have high probability to turn into NPLs based on historical patterns. There has been a sharper increase in the share of special mention loans for smaller banks given their relatively larger exposure to small firms with higher default probability (Chart 2.14).

Chart 2.14
Share of special-mention loans for major listed banks

Source: WIND.

To contain the increase in problematic loans, some banks particularly joint-stock banks have become reluctant to extend credit to small firms.[5] To step up liquidity support to the real sector, policymakers have used various targeted measures to encourage bank lending to small business owners. For instance, the PBoC allowed a lower RRR for banks with significant lending to the agricultural sector and small and micro-sized enterprises. The central bank also increased the size of medium-term lending facility (MLF) to commercial banks that extend credit to strategically important areas such as small business financing.[6] Underpinned by these targeted liquidity measures, growth of bank credit to small firms rebounded in the fourth quarter of 2015 (Chart 2.15).

Chart 2.15
Loans to small enterprises by type of commercial banks

Source: CBRC.

In the face of higher NPLs, banks have increased provisions to cover potential loan losses. On a year-on-year basis, provisions put aside by commercial banks increased by 18% during 2015, with the bad debt coverage ratio (provisions / NPLs) standing at 181% at the year-end. While this serves as a strong buffer for banks to cope with deterioration in asset quality, increased provisions have also exerted downward pressure on growth of net profits of banks, which slowed to 2.4% in 2015, down from 9.6% in 2014. Reflecting this, return on equity declined from 17.6% at end-2014 to 15.0% at end-2015.

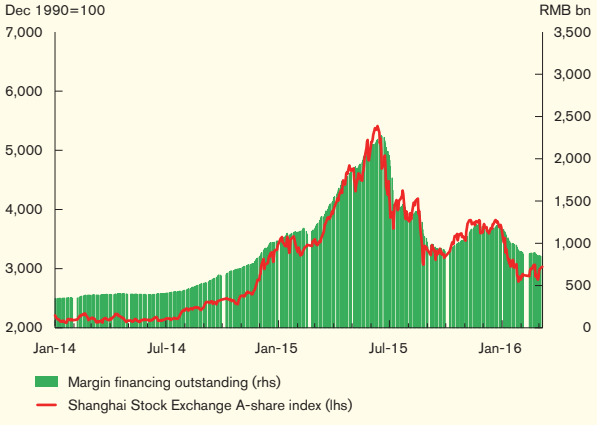
[5] For example, China Merchants Bank stated in its 2015 interim report that the bank cut back lending to small enterprises with potential risk of default against the backdrop of economic slowdown.

[6] The PBoC lowered the interest rate of MLF with tenor of 6 months by 10 basis points to 3.25% in November 2015, and increased the size of medium-term loans extended to commercial banks by some RMB180 billion in the fourth quarter last year.

Asset markets

During the review period, the Mainland stock markets remained volatile. Following the market turbulence last summer, the Shanghai A-share index rebounded initially in October and November, but then plummeted by 18% in the first half of January (Chart 2.16). In order to stabilise the market, the China Securities Regulatory Commission (CSRC) introduced a circuit-breaker system in early-January, which however was suspended later on as it failed to meet the policy objective. Since the marked sell-offs last summer, stock valuations have already come down to a more reasonable level and leveraged trading activities were also much less pervasive. For instance, the outstanding size of margin financing came down significantly to an average of RMB883 billion in February from the peak of RMB2,300 billion last June. Informal margin financing also shrank markedly as the authorities stepped up efforts to mop up leveraged trading through unregulated channels.

Chart 2.16
Mainland China: Shanghai A-share index and margin financing



Sources: CEIC and HKMA staff estimates.

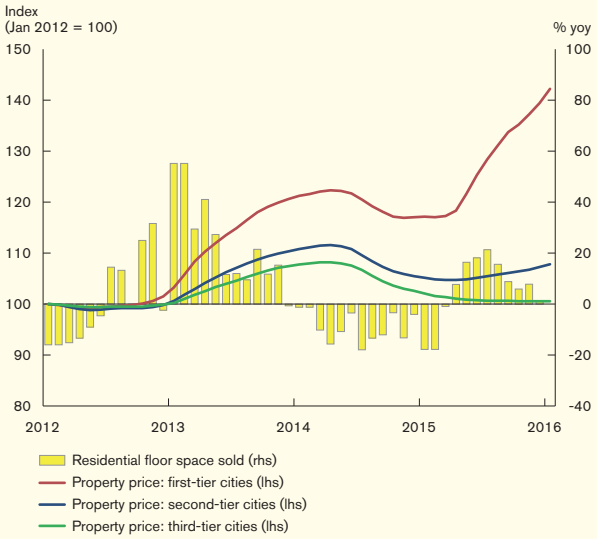
To facilitate direct financing of corporates, the CSRC resumed initial public offerings last November, lifting the suspension put into effect in July during the stock market crash. Several policy measures such as refining the listing system, conducting stress tests on securities and futures firms on a regular basis, and cracking down on informal and illegal trading activities, were also introduced to promote healthy and sustainable development of the stock market.

On the corporate bond market, there have been signs of overheating recently. The yield spread of 5-year AAA corporate bond over Ministry of Finance bond narrowed to less than 10 basis points in September 2015 before widening somewhat recently. The unusually low yield spread of corporate bonds has raised concern over the risk of mispricing of credit risk of bond issuers given deterioration in corporate earnings. Some investors even increased borrowing from the exchange repo market to leverage up their investment in corporate bonds. Box 2 assesses the risk of leveraged activities in the corporate bond market and the impact of a sharp correction in corporate bond prices on financial stability. Our findings suggest that given the small outstanding size of corporate bonds relative to the stock of aggregate financing and little bank exposure to corporate bonds, the systemic risk associated with mispricing in the corporate bond market should be limited.

In the property market, while market conditions continued to improve at national level, performance was mixed across different cities. During the review period, market transactions remained active, with the overall floor space sold continuing to expand in the fourth quarter but

at a slower pace compared with previous quarter. On the price side, the overall house prices rose by 0.6% and 0.5% on a sequential basis in the third and fourth quarters respectively, underpinned by buoyant market conditions in higher-tier cities. In contrast, property prices in lower-tier cities remained largely unchanged during the period as oversupply problems continued to linger.[7] (Chart 2.17)

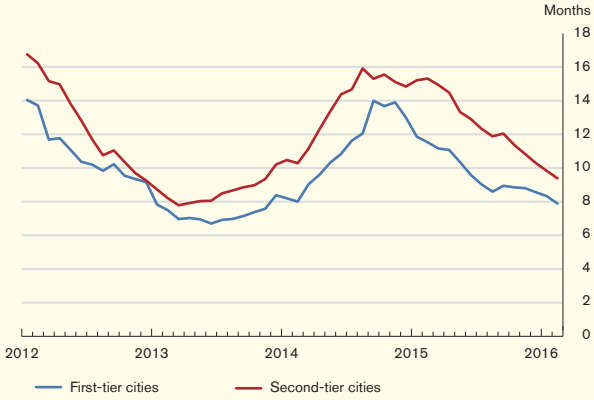
Chart 2.17
Mainland China: house prices and floor space sold



Sources: NBS, Wind and HKMA staff estimates.

The divergence in property market performance between higher- and lower-tier cities is likely to persist on different demand and supply conditions. In particular, while housing inventory in first- and second-tier cities fell to low levels in recent months (Chart 2.18), weak demand and oversupply issues remained in lower-tier cities. Some market research suggests that the inventory to sales ratio decreased in third-tier cities from the beginning of last year but remained at high levels of around 20 months at the year end.[8]

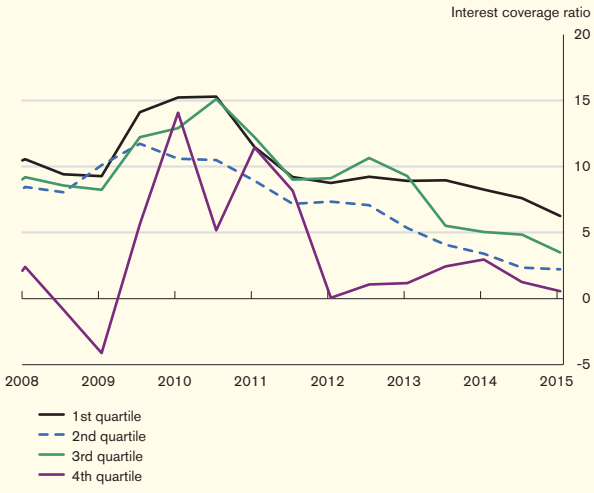
Chart 2.18
Mainland China: housing inventory to sales ratio



Sources: Wind and HKMA staff estimates.

In the near term, lingering oversupply issues in lower-tier cities will inevitably exert pressures on developers operating in these markets, especially those with weak financial positions. Listed company data show that financial viability of smaller developers was particularly low, with the interest coverage ratio of some even slipping below one (purple line in Chart 2.19). This may suggest that the real estate industry will likely see further consolidation in periods ahead. Latest data show that in the first nine months of 2015, merger and acquisition deals of private developers totalled more than US$4.5 billion.

Chart 2.19
Mainland China: interest coverage ratio of listed property developers by asset size



Sources: Bloomberg and HKMA staff estimates.

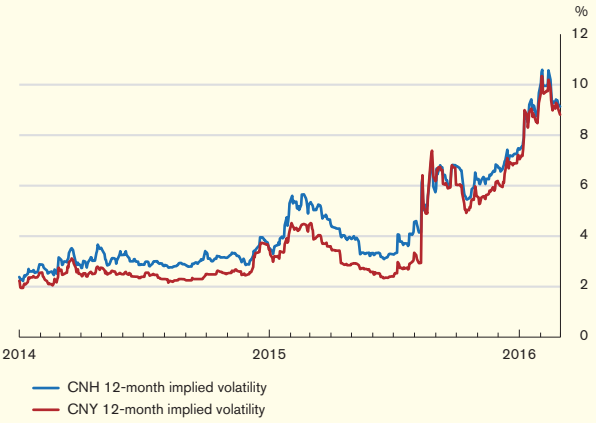
[7] House prices in 1st-tier, 2nd-tier and 3rd-tier cities increased by 1.6%, 0.5% and stayed unchanged from the previous month in December respectively.

[8] Estimate is from "China real estate market: 2015 summary" by China Index Academy.

Exchange rate and money market

Following the refinement to the fixing mechanism of the central parity rate in August last year, the renminbi exchange rate has become more market driven. The renminbi depreciated by 4.5% against US dollar in 2015, and weakened by 1.3% in January before stabilising in February this year. With the renminbi exchange rate becoming more flexible, market participants have expected higher exchange rate volatility over the near term (Chart 2.20).

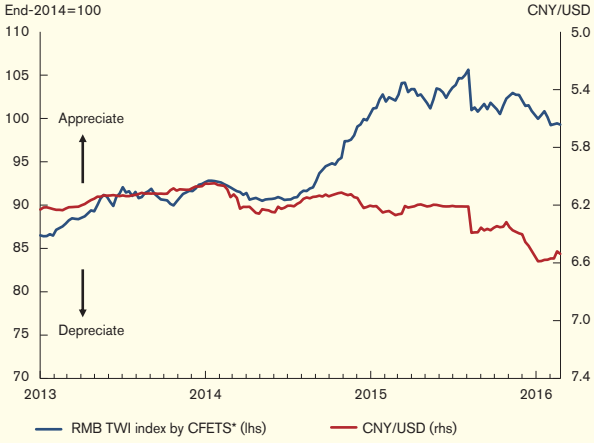
Chart 2.20
Mainland China: Option implied volatility of the CNY and CNH exchange rates



Source: Bloomberg.

Despite increased volatility in the bilateral exchange rate of the renminbi against the US dollar, the renminbi has remained relatively stable against the currencies under the trade weighted index (TWI) basket. The renminbi TWI, which captures the movement of the renminbi against the currencies of 13 major trading partners, moved within a narrow range for most of the time in 2015, and registered a mild depreciation of 0.37% from end-2014 to February 2016 (Chart 2.21).

Chart 2.21
Mainland China: RMB trade weighted index and the CNY exchange rate



* Data before December 2015 is estimated based on the weights of TWI basket.

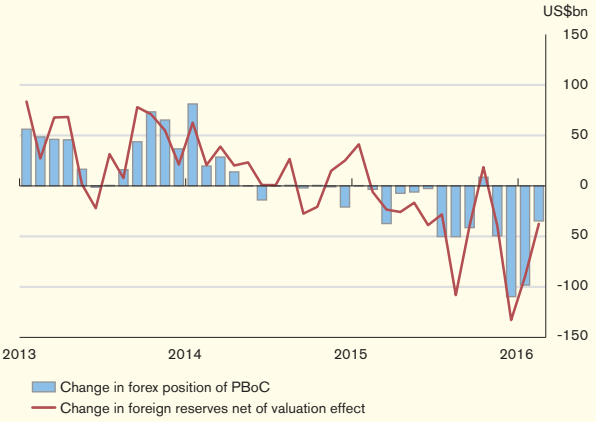
Sources: CEIC, Bloomberg and HKMA staff estimates.

With a relatively steady central parity rate, the CNY exchange rate strengthened by 0.5% in February to close at 6.5472 at the end of the month. While the CNY exchange rate could become more volatile in the near term, Mainland's relatively strong fundamentals such as decent current account surplus, faster economic and productivity growth relative to other major economies, and ample foreign reserves would support the renminbi exchange rate over the medium term.

Amid a weaker renminbi and less certain economic outlook, outflow pressures increased during the second half of 2015. To stabilise the renminbi exchange rate, the foreign exchange position of the PBoC shrank by US$350 billion in 2015, which largely explained the decline of some US$400 billion in official reserve assets net

of valuation effect (Chart 2.22).[9] Outflow pressures appear to have stabilised in February, with the decline in official foreign reserves narrowing to US$29 billion from US$99 billion in January. The decrease in foreign reserves at the start of the year was partly due to seasonal factors as Mainland residents converted renminbi into foreign currencies subject to a quota of US$50,000 per person per year. Some Mainland companies also chose to pay off their US dollar debt at the beginning of the year to reduce exposure to exchange rate risk. As the effect of these activities dissipates, together with the recent softening of the US dollar, outflow pressure is likely to ease in the coming months.

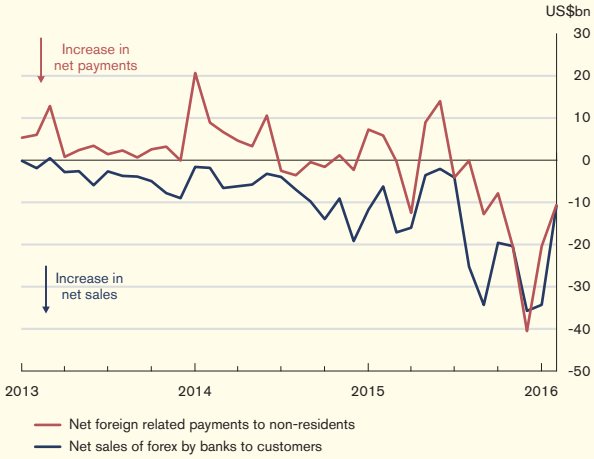
Chart 2.22
Mainland China: Changes in PBoC's foreign exchange position and foreign reserves



Sources: CEIC, Bloomberg and HKMA staff estimates.

While the increase in outflow pressure over the past few months has been partly driven by cross-border outflows, it also reflected asset-liability rebalancing by Mainland residents. In terms of cross-border flows, foreign related payments and receipts show that net payments to non-residents not related to trade and foreign direct investment (FDI) reversed from net inflows in the first half of 2015 to net outflows in the second half, resulting in a marked increase in net sales of foreign exchange by banks to customers (Chart 2.23).

Chart 2.23
Mainland China: Net foreign related payments to non-residents and net sales of forex by banks not related to trade and FDI



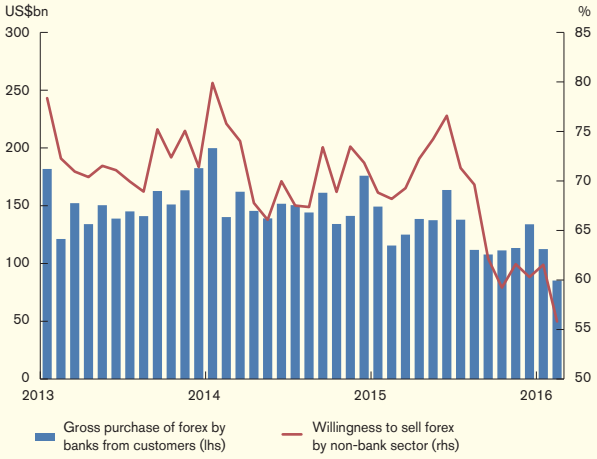
Sources: SAFE and staff estimates.

Given that portfolio investment flows are still subject to the quotas set under the QDII and QFII schemes, the size of potential cross-border flows through the portfolio investment channel should be limited. In fact, the asset-liability rebalancing by Mainland residents plays a role in explaining the increase in outflow pressure lately. Over the past few years, the trend of renminbi appreciation provided a strong incentive for residents to hold most of their assets in terms of renminbi, while business owners increased borrowing in US dollar to benefit from the low interest rates. Recently, the less certain economic outlook and increased volatility in the renminbi exchange rate have prompted Mainland residents to reallocate their assets by holding more foreign currencies and less renminbi so as to achieve a more balanced portfolio. This can be seen from the increase of US$371 billion in gross sales of foreign exchange by banks to customers during 2015. Part of the foreign exchange purchased by residents has been recycled back to the domestic banking sector.

[9] The decline in the headline official foreign reserves was US$513 billion in 2015.

Meanwhile, Mainland residents are more inclined to retain their foreign currency receipts and delay the conversion back to renminbi, with the gross purchase of foreign exchange by banks from customers shrinking by US$300 billion in 2015, the largest decline on record (Chart 2.24). It is believed that a substantial part of these foreign currency receipts has been placed with overseas banks as offshore deposits.

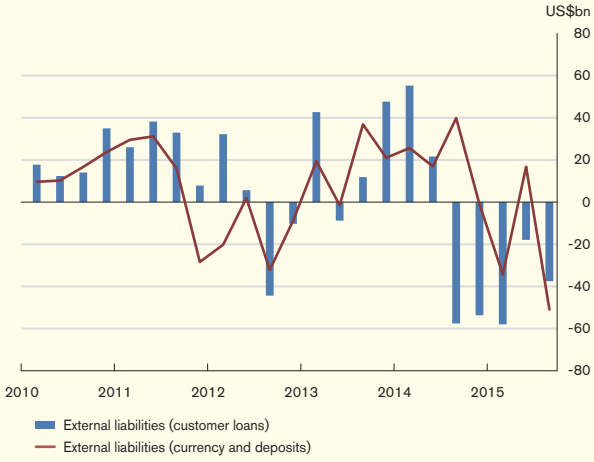
Chart 2.24
Mainland China: Gross purchase of foreign exchange by banks and willingness to sell foreign exchange by the non-bank sector[10]



Sources: CEIC and HKMA staff estimates.

Apart from achieving a more balanced portfolio on the asset side, non-bank Mainland entities have also reduced their foreign currency liabilities by paying off external debt. Balance of payments (BoP) statistics show that the Mainland non-bank sector cut back their overseas borrowing by some US$110 billion during the first three quarters of 2015 to reduce exposure to exchange rate risk given their earnings are mainly denominated in renminbi (Chart 2.25). Reflecting reduced demand for foreign currency loans, Mainland banks also trimmed down their external liabilities to foreign counterparts.

Chart 2.25
Mainland China: BoP external liabilities: customer loans versus currency and deposits



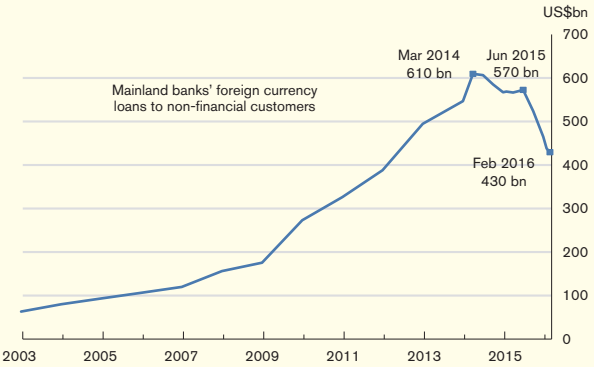
Sources: NBS, CEIC and HKMA staff estimates.

Banking statistics show that Mainland firms cut back their foreign currency borrowing following RMB depreciation in the second half of last year. This can be seen from the decline of foreign currency loans extended by Mainland banks to non-financial entities, by US$140 billion between June 2015 and February 2016 (Chart 2.26). Comparing to the peak in March 2014, domestic foreign currency loans have declined by 30% by the end of February this year. While in the offshore market, US dollar loans extended by banks in Hong Kong to their non-bank customers on the Mainland exhibited a similar trend, shrinking by US$7 billion, or 12%, during the second half of 2015 (Chart 2.27).[11]

[10] Willingness to sell foreign exchange by the non-bank sector is defined as the ratio of foreign currency purchase by banks from customers relative to the non-RMB foreign related receipts by banks on behalf of their customers.

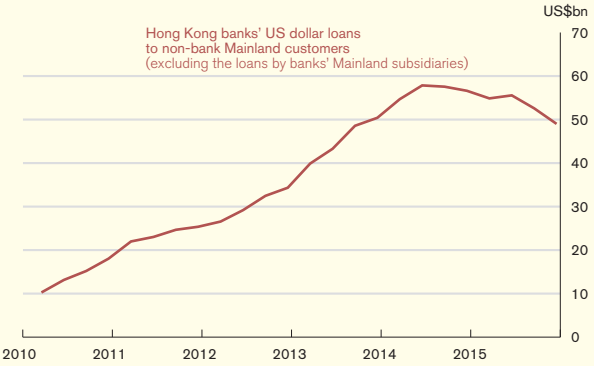
[11] According to BIS international banking statistics, banks in Hong Kong provided about one-third of the external dollar credit to the non-bank sector in Mainland China.

Chart 2.26
Mainland China: Domestic foreign currency loans to non-financial customers



Sources: PBoC and staff estimates.

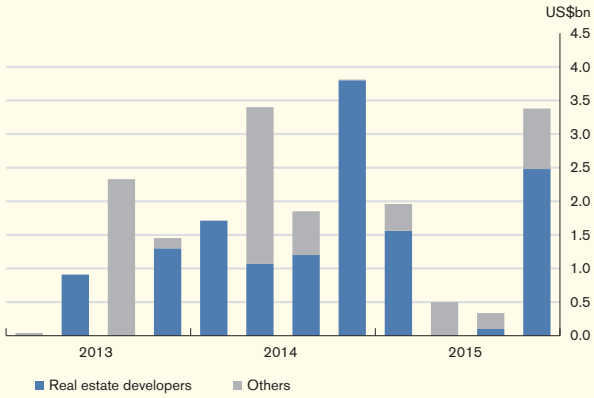
Chart 2.27
Mainland China: US dollar loans by Hong Kong banks to Mainland non-bank sector



Sources: HKMA and staff estimates.

Mainland firms not only reduced their foreign currency borrowing in both onshore and offshore markets, but also increased the pace of early redemption of their US dollar bonds issued in the offshore market. Based on corporate announcements made by listed company in Hong Kong, Mainland firms redeemed US dollar bonds worth of US$3.4 billion before maturity in the fourth quarter of last year, which is one of the quarters with largest early redemption in recent years. Breakdown by issuer shows that most of the early redemption is exercised by Mainland real estate developers, who have actively tapped US dollar funds in the offshore bond market to benefit from low US dollar interest rates over the past few years (Chart 2.28).

Chart 2.28
Mainland China: Early redemption of offshore US dollar bonds by Mainland firms listed in Hong Kong

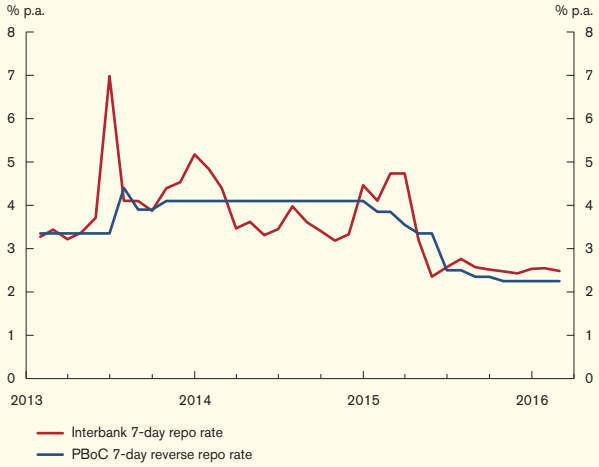


Sources: HKEx and staff estimates.

Despite increased outflow pressures, liquidity conditions remained largely stable in the interbank market. The PBoC injected liquidity into the banking system through reverse repo and other quantitative instruments such as short-term liquidity operation (SLO) and medium-term lending facility (MLF) to keep short-term interest rates stable.[12] Both 7-day repo rate and 1-month Shanghai Interbank Offered Rate (SHIBOR) traded within a narrow range for most of the time in January and February. To lower bank funding costs, the PBoC cut the interest rate of 7-day reverse repo by 10 basis points to 2.25% in October last year, which is below the interbank repo rate of comparable tenor (Chart 2.29).

[12] During January, the PBoC injected a net amount of RMB1.2 trillion into the banking system through short-term reverse repo and extended medium-term loans of a net amount of RMB610 billion to banks through MLF to meet the seasonal liquidity demand before the Lunar New Year.

Chart 2.29
Mainland China: Interbank 7-day repo rate and PBoC reverse repo rate



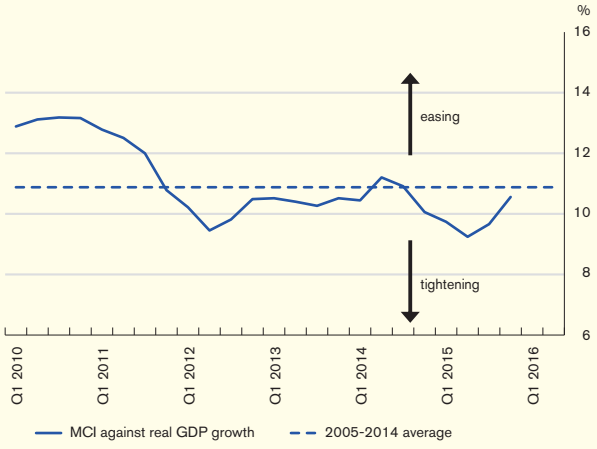
Sources: CEIC and HKMA staff estimates.

Fiscal and monetary policy

The 2016 Government Work Report highlighted that one of the major tasks of this year is to tackle major structural problems through supply-side reforms, including cutting industrial capacity, destocking property market, de-leveraging, lowering corporate costs and improving weak links in the economy. While restructuring would benefit growth in the long run, the government is also well aware of its short-term negative impact on growth. To strike a balance between restructuring and stabilising growth, the authorities will adopt a prudent monetary policy that is flexible and appropriate as well as a more proactive fiscal policy this year.

On the monetary policy front, Zhou Xiaochuan, governor of the PBoC, reportedly characterised the current monetary policy stance as "prudent with a slight easing bias", with M2 growth being targeted slightly higher at around 13% in 2016 from 12% in 2015 according to the 2016 Government Work Report. During the review period, the central bank had accelerated the targeted measures to lower the financing costs for enterprises and support infrastructure spending while refraining from across-the-board balance sheet expansion. For instance, starting from last October, the coverage of Pledged Supplementary Lending (PSL), a relending facility, has been broaden to all policy banks to support the financing of key infrastructure projects such as slum reconstructions and water conservancy. Meanwhile, in addition to the cut of benchmark 1-year lending and deposit rates by 25 basis points to 4.35% and 1.5% respectively and the required reserve ratio (RRR) by 100 basis points in total to 17% and 15% for large banks and small banks respectively during the review period, the PBoC also lowered RRR by an additional 50 basis points for financial institutions providing sufficient lending support to small and micro-sized enterprises and the agricultural sector. To improve the credit market efficiency, the PBoC also removed the ceiling of banks' deposit rates, which completed the last step of interest rate liberalisation. Our in-house monetary condition index indeed pointed to some signs of loosening in recent periods (Chart 2.30). In particular, the effective bank lending rate declined further by 16 basis points in the fourth quarter in real terms, while the increase in real effective exchange rate also slowed notably in recent months.

Chart 2.30
Mainland China: Monetary condition index



Sources: CEIC and HKMA staff estimates.

On the fiscal policy front, the authorities also stepped up fiscal spending in the second half of 2015 in an effort to stabilise the economy. To facilitate the supply-side economic reform and stave off downward pressures on growth, policy-makers have placed more emphasis on cutting tax to boost both demand and effective supply and will further reduce taxes and fees for enterprises and individuals by more than RMB500 billion this year, in addition to allocating larger outlays for infrastructure projects such as railway and road construction. As a result, the government increased the budget deficit from 2.3% of GDP in 2015 to 3% of GDP in 2016.

The overall risks of local government debt remained largely contained, particularly given that the growth rate of local government debt slowed noticeably in 2015. For instance, the ceiling of local government debt for 2015 was set at RMB16 trillion, less than 4% increase from the RMB15.4 trillion outstanding local government debt at end-2014. That said, funding pressures of local governments had increased as land sales revenue fell by 21.4% in 2015. Detailed analysis shows that some local governments even recorded declines in overall fiscal revenue amid the recent economic slowdown. Nonetheless, the authorities pledged to further expand the local government debt-swap program in 2016, which would help reduce the refinancing pressures and interest burden of local governments.[13]

[13] For example, the average interest cost of debt under the RMB3.2 trillion debt-swap program in 2015 was reduced sharply from around 10% per annum to around 3.5% per annum, suggesting a reduction in interest burden of more than RMB200 billion per year for local governments.

Box 1
Analysis on service sector developments in Mainland China

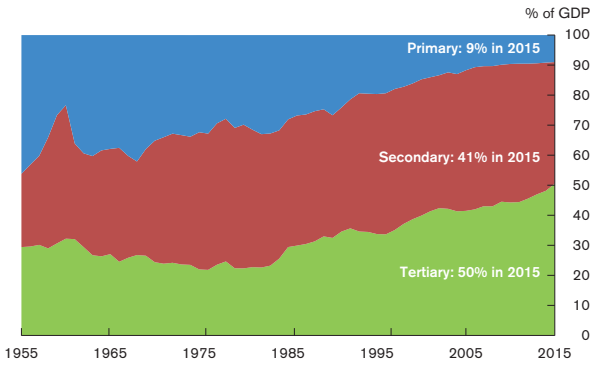
Introduction

The service sector has been expanding very fast over the past decades in Mainland China and has overtaken the manufacturing sector as the most important growth engine and employment provider. However, less is known about the patterns of development among the segments of the service sector. In view of this, this box takes a closer look at the relative performance of different segments of the service sector in terms of output growth and job creation and compares it with international experience. Potential drivers and bottlenecks for service sector development are also discussed.

Fast expansion of the service sector on the Mainland

The Mainland service sector has started to boom since the early 1980s, as the authorities started to open up the economy and implement economic reforms. After three decades of growth and development, the service sector has overtaken manufacturing to become the most important value-creation sector of the Mainland economy in 2012, with the share in GDP increasing from over 20% to above 50% (Chart B1.1).

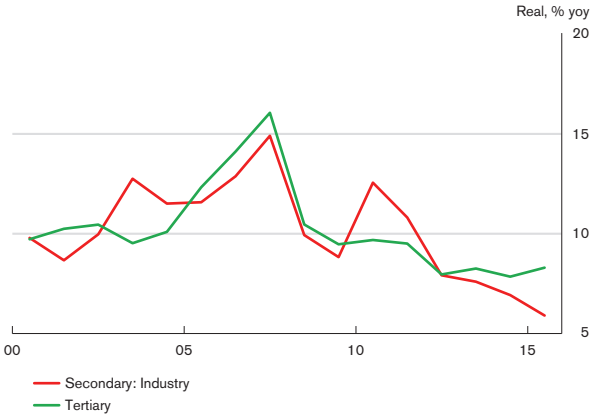
Chart B1.1
Share in Mainland GDP by industry



Sources: CEIC and HKMA staff estimates.

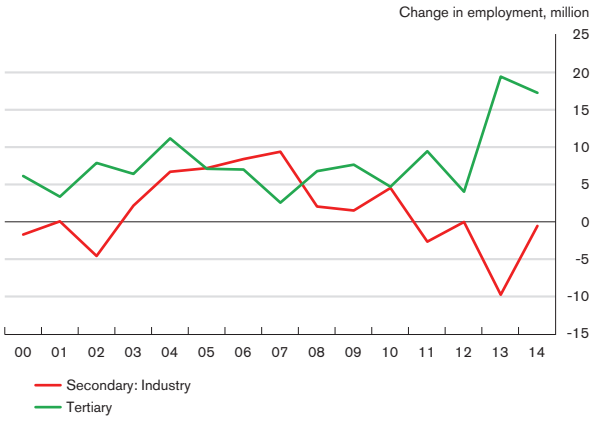
The performance of the service sector remained robust amid the recent economic slowdown. In particular, services continued to hold up well and grew at around 8% per year in real terms after a temporary deceleration in 2010–2011(Chart B1.2). In comparison, growth of the manufacturing sector has slowed significantly since the global financial crisis to 6% year on year recently. Echoing the strong growth of services, the number of net new jobs in the service sector has also picked up noticeably since 2012, which offset the declines in manufacturing employment (Chart B1.3).

Chart B1.2
Services and industry growth: 2000–2015



Sources: CEIC and HKMA staff estimates.

Chart B1.3
Net new jobs in services and industry: 2000–2014



Sources: CEIC and HKMA staff estimates.

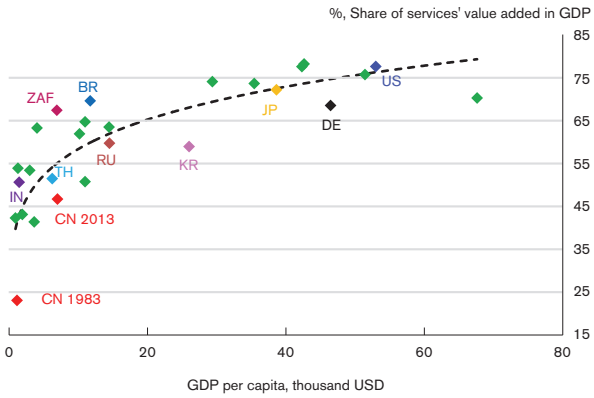
Key growth drivers for the service sector on the Mainland

The development of the service sector on the Mainland is closely related to the country's level of economic development, urbanisation, and market liberalisation. On the demand side, as per capita income rises, households' basic need for food and shelter shifts towards non material goods, such as personal services and entertainment. Fast economic development also requires the support from a well-functioning financial system to mobilise savings and facilitate investment. In addition, unparalleled pace of urbanisation on the Mainland has shifted more than half of the population away from farming, and given rise to hundreds of cities with more than 1 million residents. A growing agglomeration of people in the urban area with improving living standards generates huge demand for trade, logistics, housing as well as social services.

On the supply side, market liberalisation in the service sector also greatly boosted productivity. In particular, service sector reforms aiming to abolish monopolies, eliminate barriers to entry, and commercialise state-owned enterprises have not only improved the sector's efficiency markedly, but also increased both the width and the depth of service products available.

Similar to the experience in many other economies, the service sector in Mainland China expands as per capita income improves. While cross-country comparison suggests that less developed economies normally tend to have an inferior service sector, the development level of the service sector in Mainland China remained below the emerging market average despite the fast growth in the sector (Chart B1.4). In particular, compared with economies with a similar level of GDP per capita, such as South Africa and Thailand, the Mainland had a smaller service sector in terms of share in GDP. Even with a much lower level of per capita GDP, India's output share of the service sector is similar to that of Mainland China.

Chart B1.4
Service sector development and per capita GDP: 2013



Sources: CEIC, World Bank and HKMA staff estimates.

The uneven levels of development within the Mainland service sector

Although the past decades had witnessed tremendous growth of the Mainland service sector as a whole, different segments of services exhibited distinct levels of developments. For instance, benefiting from the ongoing financial liberalisation and fast urbanisation, *financial intermediation* and *wholesale & retail trade* registered the fastest pace of expansion, on average at around 15% per year during the period

of 2005–2012 (Table B1.A). *Scientific research* and *leasing & commercial services* also grew fast at around 13% and 12% per year respectively on increased demand for services supporting business activities. In comparison, some segments such as *transport, storage & post, accommodation & catering* and *IT, computer services & software*, on average expanded at the slowest paces of 8.6%, 8.4% and 7.6% each year respectively.

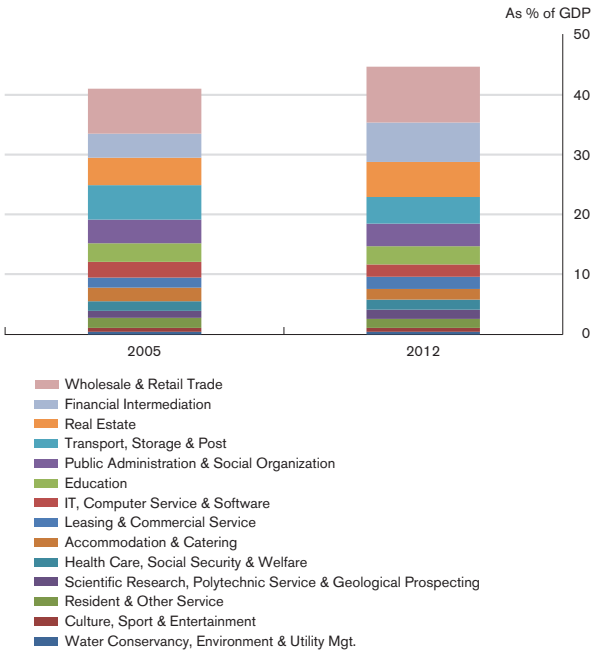
Table B1.A
Growth of service segments and their contributions to GDP growth: 2005–2012

	Growth rate (%, annualised)	Contribution to growth (%)
GDP	**10.6**	**–**
Secondary: Industry	**11.5**	**42.6**
Tertiary	**11.2**	**45.1**
Financial Intermediation	**14.8**	**7.2**
Wholesale & Retail Trade	**14.7**	**11.4**
Scientific Research, Polytechnic Service & Geological Prospecting	**12.9**	**1.6**
Leasing & Commercial Service	**11.6**	**2.0**
Real Estate	**10.6**	**4.9**
Health Care, Social Security & Welfare	**9.9**	**1.4**
Education	**9.8**	**2.8**
Public Administration & Social Organization	**9.8**	**3.7**
Culture, Sport & Entertainment	**9.7**	**0.6**
Resident & Other Service	**9.6**	**1.4**
Water Conservancy, Environment & Utility Mgt.	**9.2**	**0.4**
Transport, Storage & Post	**8.6**	**4.3**
Accommodation & Catering	**8.4**	**1.7**
IT, Computer Service & Software	**7.6**	**1.8**

Sources: CEIC, China Statistical Yearbook of the Tertiary Industry (varied years) and HKMA staff estimates.

As a result, the shares of *wholesale & retail trade* and *financial intermediation* in GDP increased from 7.5% and 4% to 9.3% and 6.6% respectively during the period of 2005–2012 (Chart B1.5). *Real estate management* had also gained importance amid fast economic growth and urbanisation, with its share in GDP expanding from 4.6% to 5.8% during the same period. Due to relatively slower growth, the shares in GDP of some segments were little changed over time or even shrank, such as *transport, storage & post, accommodation & catering* and *IT, computer services & software*.

Chart B1.5
Share in Mainland GDP by service segment



Sources: CEIC, China Statistical Yearbook of the Tertiary Industry (varied years) and HKMA staff estimates.

With their varied shares in GDP and paces of expansion, different segments of services have exhibited distinct impact on output growth. For instance, *wholesale & retail trade* and *financial intermediation* were the most important value creators for the period of 2005–2012, on average contributing 11.4% and 7.2% of GDP growth each year.

In terms of job creation, the share of service sector employment in total employment rose to around 36% from about 31% during the period of 2005–2012, suggesting an annual average growth rate of 2.4% (Table B1.B). Among all segments, *wholesale & retail trade* dominated job creation, with its share in total employment increasing to 11.7% in 2012 from 7.4% in 2005. The shares of the employment of some segments such as *education, public administration,* and *transportation, storage & post* in total employment were also prominent, but declined over time, likely due to the ongoing market liberalisation which greatly boosted productivity and reduced labour redundancy. In contrast, while some business-related segments such *as scientific research, IT, computer services & software* and *leasing & commercial services* enjoyed the fastest expansion paces in employment, their shares in total employment were relatively small.

Table B1.B
Growth of service segment employment and their shares in total employment: 2005–2012

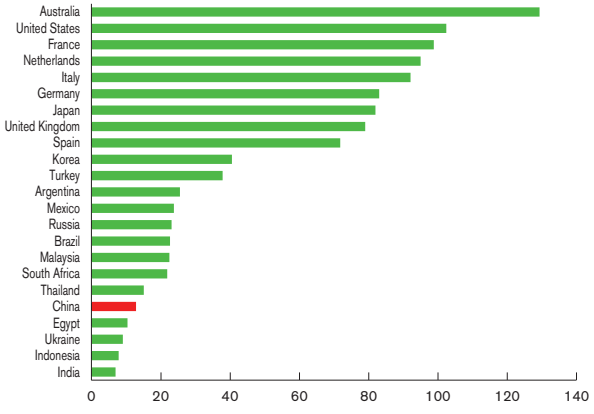
	Growth rate (% annualised)	share in total employment, 2005 (%)	share in total employment, 2012 (%)
Total employment	**0.4**	**–**	**–**
Manufacturing	**2.5**	**15.4**	**17.8**
Tertiary Industry	**2.4**	**31.4**	**36.1**
Scientific Research, Polytechnic Service & Geological Prospecting	9.0	0.8	1.5
IT, Computer Service & Software	7.7	0.7	1.1
Leasing & Commercial Service	7.7	1.3	2.1
Real Estate	7.4	0.7	1.2
Wholesale & Retail Trade	7.2	7.4	11.7
Resident & Other Service	6.8	1.1	1.6
Accommodation & Catering	4.4	1.6	2.1
Financial Intermediation	0.5	1.3	1.3
Water Conservancy, Environment & Utility Mgt.	0.2	0.7	0.7
Culture, Sport & Entertainment	0.0	0.6	0.5
Transportation, Storage & Post	-0.2	2.8	2.7
Health Care & Social Security & Welfare	-0.4	1.9	1.8
Public Administration & Social Organization	-3.8	5.1	3.8
Education	-4.2	5.4	3.9

Sources: CEIC, China Statistical Yearbook of the Tertiary Industry (varied years) and HKMA staff estimates.

Service productivity in Mainland China: relatively low but with room to improve

Despite the fast expansion, the Mainland service sector suffers a relatively low level of labour productivity. Cross-country comparison suggests that the productivity of the Mainland service sector was much lower even than other major emerging economies, such as Russia, Brazil, and South Africa (Chart B1.6). On one hand, a low level of labour productivity may reflect the fact that the production technology of the Mainland service sector remains largely labour intensive at the current development stage. On the other hand, the productivity gap between Mainland China and other major emerging countries may suggest that the domination of state-owned enterprises in the service sector has constrained productivity from further improving because of limited entry or competition. As labour productivity of the service sector is still below that of the manufacturing sector, Mainland's economic growth will likely slow during its transition from investment- and manufacturing-led to consumption- and service-led economy.

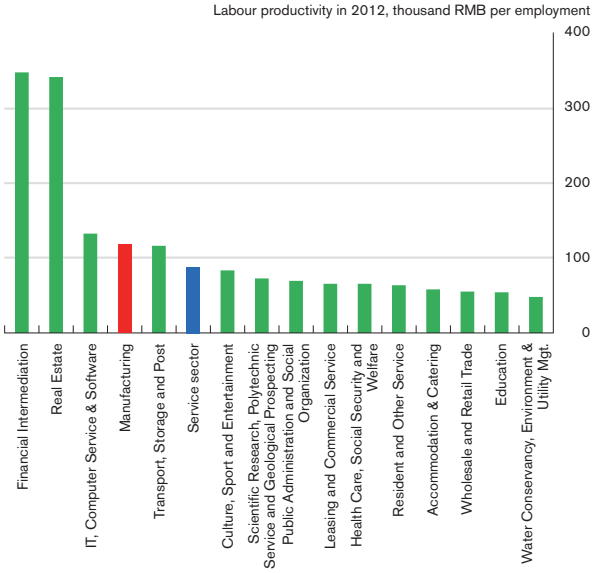
Chart B1.6
Cross-country comparison of service sector labour productivity: 2013



Sources: World Bank and HKMA staff estimates.

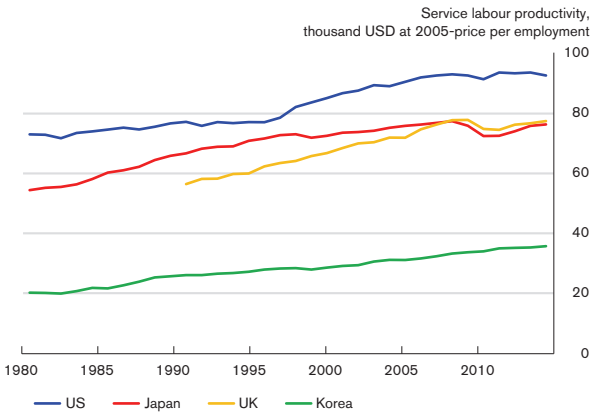
That said, the relatively low level of productivity also means that there is plenty of room to improve the Mainland service sector productivity over the medium term. First, there are some segments exhibiting much higher labour productivity than the manufacturing sector, such as *financial intermediation* and *real estate* (Chart B1.7). Should these segments continue to expand, the overall productivity of the service sector will likely improve. Second, Mainland China may continue to benefit from cross-country technological spillovers should the service sector be further opened up. Indeed, international experience suggests that service sector labour productivity tends to improve over time (Chart B1.8).

Chart B1.7
Labour productivity of the service and the manufacturing sectors: 2012



Sources: CEIC and HKMA staff estimates.

Chart B1.8
Evolution of labour productivity of the service sector in selected economies



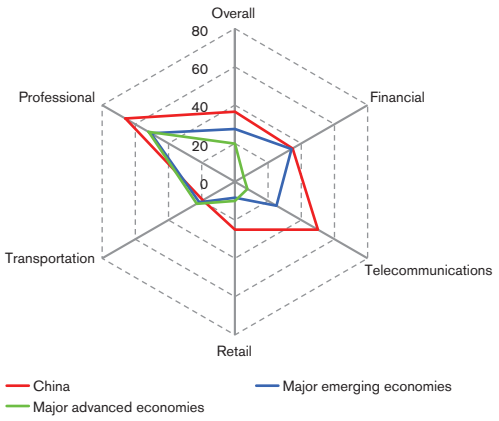
Sources: CEIC, World Bank and HKMA staff estimates.

Where are the bottlenecks for further developments of the Mainland service sector?

The fact that the Mainland service sector has lagged behind international standard in terms of size and productivity points to the existence of bottlenecks. To promote the modernisation and increase value-added content of the service sector, the Mainland needs to establish a level playing field for all service providers by breaking down regulatory barriers which protect vested interests. According to the World Bank Service Trade Restrictions Index, the degree of discrimination on the Mainland against foreign services or service providers is ranked the 27th highest out of 103 economies, higher than most major emerging economies. More specifically, foreign entry is found to be particularly restrictive especially in some service segments

such as *telecommunications, retail,* and *professional services* (Chart B1.9). The fact that foreign competitors remain largely kept out of these sectors will inevitably hinder the technological spillovers from international market leaders. Meanwhile, limited private capital participation in certain service segments also staves off competition and lowers efficiency. In addition, deepening the human capital stock by establishing a better education system is also needed for speeding up the transition of the service sector. Currently, Mainland China is ranked relatively low in both average and expected years of schooling compared with other major emerging economies according to the Education Index published by the United Nations.

Chart B1.9
Services Trade Restrictions by segment



Note: Higher scores refer to greater restrictions of foreign entry.
Sources: World Bank and HKMA staff estimates.

Conclusion

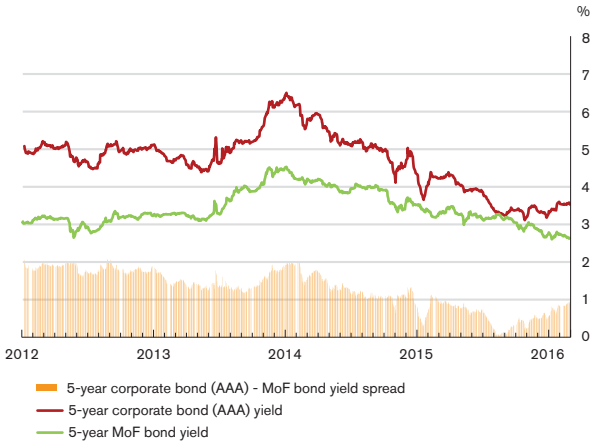
While the Mainland service sector has been expanding very fast over the last decades, different service segments have performed quite differently in terms of value addition and job creation, depending on how much they have benefited from the fast economic development and the ongoing urbanisation and market reforms on the Mainland. Given the relatively lower productivity of the service sector as a whole compared with the manufacturing sector, Mainland China will likely experience economic slowdown during its transition to a service-driven economy. That said, there is still room to improve the productivity of the service sector, should bottlenecks such as barriers to entry and limited human capital stock be successfully eliminated.

Box 2
Leveraged activities in the Mainland corporate bond market

Signs of overheating in the Mainland corporate bond market

Concerns over the risk of mispricing have increased in the Mainland corporate bond market. Despite deterioration in corporate earnings, the yield spread of corporate bonds has narrowed to unusually low levels in the second half of last year, with the bonds issued by corporates of prime credit ratings pricing almost at par with the bonds issued by the Ministry of Finance (MoF) in September 2015 (Chart B2.1).

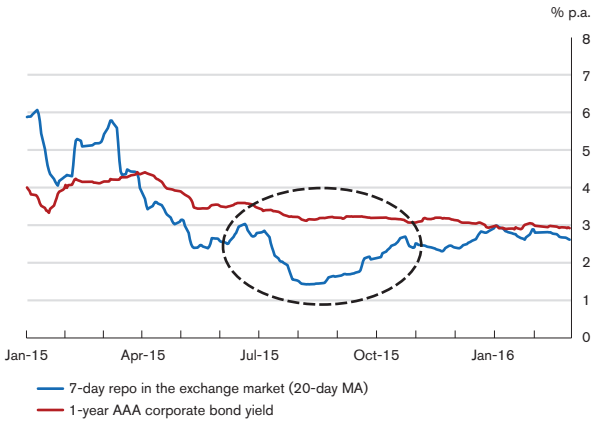
Chart B2.1
Corporate bond yield spread over MoF bond



Sources: WIND and HKMA staff estimates.

The marked narrowing of corporate bond yield spread has been partly driven by buoyant carry trade activities on the back of exceptionally low repo rates in the exchange market (Chart B2.2). The A-share market rout around the middle of last year has boosted the safe-haven demand for bonds, particularly for private-sector issuers that carry higher yields. With expectations of further rate cut by the People's Bank of China, some investors have used their bond holdings as collateral to borrow funds in the exchange repo market to leverage up their investment in corporate bonds. These leveraged activities have increased investors' exposure to interest rate risk. If repo rates surge on risk aversion or tightened liquidity conditions, this may lead to sharp correction in corporate bond prices, resulting in big mark-to-market losses to bond investors.

Chart B2.2
Repo rate in the exchange market versus corporate bond yield

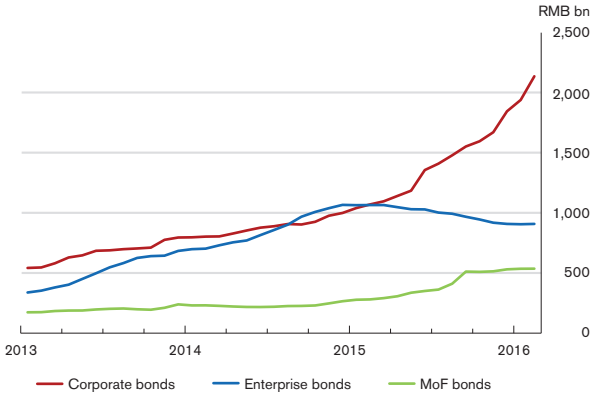


Sources: WIND and HKMA staff estimates.

Assessing leveraged activities in the corporate bond market

Reflecting strong demand, the outstanding size of corporate bonds increased markedly by 85% in 2015 to stand at RMB1.8 trillion at the year-end (Chart B2.3). Meanwhile, increased leveraged activities in the corporate bond market also boosted repo borrowing in the exchange market by more than one-third to RMB890 billion in 2015.

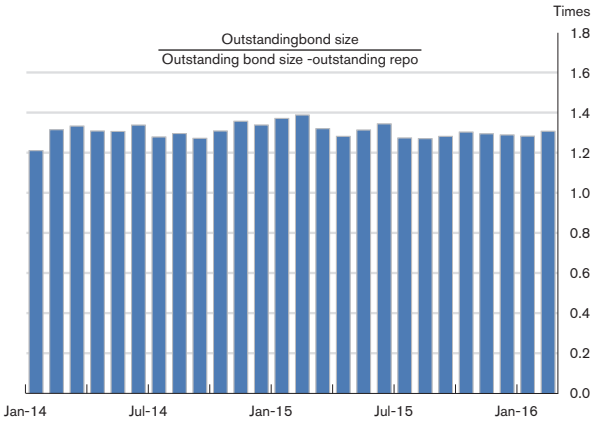
Chart B2.3
Outstanding size of bonds traded in the exchange market by type



Sources: WIND and HKMA staff estimates.

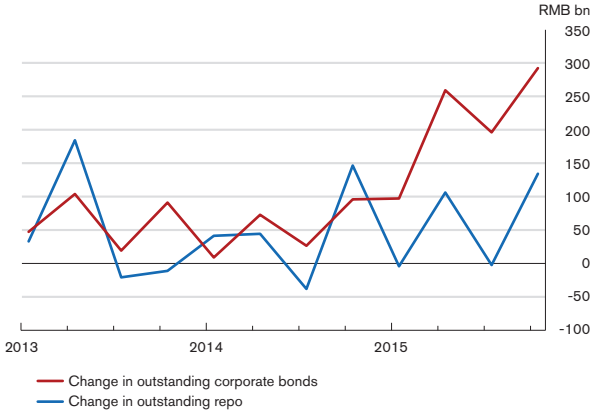
So far, overall leveraged activities are not excessive in the exchange bond market, which can be seen from the relatively stable leverage ratio, which is defined as [outstanding bond size / (outstanding bond size – outstanding repo)] (Chart B2.4). That said, the relatively strong co-movement between the recent expansion in the corporate bond market and repo borrowing offers some evidence that some investors may borrow short-term funds to leverage up their investment in corporate bonds (Chart B2.5).

Chart B2.4
Leverage ratio in the exchange bond market



Sources: WIND and HKMA staff estimates.

Chart B2.5
Change in outstanding corporate bonds and outstanding repos in the exchange market

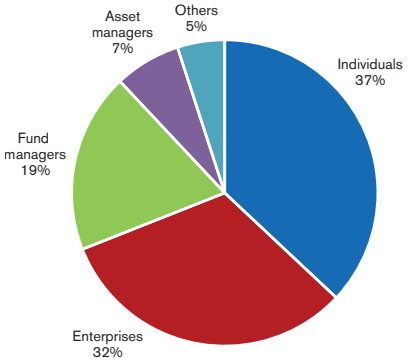


Sources: WIND and HKMA staff estimates.

Most of the leveraged positions are taken by institutional investors, who are major repo borrowers and active investors in the corporate bond market. Major fund providers in the exchange repo market are individuals and non-bank corporates. Exchange data and

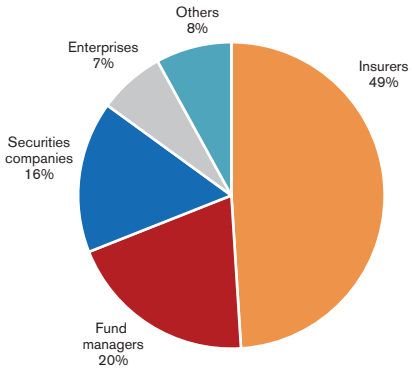
private-sector estimates suggest that most of the lending in exchange repo market comes from individuals and enterprises, while non-bank financial institutions such as insurers, fund managers and securities firms are major repo borrowers that invest in corporate bonds and other high yield assets (Charts B2.6 and B2.7). While banks and high net worth retail investors are allowed to invest in corporate bonds traded on the exchange, there is little evidence to show that they have active participation in leveraged investment activities. Chart B2.8 illustrates the flow of funds among different participants in the exchange repo market and bond market.

Chart B2.6
Fund providers in the exchange repo market by type



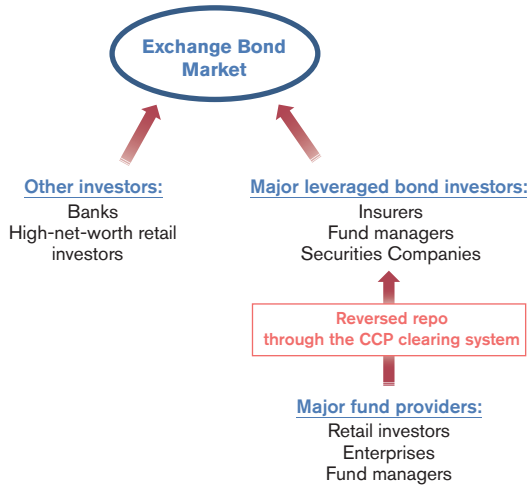
Source: Haitong Securities.

Chart B2.7
Borrowers in the exchange repo market by type



Source: Haitong Securities.

Chart B2.8
Flow of funds in the exchange bond market



Source: HKMA staff compilation.

Impact of a correction in corporate bond prices on financial stability

With the unusually low corporate bond yields, further deterioration in corporate earnings or increase in the number of bond defaults could trigger abrupt re-pricing of credit risk by investors, and the unwinding of leveraged positions will exacerbate the decline in corporate bond prices that could undermine financial stability.

Meanwhile, the systemic risk associated with a fall-out in the corporate bond market should be manageable given (i) its relatively small size; (ii) limited bank exposure to this segment; and (iii) limited linkage between exchange repo and interbank repo markets. Despite the rapid growth in the outstanding size of corporate bonds, it still accounts for a tiny share of 1.3% in the stock of aggregate financing. Meanwhile, investment in corporate bonds by banks is small relative to total banking assets. Balance sheet data of a number of listed Mainland banks show that their investment in corporate and enterprise bonds accounts for about 2% of total assets as of mid-2015. So far, leveraged activities in the corporate bond market have been largely funded

by borrowing in the exchange repo market. Given that corporate bonds are not eligible to back borrowing in the interbank repo market, a sharp correction in corporate bond prices should have limited spill-over effect on repo rates in the money market.

That said, there are pockets of risk if a downturn in the corporate bond market results in sizable withdrawal of liquidity by fund providers that may render corporate bond investors with high leverage vulnerable.[14] Given that there is no liquidity backstop provided by the clearing house or central bank in the exchange repo market, heightened risk aversion or shift in risk appetite of fund providers could push up repo rates markedly that may result in a sell-off in the corporate bond market. Leveraged bond investors, particularly small securities firms and asset managers, could be hit hard by higher repo rates and lower bond prices, and may suffer big losses if they are forced to unwind their leveraged positions. Fund managers may also face increased redemption pressures if they suffer significant losses following the correction in corporate bond prices.

A downturn in the corporate bond market may also hinder corporates to raise funds through the direct financing channel. With more and more Mainland firms raising funds in the onshore bond market to benefit from low renminbi interest rates, a surge in corporate bond yields will increase the borrowing cost of bond issuers even with good credit quality, which is detrimental to business spending.

To contain leveraged activities in the corporate bond market, regulators have strengthened risk management in the exchange repo market and tightened rules on collateral used in repo borrowing. In late November last year, the China Securities Depository and Clearing Corporation Limited (CSDC) issued a circular to (i) tighten the haircut applied to corporate bonds for repo borrowing based on a number of new factors such as concentration risk of repo borrowing, liquidity and credit conditions in the exchange market, and (ii) enhance the mechanism in applying different haircuts to bonds used as collateral in the exchange repo market.

Following these tightened regulations, risk of overheating in the corporate bond market appears to have receded somewhat, while the recent increase in exchange repo rates has prompted some bond investors to unwind their leveraged positons. Reflecting this, corporate bond yields have picked up and their spreads over MoF bonds have widened recently.

[14] The counterparty risk faced by fund providers should be limited given that repo transactions are conducted through central counterparty (CCP) clearing system managed by the exchange, which is the ultimate risk bearer if repo borrowers default. In general, the likelihood for the exchange to incur such losses is small because: (i) corporate bonds (including issuers) qualified as collateral must be of AA rating or above that helps limit the default risk faced by the exchange; and (ii) a significant haircut (e.g. 5–30% depending on credit rating and guarantee status of the bond) is applied to corporate and enterprise bonds used as collateral, which is also subject to daily adjustment based on the volatility of their market values.

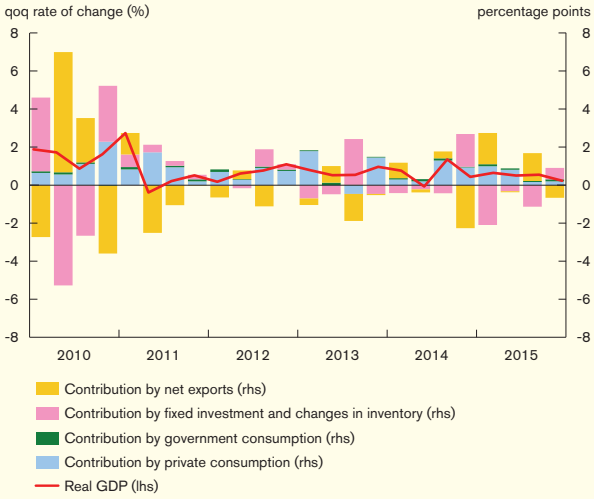
3. Domestic economy

The Hong Kong economy saw slower growth momentum towards the end of 2015, dragged by soft private consumption growth, subdued capital investment and continued decline in exports of services. Economic growth for 2016 is expected to remain soft, with the outlook clouded by high uncertainties surrounding the global macro-financial environments. Local inflationary pressure is likely to stay contained amid the modest domestic growth momentum, moderating housing rentals and benign import price inflation.

3.1 Real activities

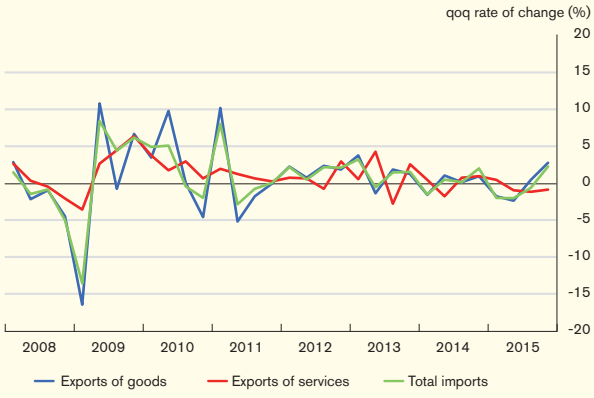
The growth momentum of the Hong Kong economy slowed towards the end of 2015, with the real GDP growth rate softening to 0.2% on a seasonally adjusted quarter-on-quarter basis in the fourth quarter from around 0.6% in the previous three quarters (Chart 3.1). Despite support from broadly stable job and income conditions, private consumption growth shifted to a lower gear in the last two quarters, partly reflecting weak consumer confidence and softer financial services demand. Box 3 analyses how interest rate hikes would affect private consumption through different channels. As for fixed investment, capital spending remained subdued amid deteriorating business sentiment while building and construction activities showed moderated momentum alongside slower progress in public projects. Destocking continued but its pace slowed considerably. On the external front, net exports turned to a drag on GDP growth in the fourth quarter. In particular, exports of services continued to shrink, restrained by weaker inbound tourism and reduced financial market activities, but exports of goods and total imports picked up sequentially after contracting in the first half of 2015 (Chart 3.2).

Chart 3.1
Real GDP growth and contribution by major expenditure components



Source: Census and Statistics Department (C&SD).

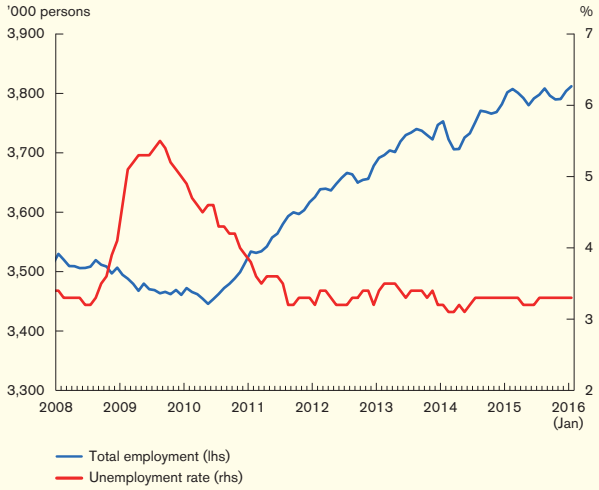
Chart 3.2
Exports and imports in real terms



Source: C&SD.

On a year-on-year basis, real GDP growth moderated to 2.2% in the third quarter and 1.9% in the fourth quarter, compared with 2.7% in the first half of the year. For the whole of 2015, real economic growth also slowed to 2.4%, down from 2.6% a year earlier. The weaker economic performance was mainly attributable to slower growth in domestic demand although net exports reverted to a positive contributor to GDP growth as total imports declined faster than total exports. Despite weaker economic conditions, the seasonally adjusted unemployment rate continued to stay low at 3.3% in recent months (Chart 3.3). However, total employment appeared to be levelling off, signalling softer labour demand. The main drag came from the retail, accommodation and food services sector.

Chart 3.3
Unemployment rate and total employment

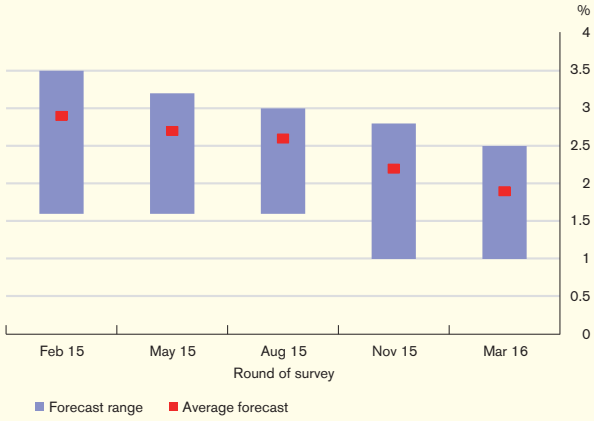


Source: C&SD.

Real economic growth for 2016 is expected to remain soft. The lacklustre global growth prospects, sustained weakness in inbound tourism, and negative spill-overs from turbulent global financial market conditions will continue to restrain Hong Kong's exports performance. Domestically, private consumption is anticipated to grow moderately, as labour market conditions will likely face some pressures amid weaker economic momentum, and local asset price adjustments may dent consumer confidence and induce negative wealth effects. Building and construction activities in the private sector should continue to hold up, but those in the public sector will be more uncertain due to possible gridlock in funding approvals. Weak business sentiment and interest rate rises would also weigh on capital investment. That said, the moderately expansionary fiscal stance in the 2016/2017 Budget will help cushion the slowing economic momentum.

The HKMA in-house composite index of leading indicators suggests that economic growth momentum may remain sluggish in the first half of 2016. For 2016 as a whole, the Government forecasts real GDP growth in the range of 1–2% while private sector analysts project the economy to grow by a wide range between 1.0% and 2.5%, averaging at around 1.8% (Chart 3.4).

Chart 3.4
Consensus forecasts for 2016 real GDP growth



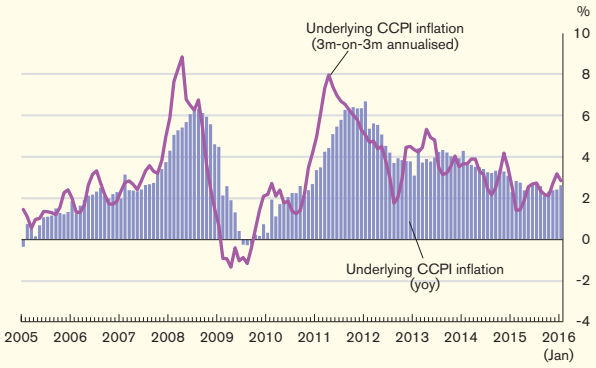
Source: Consensus Forecasts.

This growth outlook is subject to a number of uncertainties and risks. In particular, the pace and magnitude of further US interest rate hikes, the macro-financial developments in Mainland China, as well as their impact on the global economies, fund flows and asset markets are still highly uncertain. Higher financial volatilities, sudden tightening in local monetary conditions or sharper-than-expected adjustments in the property market could pose downside risks to the outlook. However, faster progress in local public projects could help cushion the downward pressures on GDP growth.

3.2 Consumer prices

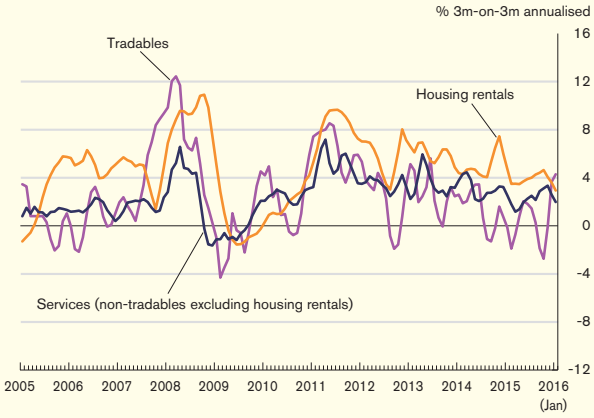
Consumer price inflation has largely remained on a downtrend since 2012, although the sequential momentum has picked up recently due to higher food prices and a rebound in the costs of utilities. On a year-on-year comparison, the underlying inflation rate held steady at 2.4% in both the third and fourth quarters, before rising slightly to 2.6% in January 2016 as the unusually cold weather drove up fresh vegetable prices (Chart 3.5). Meanwhile, inflation momentum, as measured by the annualised three-month-on-three-month underlying inflation rate, picked up from 2.2% in third quarter to 2.8% in January on the dissipation of the special fuel rebate in electricity provided in August. Analysed by main components, both housing rentals and services inflation have eased, while the volatile prices of tradables increased on the back of higher clothing and footwear prices (Chart 3.6).

Chart 3.5
Different measures of consumer price inflation



Sources: C&SD and HKMA staff estimates.

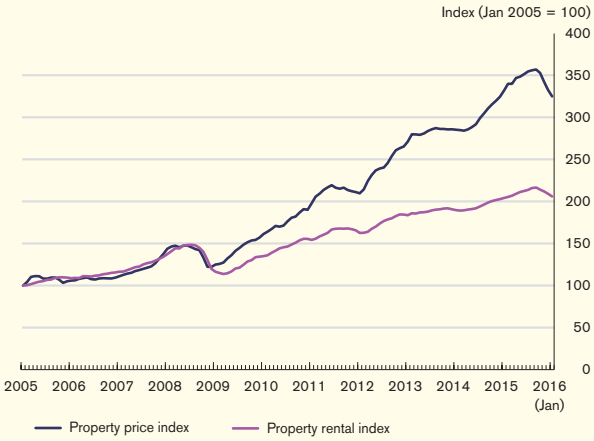
Chart 3.6
Consumer price inflation by broad component



Sources: C&SD and HKMA staff estimates.

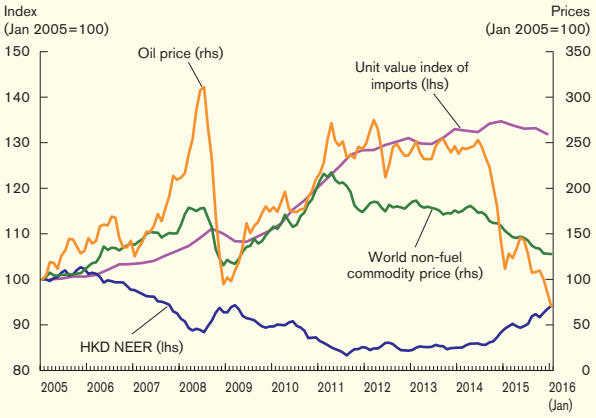
Looking ahead, sequential inflation momentum is likely to remain contained, due in part to the expected pass-through from the recent easing of fresh-letting residential rentals (Chart 3.7). Moreover, the output gap, which is estimated to be negative in the fourth quarter of 2015, should restrain domestic business costs and keep services inflation in check. On the external front, import price inflation will likely remain benign, on the back of the strong Hong Kong dollar and subdued global commodity prices (Chart 3.8). On the whole, local inflation is expected to ease further in 2016, with the Government forecasting an annual underlying inflation rate of 2.0% for 2016, down from 2.5% in 2015.

Chart 3.7
Residential property price and rental indices



Source: Rating and Valuation Department.

Chart 3.8
Commodity and import prices



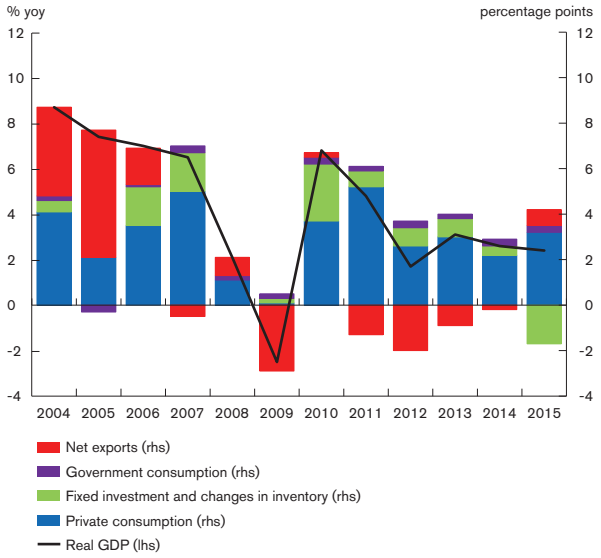
Sources: C&SD and IMF.

The outlook for inflation could be subject to downward pressures. Firstly, the global economic outlook is confronted by various challenges and difficulties, and a weaker-than-expected growth performance in major advanced and emerging market economies would weigh on global commodity prices and pose downside risks to Hong Kong's growth outlook. Secondly, uncertainties over the future monetary policy path in the US and the growth outlook in major economies may trigger spikes of global financial market volatility, which could spill over to the local property market. This possibility, coupled with rising housing supply, could put downward pressures on local housing prices, and hence residential rentals and consumer sentiment. At the same time, the weakening trend of inbound tourism, if continues, could erode the pricing power of local retailers while posing a drag on the retail property market and the labour market, thereby pointing to the possibility of weaker-than-expected domestic inflation.

Box 3
Examining the impact of interest rate hikes on Hong Kong's private consumption

As the US interest rate normalisation process has begun, Hong Kong dollar interest rates are expected to pick up alongside the rises in US interest rates under the Linked Exchange Rate System (LERS). This box examines the impact of interest rate hikes on Hong Kong's domestic demand. Conceptually, higher interest rates could reduce domestic demand through dragging private consumption and investment. Private investment constitutes a relatively small share of GDP and is volatile for modelling, while private consumption is a major component of Hong Kong's GDP (amounting to 66% of GDP in 2015) and has been a key driver of GDP growth over the past few years (Chart B3.1). Therefore, analysing the impact of interest rate hikes on private consumption can provide a better sense of how the US interest rate normalisation process would affect the domestic economy.

Chart B3.1
Hong Kong: contribution to real GDP growth by major expenditure components



Source: C&SD.

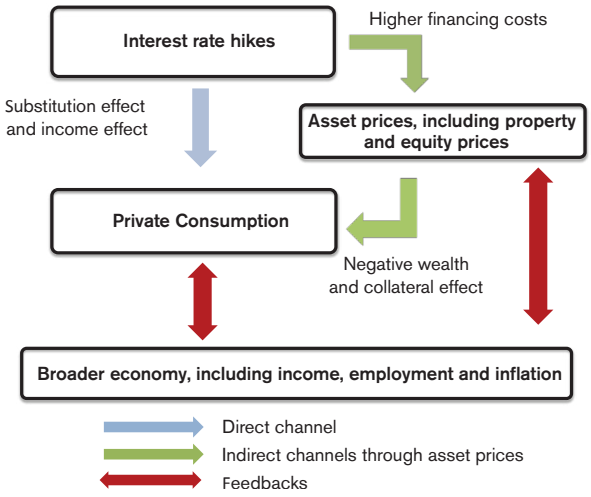
Transmission channels of interest rate hikes to Hong Kong's private consumption

Interest rate hikes can be transmitted to private consumption through direct and indirect channels. The direct channel, which works through the substitution and income effects, reflects households' decisions on whether to consume today or save for tomorrow. For the substitution effect, higher interest rates would increase the relative price of today's consumption (i.e. intertemporal substitution), inducing households to consume less and save more today. For the income effect, its impact on consumption depends on whether households are net creditors or debtors. For net creditors, higher interest rates would raise their interest income and prompt them to consume more and save less today. But for net debtors, higher interest rates would raise their debt-servicing burden, reducing their income and consequently consumption.

As for the indirect channels, higher interest rates could dampen equity and property prices, which in turn would affect private consumption via negative wealth and collateral effects. Among different types of assets, property assets are expected to be a key transmission channel, as residential property usually constitutes a major portion of household assets.

Apart from the abovementioned, higher interest rates, through affecting private consumption and asset prices, would also influence the broader economy (e.g. labour market), which in turn would have repercussions on private consumption. Chart B3.2 illustrates how interest rate hikes could be transmitted to private consumption through these direct and indirect channels.

Chart B3.2
Transmissions of interest rate hikes to private consumption

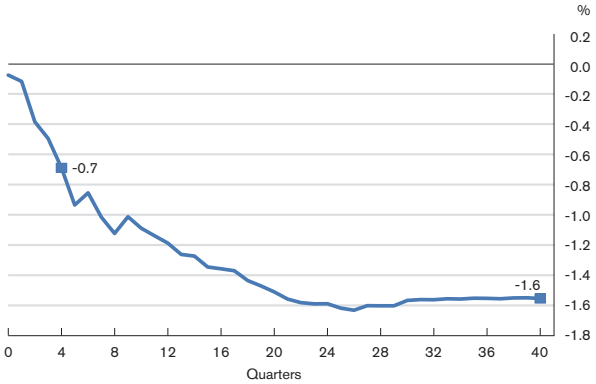


Empirical analysis

To analyse the impact of interest rate hikes on private consumption, we construct a vector auto-regressive (VAR) model with the following six variables: real private consumption, real labour income (constructed by multiplying real payroll per person with total employment), real housing prices, real equity prices (proxied by the Hang Seng Index), Hong Kong dollar interest rate (proxied by the three-month HIBOR), and underlying Composite Consumer Price Index (CCPI) inflation rate. Hong Kong dollar interest rate and underlying CCPI inflation rate are expressed in quarterly changes, while the remaining variables are expressed in quarter-on-quarter growth rate.

Through simulating the transmission of an interest rate shock and taking into account the consequent interaction between the variables, we derive the total impact on private consumption from the accumulated impulse response. Our simulation shows that a hypothetical 100 basis points rise in the Hong Kong dollar interest rate would cumulatively decrease private consumption by 0.7% at the one-year horizon and 1.6% in the long run (Chart B3.3).

Chart B3.3
Total impact of interest rate hikes on private consumption

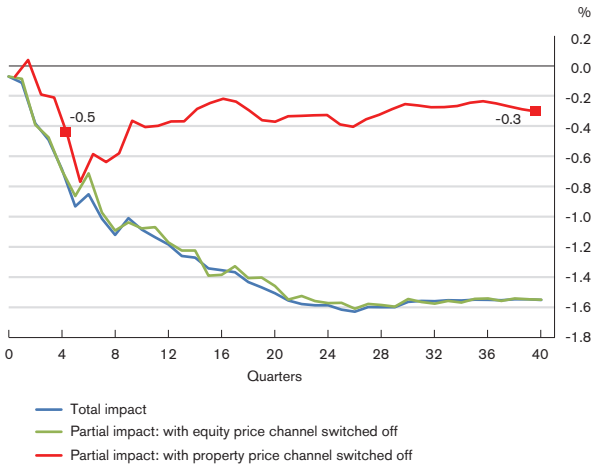


Source: HKMA staff estimates.

To dissect the impact of interest rate hikes through the asset price channels, we switch off counterfactually the effects of asset prices on private consumption (i.e. by setting the coefficients on the lags of housing prices and equity prices to zero) and simulate an interest rate shock again. By comparing this partial impact of interest rate hikes with the total impact (i.e. in Chart B3.3), we can draw insights on the interest rate transmission through the asset price channels. We switch off the effects of housing prices and equity prices in turn to estimate the influence of the property price channel and equity price channel respectively.

On switching off the property price channel, we find that the impact of interest rate hikes would become slightly smaller than the total impact at the one-year horizon, and much smaller in the long run (red line, Chart B3.4). This implies that the interest rate transmission works through the property price channel with a time lag, and the property price channel would eventually pose a strong drag on private consumption. On the other hand, we find that switching off the equity price channel would not affect much the estimated impact of interest rate hikes whether in the short or long run (green line, Chart B3.4). The very limited transmission through the equity price channel may in part be due to the fact that equity prices are volatile in nature and difficult to model.

Chart B3.4
Total and partial impact of interest rate hikes on private consumption



Source: HKMA staff estimates.

Concluding remarks

Our simulations illustrate the possible impact of interest rate hikes on private consumption. The findings suggest that the ultimate impact of interest rate hikes on private consumption would depend crucially on how far property prices are being affected by the rate hike. This finding is consistent with the fact that property is the major type of household assets, which can act as the key transmission channel of interest rate shocks to the domestic economy.

The empirical results above, however, are based on the average relationship between private consumption and asset prices across different economic and property cycles. At the current cycle, the property valuation is stretched, so higher interest rates would likely induce bigger and non-linear negative effect on property prices. This means that the actual impact of interest rate hikes could be larger than shown by our results. Moreover, rises in the households' debt servicing burdens in recent years may make the decline in private consumption more sensitive to a property market downturn.

4. Monetary and financial conditions

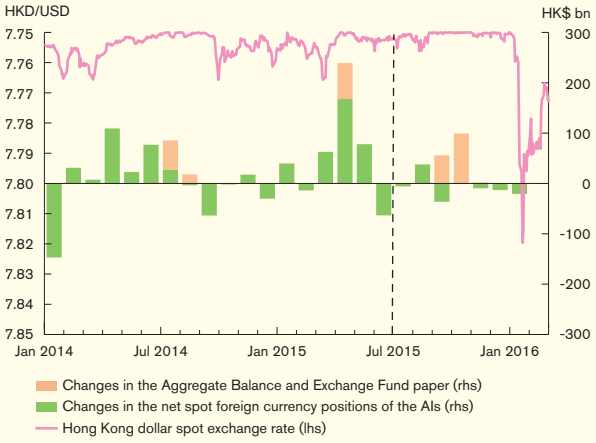
Exchange rate, capital flows and monetary developments

The Hong Kong dollar exchange rate hovered near 7.75 in the second half of 2015 with strong inflows driven by conversions of offshore renminbi into Hong Kong dollars, but it eased more recently reflecting the normal functioning of the currency board system after the US interest rate lift-off, and heightened volatility in the global and local financial markets. Going forward, the softening of the Hong Kong dollar is a natural and unavoidable step in the process of the normalisation of Hong Kong's monetary conditions. Given the likely gradual pace of US interest rate hikes and the sizable Hong Kong dollar Monetary Base, adjustments in Hong Kong dollar interest rates should not be too rapid.

4.1 Exchange rate and capital flows

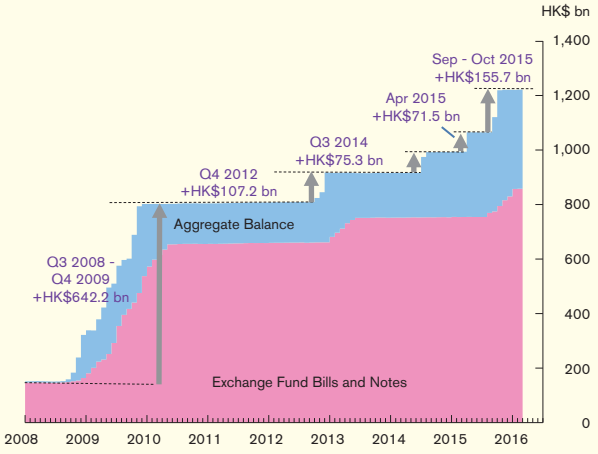
In the second half of 2015, the Hong Kong dollar remained broadly stable and traded within a narrow range between 7.7500 and 7.7562 against the US dollar, despite heightened volatility in the global financial markets and the US interest rate lift-off (Chart 4.1). The Hong Kong dollar spot exchange rate strengthened to 7.75 in late August amid sizable inflows, with the strong-side Convertibility Undertaking (CU) being triggered repeatedly between 1 September and 30 October 2015. The strong inflows, totalling HK$155.7 billion, were driven by conversions of the offshore renminbi into the Hong Kong dollar and some ordinary business demands for the Hong Kong dollar (Chart 4.2). In November and December last year, the spot exchange rate hovered near 7.75 and responded calmly to the first US rate hike on December 16, while the Hong Kong dollar forward discounts widened slightly in line with a larger negative interest rate spread between the Hong Kong dollar and the US dollar (Chart 4.3).

Chart 4.1
Exchange rate and fund flow indicators



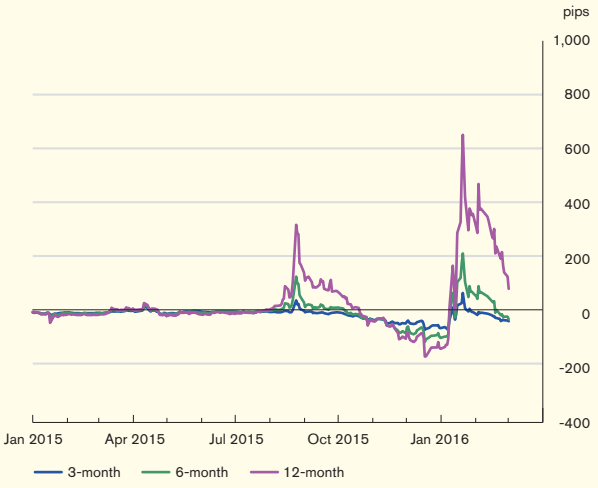
Note: For fund flow indicators, a positive value indicates inflows and the change in the net spot foreign currency positions of the AIs for February 2016 is not yet available.
Sources: HKMA and staff estimates.

Chart 4.2
Fund flow indicators



Source: HKMA.

Chart 4.3
Hong Kong dollar forward points



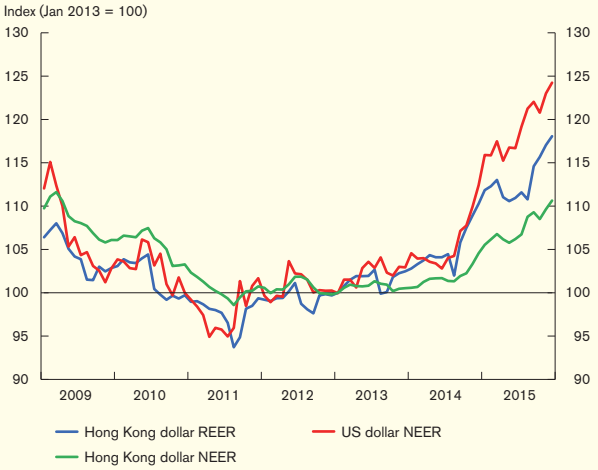
Source: HKMA.

The Hong Kong dollar started to ease notably in January 2016, reaching an intra-day low of 7.8295 against the US dollar on 20 January. The movements in the Hong Kong dollar exchange rate are in line with the workings of the Linked Exchange Rate System after the US interest rate lift-off and heightened volatility in the global and local financial markets.[15] In particular, the widened interest rate differential against the US dollar, the increased volatility of the renminbi exchange rate, general weakness in Asian currencies, the sell-off in the Mainland and Hong Kong stock markets, and the less optimistic outlook for both economies dampened demand for the Hong Kong dollar in January. There were also more investors hedging their currency and equity-related exposures, which led to an increase in supply of Hong Kong dollars in the forward market and put downward pressures on the Hong Kong dollar forward rate (Chart 4.3). In view of the tremulous financial market conditions, some market participants raised concerns about the risks of Hong Kong dollar outflows and a replay of the 1997–98 turmoil. However, it should be noted that any triggering of the weak-side CU and the resultant contraction in the Monetary Base are a natural and unavoidable step in the process of the normalisation of the Hong Kong dollar interest rates. Any attempt to sell Hong Kong dollar short and push up the Hong Kong dollar interest rates, as in 1997–98, is very difficult now under a much larger Monetary Base and the Discount Window mechanism. The Hong Kong dollar exchange rate moved within a range between 7.7668 and 7.7905 in February as the market sentiment improved.

From a broader perspective, the trade-weighted Hong Kong dollar nominal effective exchange rate index (NEER) increased by 4.2% in the second half of 2015, driven mainly by the further strengthening of the US dollar (Chart 4.4). Together with a positive but narrowing headline inflation differential between Hong Kong and its trading partners, the Hong Kong dollar real effective exchange rate index (REER) registered an increase of 6.4% in the six months to December 2015. In its 2015 Article IV Consultation with Hong Kong, the IMF Mission assesses that the Hong Kong dollar REER and external position are broadly in line with fundamentals and desirable policies.

[15] For more details, see the inSight articles on "The Hong Kong Dollar Linked Exchange Rate System" and "Get a Full Grasp of the Situation and Stay Calm" published by the HKMA on 27 January and 1 February 2016 respectively.

Chart 4.4
Nominal and real effective exchange rates



Note: Real effective exchange rate index is seasonally adjusted.
Sources: C&SD and HKMA staff estimates.

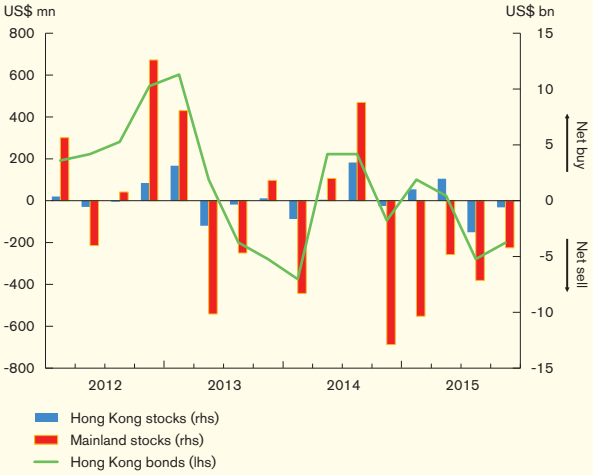
There were portfolio investment outflow pressures in the second half of 2015 and more recent periods. According to the latest Balance of Payments (BoP) statistics, net equity portfolio investment outflows occurred in the third quarter mainly because non-residents further reduced their holdings of Hong Kong equity and investment fund shares amid the plunge in the local stock market (Table 4.A).[16] On the other hand, continued debt portfolio investment outflows were primarily driven by Hong Kong banks' increased holdings of non-resident debt securities. A survey from global mutual funds also point to equity and bond-related outflows in the final quarter and more recent weeks amid heightened volatility in the global financial markets (Chart 4.5).

Table 4.A
Cross-border portfolio investment flows

(HK$ bn)	2013	2014	2015 Q1	2015 Q2	2015 Q3
By Hong Kong residents					
Equity and investment fund shares	-179.4	-318.2	-105.4	-97.5	8.9
Debt securities	-335.2	42.1	-81.0	-109.3	-122.0
By non-residents					
Equity and investment fund shares	67.6	136.7	-119.4	-198.9	-26.4
Debt securities	61.0	75.0	23.0	10.5	-5.7

Note: A positive value indicates capital inflows.
Source: C&SD.

Chart 4.5
Market survey of equity and bond-related flows



Source: EPFR Global.

Looking forward, the direction and size of Hong Kong dollar fund flows will depend on various factors such as the Hong Kong dollar-US dollar interest rate differentials, the global macro-financial outlook, and market sentiments. Given jittery global financial market sentiments, any shock triggering a reassessment of the global economic outlook could lead to continued turbulence in the global financial markets and volatile fund flows ahead.

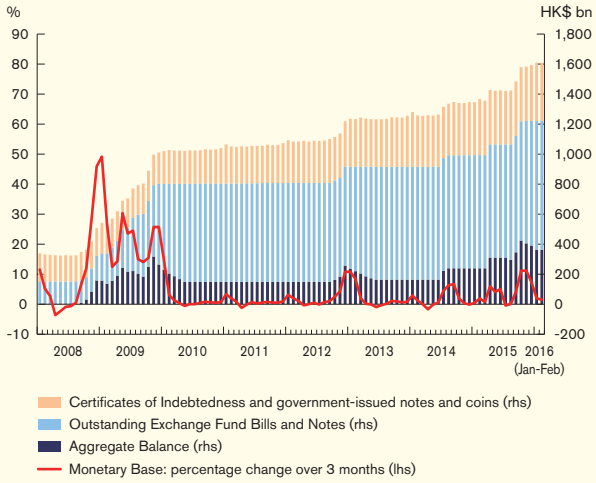
[16] At the time of writing, the fourth-quarter BoP statistics were not yet available.

4.2 Money and credit

Hong Kong's interbank liquidity remained ample, with the Monetary Base expanding further in the second half of 2015 and early 2016. Driven by the repeated triggering of the strong-side CU in September and October, the Aggregate Balance expanded from HK$310.7 billion to HK$391.3 billion during the second half of 2015 (Chart 4.6), with part of the expansion being offset by additional issuances of Exchange Fund Bills amounting to HK$75 billion to meet banks' demand for liquidity management.[17] Accordingly, the outstanding amount of Exchange Fund Bills and Notes (EFBN) increased further, to HK$829.6 billion at the end of 2015. These, together with the slight increase in Certificate of Indebtedness and Government-issued notes and coins in circulation, raised the Monetary Base by 11.8% in the second half.

Stepping into 2016, despite fluctuations in the Hong Kong dollar interest rates and exchange rate, the Hong Kong dollar interbank market continued to function normally. The Monetary Base remained largely steady and was fully backed by foreign exchange reserves in accordance with currency board principles.[18]

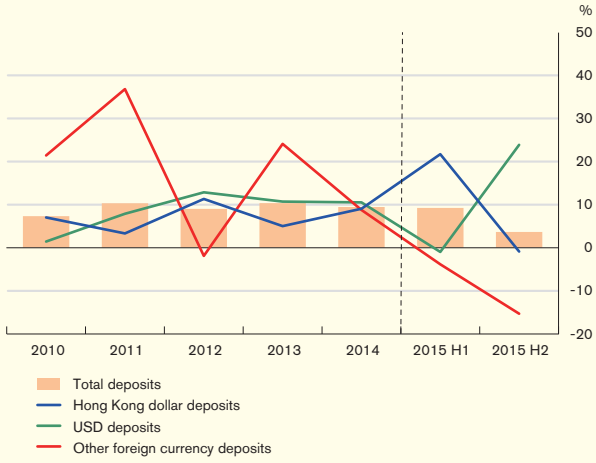
Chart 4.6
Monetary Base components



Source: HKMA.

Despite the rise in the Monetary Base, the Hong Kong dollar broad money (HK$M3) edged down by 0.2% (or 0.3% annualised) in the second half, after picking up noticeably by 10.5% (or 21.1% annualised) in the first half. Being the major component of HK$M3, Hong Kong dollar deposits decreased by 0.5% (or 0.9% annualised) in the second half (Chart 4.7), as demand deposits fell alongside the declines in turnover and fund-raising activities in the local stock market. Analysed by the asset-side counterparts, the decline in the HK$M3 mainly reflected the decrease in Hong Kong dollar loans and net foreign currency assets of banks (Chart 4.8).

Chart 4.7
Deposit growth



Note: Growth rates in 2015 H1 and H2 are annualised.
Source: HKMA.

[17] The additional issuance of Exchange Fund Bills is consistent with Currency Board principles, as it represents a change in the composition of the Monetary Base with a shift from the Aggregate Balance to Exchange Fund Paper.

[18] Under the LERS, while specific Exchange Fund assets have been designated for the Backing Portfolio, all Exchange Fund assets are available to support the Hong Kong dollar exchange rate.

Chart 4.8
Changes in the HK$M3 and the asset-side counterparts

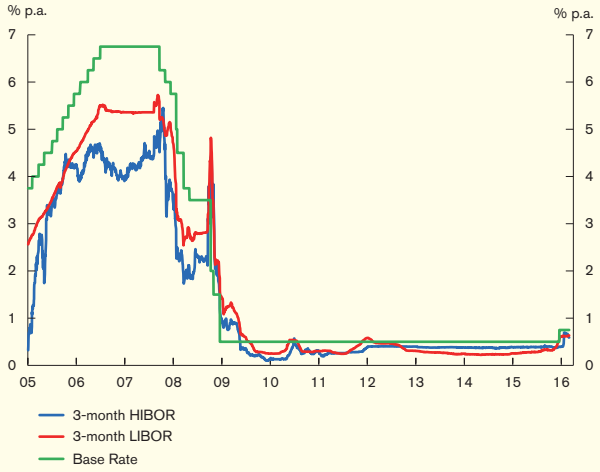
Note: The HK$M3 in the monetary survey has been adjusted to include foreign currency swap deposits and to exclude government deposits and Exchange Fund deposits with licensed banks.

Source: HKMA staff estimates.

Amid heightened exchange rate volatility, US dollar deposits registered a strong increase of 12.3% (or 24.6% annualised) in the second half of 2015 (Chart 4.7), whereas other foreign currency deposits dropped noticeably by 7.9% (or 15.8% annualised), mainly due to the contraction in renminbi deposits. Overall, growth in total deposits slowed to 1.9% (or 3.8% annualised) in the second half, compared with 4.8% (or 9.5% annualised) in the first half.

With abundant interbank liquidity, wholesale Hong Kong dollar funding costs stayed at low levels. In particular, the overnight and the three-month HIBOR fixing rates were little changed at around 0.05% and 0.39% respectively during the second half of 2015, with moderate fluctuations being driven mainly by heightened liquidity demand amid volatile financial market conditions in August, as well as banks' seasonal liquidity needs. Following the increase in the target range for the US Federal Funds Rate from 0–0.25% to 0.25–0.5% on 16 December 2015 (US time), the Base Rate was adjusted upward from 0.5% to 0.75% on 17 December 2015.[19] Stepping into 2016, Hong Kong dollar interbank interest rates faced upward pressures amid increased financial market volatilities, with the three-month HIBOR fixing rate rising to a seven-year high of 0.70% in late January. As such, the spread of HIBORs over its US counterparts narrowed. Nevertheless, the absolute level of HIBORs remained relatively low by historical standards (Chart 4.9).

Chart 4.9
The Base Rate and the interbank interest rates



Sources: CEIC and HKMA.

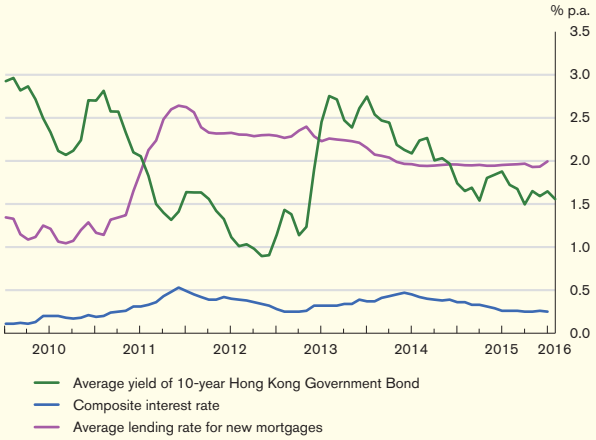
Going forward, the pace and magnitude of rises in the Hong Kong dollar interbank rates would hinge on the size of fund outflows which are affected by various factors including the Hong Kong dollar-US dollar interest rate differentials, the global macro-financial outlook, as well as market sentiments. With an expected gradual pace of US interest rate hikes and a sizable Hong Kong dollar Monetary Base, the pace of increases in the Hong Kong dollar interest rates should not

[19] According to the pre-set formula announced on 26 March 2009, the Base Rate is currently set at either 50 basis points above the lower bound of the prevailing target range for the US Federal Funds Rate or the average of the five-day moving averages of the overnight and one-month HIBORs, whichever is the higher.

be too rapid. Moreover, given that the outstanding EFBNs amounted to around HK$860 billion and the bulk is being held by banks for liquidity management, banks' access to the Discount Window will help limit excessive volatility in the interbank interest rates. That said, the size and pace of fund outflows are still subject to uncertainties, particularly given heightened volatility in the financial markets.

Broadly tracking its US dollar counterparts, the Hong Kong dollar yield curve flattened slightly at the longer tenors, with the yield of 10-year Hong Kong Government Bond edging down to 1.66% at the end of 2015 from 1.79% six months earlier (Chart 4.10). Meanwhile, banks' average funding costs (measured by the composite interest rate) decreased by 3 basis points to 0.26% in December, mainly due to the decline in weighted deposit rate, while banks' average lending rate for new mortgages remained steadily low at around 1.95%.

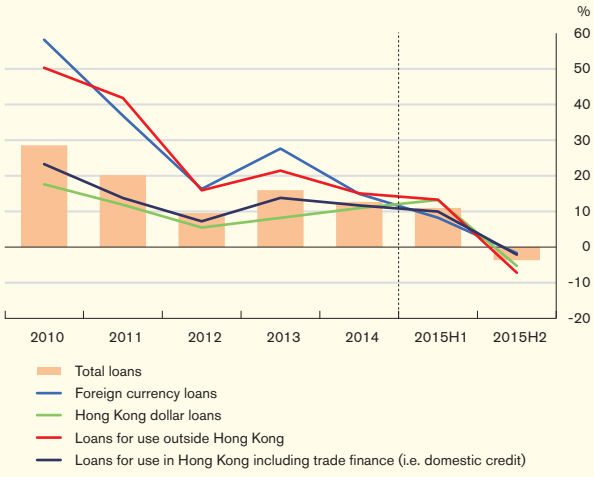
Chart 4.10
Yield of 10-year Hong Kong Government Bond, the composite interest rate and the average lending rate for new mortgages



Sources: HKMA and staff estimates.

Credit growth decelerated, largely reflecting weaker corporate credit demand amid heightened uncertainties in the macro-financial environment. After increasing by an annualised 11.0% in the first half of 2015, total loans declined by 3.7% (annualised) in the second half, marking its first decline since the first half of 2009 (Chart 4.11). Such decline was driven by both loans for use in Hong Kong and outside Hong Kong. Loans for use in Hong Kong registered a moderate decline of 2.1% (annualised). After expanding strongly in previous years, loans for use outside Hong Kong contracted by an annualised 7.2% in the second half, in part reflecting a slowdown in Mainland-related borrowings amid lower funding costs in Mainland China. Analysed by currency, Hong Kong dollar loans and foreign currency loans dropped by an annualised 5.3% and 1.7% respectively in the second half. Within the foreign currency loans, US dollar loans fell by an annualised 6.9% in part reflecting the repayment of US dollar loans amid the renminbi depreciation. For 2015 as a whole, total loan growth decelerated to 3.5% from 12.7% in 2014.

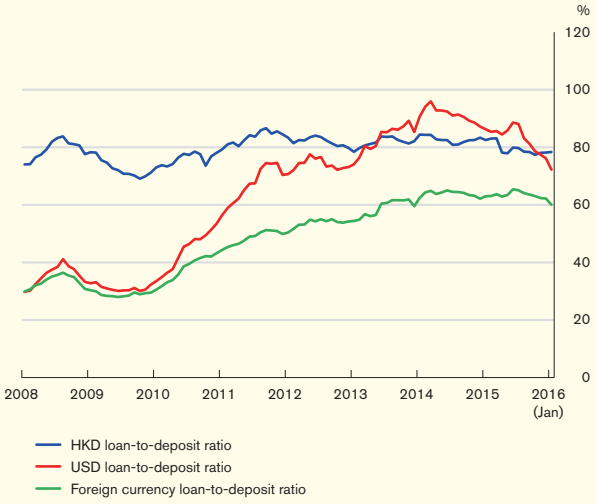
Chart 4.11
Loan growth



Note: Growth rates in 2015 H1 and H2 are annualised.
Source: HKMA.

As Hong Kong dollar loans declined at a faster pace than Hong Kong dollar deposits, the Hong Kong dollar loan-to-deposit ratio decreased from 79.9% at the end of June to 78.2% at the end of 2015 (Chart 4.12). Meanwhile, as US dollar loans contracted while US dollar deposits expanded strongly, the US dollar loan-to-deposit ratio dropped noticeably from 88.6% at the end of June to 76.1% at the end of 2015.

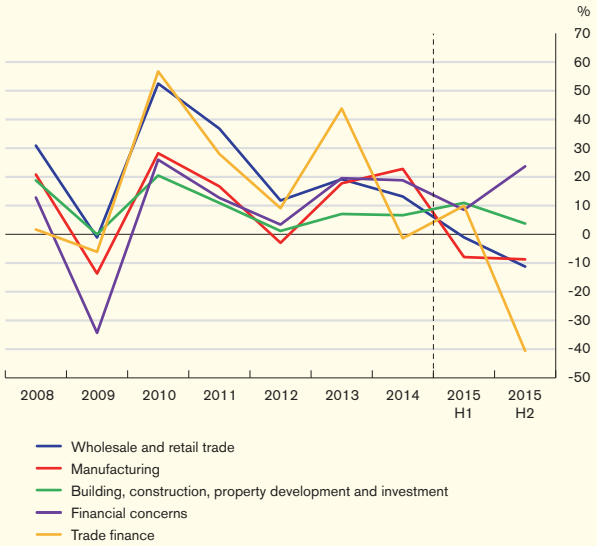
Chart 4.12
Loan-to-deposit ratios



Source: HKMA.

Analysed by economic activities, the decline in loans for use in Hong Kong was largely driven by trade finance (Chart 4.13), which slumped by 40.6% (annualised) in the second half in part due to sluggish trade flows and repayment of US dollar trade loans amid renminbi depreciation. Loans for manufacturing, wholesale and retail trade also witnessed noticeable declines amid subdued domestic economic activities, particularly the weak retail sales performance. On the other hand, loans to building, construction, property development and investment continued to expand, albeit at a moderated pace, while loans to financial concerns picked up faster in the second half.

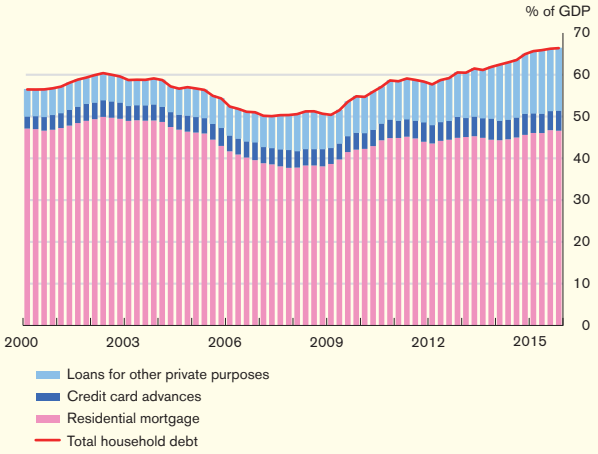
Chart 4.13
Growth in domestic loans by selected sectors



Note: Growth rates in 2015 H1and H2 are annualised.
Source: HKMA.

Growth in household debt decelerated to an annualised 7.1% in the second half of 2015 compared with 10.0% in the first half. Within the household debt, growth in personal loans (which comprise credit card advances and loans for other private purposes) slowed to an annualised 5.0% in the second half, while growth in residential mortgage loans moderated to an annualised 8.0% along with the fall in housing transactions. Overall, the household debt-to-GDP ratio edged up to 66.4% in the fourth quarter from 66.2% in the previous quarter (Chart 4.14).

Chart 4.14
Household debt-to-GDP ratio and its components



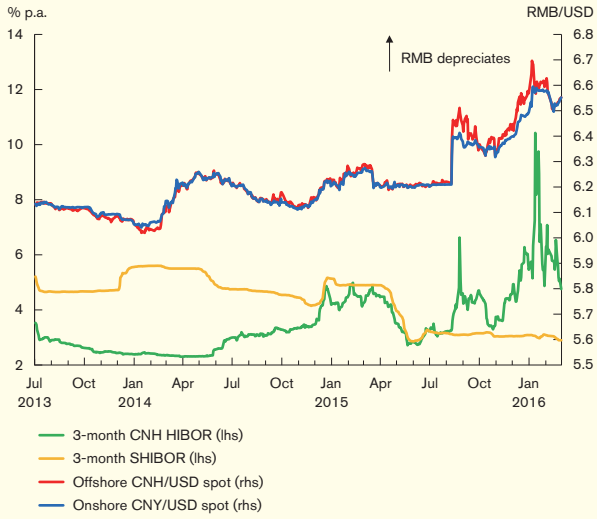
Note: Only borrowings from AIs are covered.
Source: HKMA.

Credit demand is likely to remain weak in the near term, given uncertainties surrounding the macro-financial development in the Mainland economy, the pace and magnitude of further US interest rate hikes, and shifts in financial market sentiments. According to the latest results of the HKMA Opinion Survey on Credit Condition Outlook, banks expect to see subdued credit demand in the near future.

Offshore renminbi banking business

Both the onshore (CNY) and the offshore renminbi (CNH) exchange rates faced more depreciation pressures since last November amid market concerns about the US interest rate normalisation and the prospects for the Mainland economy (Chart 4.15). In particular, the CNH once weakened to around 6.7 per US dollar in early January, with its discount vis-à-vis the onshore counterpart once widening to about 1,500 pips in early January. Box 4 studies the main drivers of the CNH-CNY spread before and after the change of the renminbi central parity fixing mechanism. CNH interbank liquidity also tightened amid increased volatility in the renminbi exchange rates, with the overnight CNH HIBOR fixing once surging to a high of 66.8% in mid-January. The renminbi exchange rates stabilised stepping into February, with the discount of CNH over CNY narrowing to virtually zero pips at the end of February. Tightness in the CNH interbank market also eased, with the 3-month CNH HIBOR declining from a high of 10% to 4.8% at the end of February.

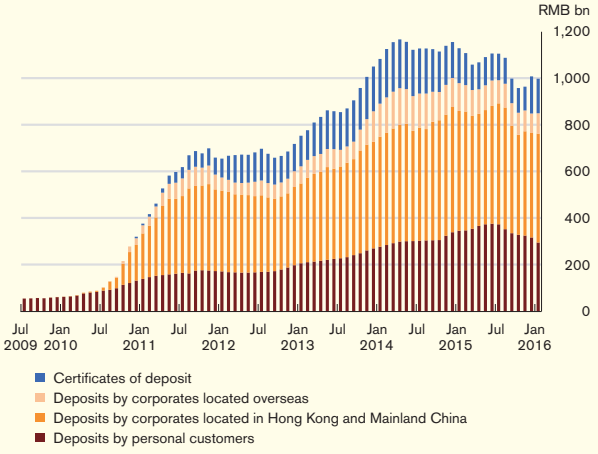
Chart 4.15
Onshore and offshore renminbi exchange rates and interbank interest rates



Sources: Bloomberg and Treasury Markets Association.

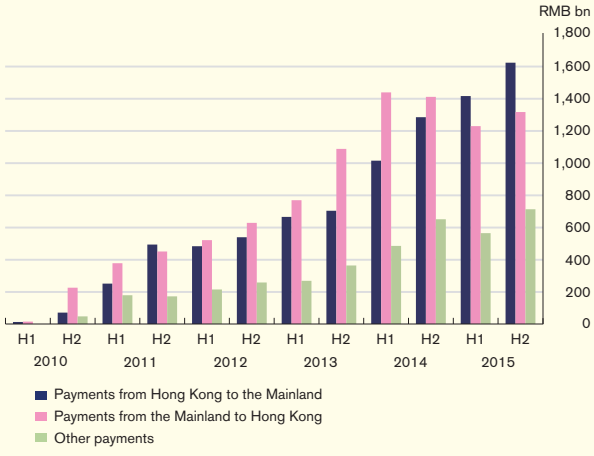
The renminbi liquidity pool in Hong Kong consolidated in the second half of 2015 amid the renminbi depreciation. The total outstanding amount of renminbi customer deposits and certificates of deposit (CDs) fell by 8.9% (not annualised) from six months earlier to RMB1,010.4 billion at the end of 2015 (Chart 4.16 and Table 4.B). Within the total, renminbi customer deposits declined by 14.3% during the second half, with both personal customer deposits and corporate customer deposits recording double-digit declines, whereas outstanding CDs bounced up by 37.4% on the back of a rise in CD issuances in December.

Chart 4.16
Renminbi deposits and CDs in Hong Kong



Source: HKMA.

Chart 4.17
Flows of renminbi trade settlement payments



Source: HKMA.

Despite the contraction in the renminbi liquidity pool, other aspects of the offshore renminbi banking business continued to grow at a firm pace. The outstanding amount of renminbi loans maintained solid growth in the second half of 2015, rising by 25.9% (not annualised) from the end of June, with the pace being roughly the same as in the first half. Renminbi trade settlement handled by banks in Hong Kong continued to expand steadily to RMB3,637.3 billion in the second half, up 13.8% from the preceding half-year period (Chart 4.17). While outward trade remittances to Mainland China continued to grow at a solid pace, inward remittances to Hong Kong also rebounded. Meanwhile, Hong Kong's position as a global hub for offshore renminbi clearing and settlement strengthened further. For 2015 as a whole, the average daily turnover of renminbi real time gross settlement (RTGS) rose to RMB947.0 billion, an increase of 29.2% compared with 2014 (Table 4.B). Within the total, around 90% were offshore transactions (i.e. not between Hong Kong and Mainland China).

The recent fluctuations in the renminbi have posed some headwinds to the development of Hong Kong's offshore renminbi business. Going forward, the demand for renminbi assets will continue to hinge on Mainland's macro-financial developments as well as the progress in renminbi internationalisation.[20] It is expected that once the Mainland economy and financial market stabilises, the demand for renminbi assets will recover and the development of the offshore renminbi business will gather momentum accordingly.

Table 4.B
Offshore renminbi banking statistics

	2014	2015
Renminbi deposits & certificates of deposit (CDs) (RMB bn)	1,158.3	1,010.4
Of which:		
Renminbi deposits (RMB bn)	1,003.6	851.1
Share of renminbi deposits in total deposits (%)	12.4	9.3
Renminbi certificates of deposit (CDs) (RMB bn)	154.7	159.3
Renminbi outstanding loans (RMB bn)	188.0	297.4
Number of participating banks in Hong Kong's renminbi clearing platform	225	217
Amount due to overseas banks (RMB bn)	145.2	105.7
Amount due from overseas banks (RMB bn)	193.3	132.1
	2014	**2015**
Renminbi trade settlement in Hong Kong (RMB bn)	6,258.3	6,833.1
Of which:		
Inward remittances to Hong Kong (RMB bn)	2,837.8	2,535.1
Outward remittances to Mainland China (RMB bn)	2,289.3	3,026.3
Turnover in Hong Kong's RMB RTGS system (Daily average during the period; RMB bn)	732.7	947.0

Source: HKMA

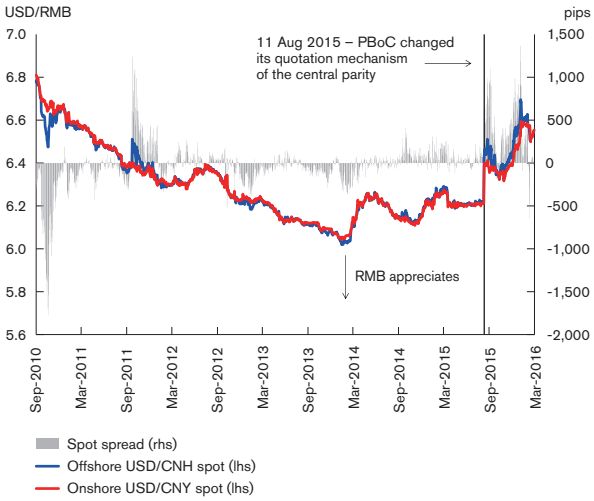
[20] There have been ongoing developments in the cross-border investment channels between Hong Kong and Mainland China. These include the launch of fund products under the Mainland-Hong Kong Mutual Recognition of Funds initiative since the latter part of 2015.

Box 4
CNH-CNY spread determination: Before and after the new central parity quotation mechanism

Introduction

While the exchange rates of the renminbi *vis-à-vis* the US dollar in Hong Kong (CNH) and onshore (CNY) have moved largely in tandem since 2010, there is always a tangible spread between them, referred to as the 'CNH-CNY spread' hereafter.[21] For the past two years, the spread had been largely steady and kept at a relatively low level until the recent spike, noticeably after the change of the renminbi central parity quotation mechanism announced on 11 August 2015 (Chart B4.1).[22] As the renminbi depreciated *vis-à-vis* the US dollar following the change, especially in the CNH market, the resulting widening of the spread was widely attributed to an increase in the exchange rate depreciation expectation.[23] Against this backdrop, this box takes a closer look at the driving forces behind the CNH-CNY spread.[24]

Chart B4.1
USD/CNH and USD/CNY spot exchange rates



Source: Bloomberg.

Our hypothesis

There are two primary reasons as to why the two exchange rates differ. First, the two markets are subject to different sets of influence. The CNH is more exposed to global influences (e.g. ups and downs of global risk appetite, the supply of and demand for global liquidity) than its onshore counterpart due to the fact that Hong Kong is an international financial centre with no capital control. Second, investors in the two markets might have different interpretations to the same economic or policy news, thus giving rise to different equilibrium exchange rates in the two segmented markets.[25]

[21] The CNH-CNY spread in this box is defined as the USD/CNH spot exchange rate minus that of USD/CNY. A positive (negative) spread means that CNH is weaker (stronger) than CNY.

[22] The China Foreign Exchange Trade System (CFETS) publishes the daily middle exchange rate of the renminbi against the US dollar for the permitted trading range of the day at 9:15 a.m. on each working day. With effect from 11 August 2015, the middle rate will be based on three measures: the closing rate of the inter-bank foreign exchange rate market of the previous day; supply and demand in the market; and the price movements of major currencies. (URL: http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/2927054/index.html)

[23] On 11 August 2015, the central parity fell by 1.9% to 6.2298, marking the largest one-day drop since the adoption of the managed float in 2005. The CNH and CNY exchange rates fell by 2.8% and 1.9% respectively on that day.

[24] Funke, Shu, Cheng and Eraslan (2015) "Assessing the CNH-CNY pricing differential: role of fundamentals, contagion and policy", *Journal of International Money and Finance*, volume 59, December 2015, pp245-262, also provided a quantitative analysis of the CNH-CNY spread but focused on an earlier sample period, i.e. 24 August 2010–20 September 2013.

[25] For details of this theory applied to dual-listed stocks, see Chung, Hui and Li (2013) "Explaining share price disparity with parameter uncertainty: Evidence from Chinese A- and H-shares", *Journal of Banking and Finance*, 37 (2013) pp1073–1083.

In the light of the above, we hypothesise that the CNH-CNY spread is driven by five factors, which could be broadly classified into two global and three local factors. The global factors are global risk appetite and global funding liquidity, whereas the local factors are the interest rate differential between the onshore and offshore markets, exchange rate expectation and relative market liquidity. Table B4.A summarises these factors, their proxy indicators and their expected impact on the spread (and the rationale behind).

Table B4.A
Explanatory variables in the econometric model

Explanatory variables	Expected Impact	Proxy Indicator	Rationale
Global risk appetite	+	VIX	CNH market is more affected by global risk
Global funding liquidity	+	Average US Treasury yields	CNH market is more responsive to changes in global liquidity condition
CNH-CNY interest rate differential	–	Average CNH-CNY forward-point differentials	Higher interest rates are supportive to CNH
RMB depreciation expectation	+	Average risk reversals of USD/CNH[26]	RMB exchange rate expectation is more reflected in CNH market
Relative RMB market liquidity	+	Bid-ask spread of USD/CNH spot rate divided by that of USD/CNY spot rate	CNH faces selling pressure when market liquidity shrinks relative to CNY

Based on this hypothesis, we specify an econometric model such that the dependent variable is the CNH-CNY spread and the explanatory variables are these five factors and the lagged value of the spread. Daily data are used to estimate the model. The sample period is 2 July 2012 to 29 February 2016.[27]

[26] The risk reversal is the price of a USD/CNH call option minus that of a put option with the same maturity.

[27] Earlier data are excluded since at that time the CNH market was not yet well developed and some episodes of elevated CNH-CNY spread were driven by unique and specific events. For example, two episodes of elevated CNH-CNY spread stand out during the early years of the CNH market. First, in October 2010, when the conversion quota for trade settlement-related renminbi transactions were used up in the CNH market, huge demand for renminbi drove the CNH much stronger than the CNY. In the second episode, when escalating European debt crisis triggered global risk aversion and strong demand of US dollar in late 2011, the CNH was substantially weaker than the CNY.

Table B4.B
Estimation results of the regression model

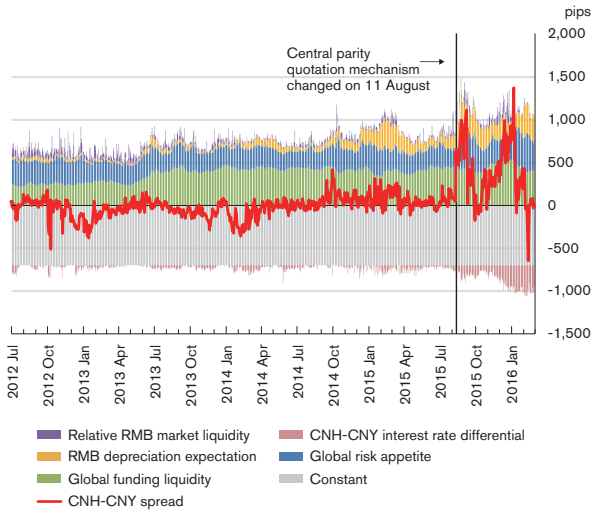
Global risk appetite	3.01***
Global funding liquidity	83.02***
Relative RMB market liquidity	3.06***
CNH-CNY interest rate differential	-0.07***
RMB depreciation expectation	14.40***
Lagged dependent variable	0.83***
Constant	-134.99***
Adjusted R-squared	0.8157
Number of observations	956
Durbin-Watson stat	2.249

Note: *** indicates statistical significance at 1% level.

Empirical results

As shown in Table B4.B, all the hypothesised factors are significant and with the expected signs. Based on the estimation results, we carry out an attribution analysis to enable us to visualise the contribution of each factor to the CNH-CNY spread throughout the period under study. As can be seen, for the whole period, global risk appetite contributed significantly to the spread, while global funding condition was also a key driver (Chart B4.2). Starting from mid-2014, when movements of the renminbi exchange rate became increasingly unpredictable (rather than continuing to appreciate), renminbi exchange rate expectation also played an important role in driving the spread. Chart B4.3 takes a close-up view of the latest episode (from the beginning of August 2015 to the end of February 2016). As can be seen, the impact of the local factors has become more prominent lately. After the latest change of the quotation mechanism of the central parity announced on 11 August 2015, not only did renminbi exchange rate expectation account for a more significant part of the spread, interest rate differential also contributed a much larger share of it than in earlier years. However, given the short span of time, it is too early to conclude that the rising importance of local factors is transitory or reflects changes that are more structural in nature. Whichever the case, it is useful to note that global risk appetite was also, to a large extent, responsible for the increase in the spread in the period. Relative market liquidity, while found statistically significant, has no discernible influence.

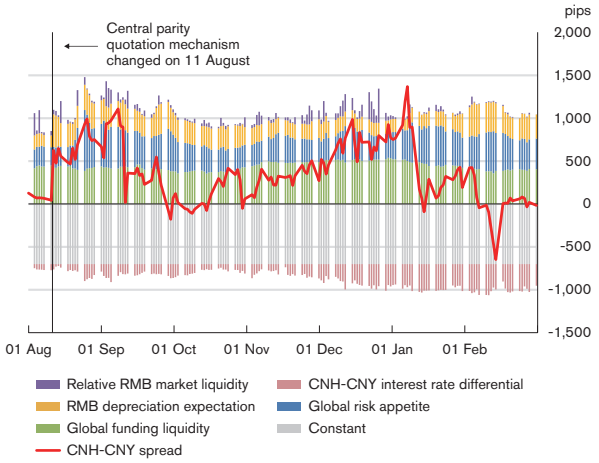
Chart B4.2
Factors of CNH-CNY spread for July 2012–February 2016



Note: The shaded areas indicate the long-term contributions of the factors to the CNH-CNY spread, assuming that the spread would converge to an equilibrium level in the long run with no further changes in these driving factors. The shaded areas do not necessarily add up to the day-to-day spread level.

Source: HKMA staff estimates.

Chart B4.3
Close-up view of CNH-CNY spread for August 2015–February 2016



Note: The shaded areas indicate the long-term contributions of the factors to the CNH-CNY spread, assuming that the spread would converge to an equilibrium level in the long run with no further changes in these driving factors. The shaded areas do not necessarily add up to the day-to-day spread level.

Source: HKMA staff estimates.

Concluding Remarks

Following the recent change to the setting of the daily middle exchange rate of the permissible renminbi band, the currency experienced a sharp depreciation, especially in the CNH market. As a consequence, the CNH-CNY spread widened significantly. This box studies the major drivers behind the spread in the past few years with a particular focus on the recent episode. Before the change of the central rate quotation mechanism, global risk appetite and global funding liquidity were basically what determined the size of the spread, although exchange rate expectation also emerged to be an additional driving force from around mid-2014. Other factors played only a minor role. After the change, the global factors continued to play an important role. However, interest rate differential is found to have exerted a much greater impact on the spread than before. The influence of exchange rate expectation also increased in the recent episode but to an extent that is perhaps smaller than many had thought.

Asset markets

The Hong Kong equity market fluctuated widely and experienced a sharp correction during the review period amid global risk-off sentiment. The market outlook will be highly susceptible to international financial market volatility as increased risks of a global slowdown and heightened geopolitical tensions weigh on investor appetite. While the Hong Kong dollar debt market maintained its steady growth, the offshore renminbi debt market contracted with its first decline in annual issuance since its inception. Residential property market has softened since the second half of 2015 amid weaker market sentiments.

4.3 Equity market

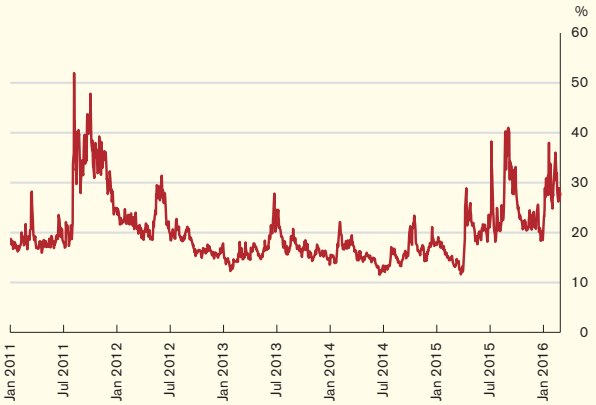
Reflecting a deteriorating external environment amid concerns about global economic slowdown, the equity market in Hong Kong experienced a sharp correction in the past six months. Following the US Federal Reserve (Fed)'s decision to keep its policy rate unchanged last September, investors regained some confidence after a turbulent summer break. However, the market came under pressure again towards the end of 2015. While the widely expected rate hike at the December Federal Open Market Committee meeting did not trigger much market reaction, concerns were mounting that the global economy is stalling in view of the weakness of oil and commodity prices (Chart 4.18). Heightened tensions in the Middle East and migrant flows added to the pessimism, especially on the economic outlook for Europe. After the turn of the year, the Mainland economy came under the spotlight amid further depreciation of the renminbi and the equity market shutdown in early January following the triggering of the newly-introduced circuit breaker weighed further on the sentiment.[28] Against this backdrop, equities in Hong Kong and across major markets saw a sharp fall in valuations toward the end of the review period. Overall, the Hang Seng Index (HSI) fell by 11.8% from September 2015 to February 2016, with the option implied volatility of the HSI (VHSI) staying mostly above 20% (Chart 4.19).

Chart 4.18
Equity prices in Hong Kong

Source: Bloomberg.

[28] To maintain market stability, the China Securities Regulatory Commission (CSRC) decided to suspend the circuit breaker mechanism, effective on 8 January 2016.

Chart 4.19
Option-implied volatility of the HSI



Source: Bloomberg.

Due to increased uncertainties over the scale of the adjustment required for the Mainland economy, the Hang Seng China Enterprises Index (HSCEI), also known as the H-share index, came under significant selling pressure, dropping by 18.7% during the review period. Compared to their onshore counterparts (i.e. A-shares), H-shares continued to be traded at a discount which may be attributed to discrepancies in the equity valuation between the Mainland and Hong Kong investors in the wake of heightened volatility in financial markets (Chart 4.20).[29]

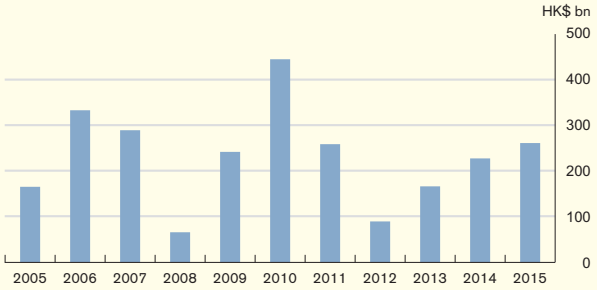
Chart 4.20
Hang Seng China AH Premium Index

Source: Bloomberg.

[29] See Chung, Hui and Li (2013) "Explaining share price disparity with parameter uncertainty: Evidence from Chinese A- and H-shares", *Journal of Banking and Finance*, 37 (2013) pp1073–1083.

Notwithstanding the turmoil in global equity markets, the primary market in Hong Kong enters a third straight year of solid growth. The funds raised through IPO in 2015 increased by 14.7% year-on-year to HK$261.3 billion, making Hong Kong the world's largest bourse by amount of funds raised (Chart 4.21).

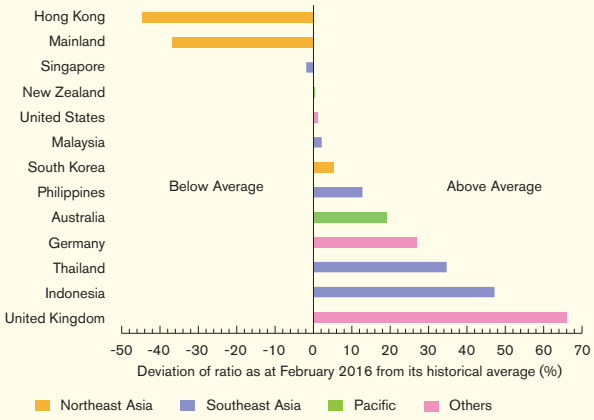
Chart 4.21
The IPO market in Hong Kong



Source: CEIC.

Looking ahead, uncertainties over the global economy and geopolitical risks in the Middle East are likely to keep investors on the sideline for a protracted period of time. While the recent market volatility may prompt the Fed to take a more gradual path in normalising monetary conditions, thus providing temporary breathing space for the markets, local equities will likely remain susceptible to the global risk-off sentiment. This is despite the more attractive valuation of the local equity market compared to other markets in the region (Chart 4.22).

Chart 4.22
Price-earnings ratios of Asia Pacific (excluding Japan) and other major markets

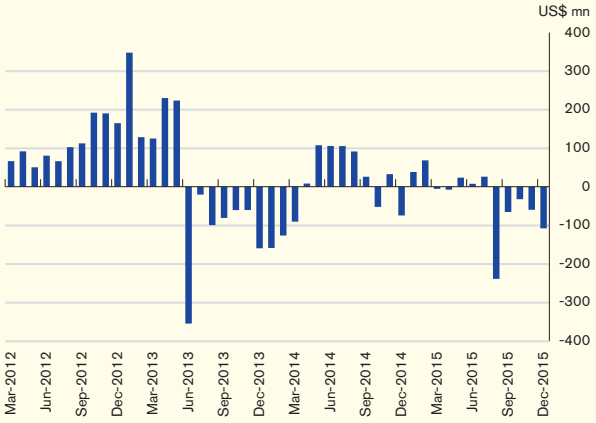


Sources: Bloomberg and HKMA staff estimates.

4.4 Debt market

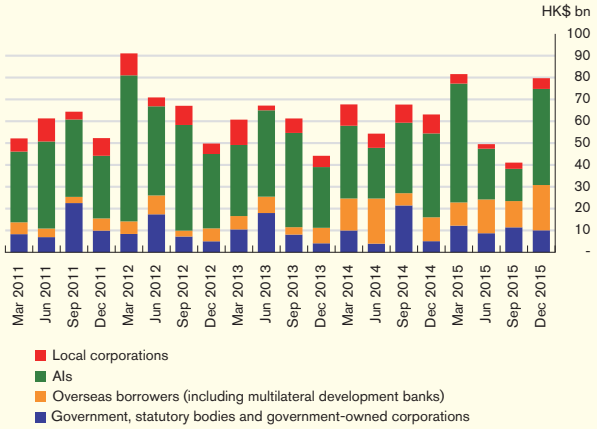
The Hong Kong dollar debt market maintained its steady growth in 2015 despite a major risk-reappraisal in global bond markets. Last year, particularly in the second half, Hong Kong saw significant net outflows from bond funds, suggesting that there was a reduction in investor appetite for bonds in the local market in the wake of the US monetary normalisation (Chart 4.23). Against this backdrop, new debt issued by the local private sector, which comprises AIs and local corporations, fell by 6.2%.[30] In contrast, public sector debt issuance rose by 3% to HK$2,284.6 billion, which more than offset the decline in the local private sector issuance.[31] Overall, total issuance of Hong Kong dollar debt securities amounted to HK$2,494.0 billion last year, up by 2.6% from the preceding year (Chart 4.24).

Chart 4.23
Bond fund flows into Hong Kong



Source: EPFR Global.

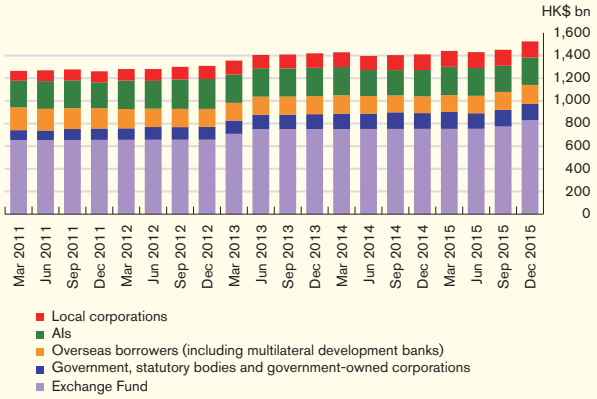
Chart 4.24
New issuance of non-Exchange Fund Bills and Notes Hong Kong dollar debt



Source: HKMA.

With the growth in total issuance, the outstanding amount of Hong Kong dollar debt rose by 8.1% to HK$1,524.6 billion at the end of December 2015, equivalent to 26.4% of Hong Kong dollar M3 or 22.2% of Hong Kong dollar denominated assets of the entire banking sector (Chart 4.25). The increase was mainly driven by the Exchange Fund and overseas borrowers including multilateral development banks (MDBs), which saw their outstanding debt increase by 10.1% and 13.3% to HK$828.4 billion and HK$167.4 billion respectively.

Chart 4.25
Outstanding Hong Kong dollar debt



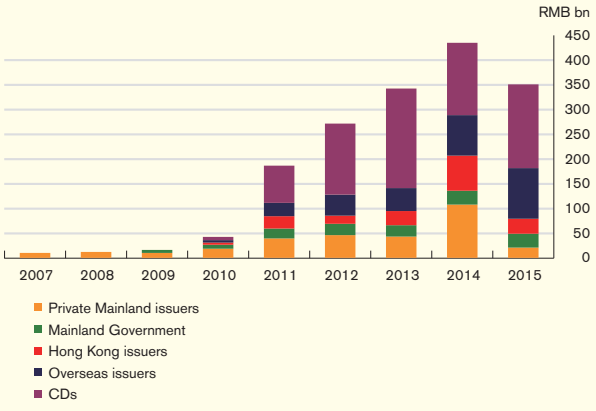
Source: HKMA.

[30] In 2015, new debts issued by local corporations declined notably by 57.4% to HK$14.2 billion, which more than offset the growth of 7.3% in new debts issued by AIs.

[31] New debts issued by the Exchange Fund and statutory bodies/government-owned corporations rose by 3.0% and 24.5% to HK$2,024.2 billion and HK$12.0 billion respectively, while issuance by the Government declined by 1.3% to HK$30.4 billion.

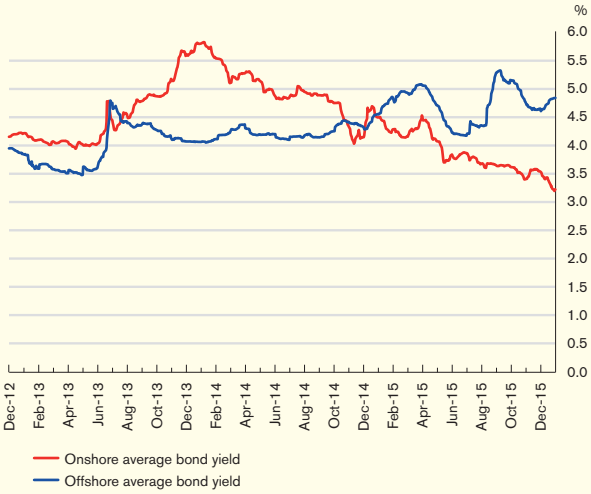
Meanwhile, after a period of rapid growth, the offshore renminbi debt market in Hong Kong showed signs of moderation. In 2015, offshore renminbi debt issuance amounted to RMB350.6 billion, down by 19.3% from the previous year, marking the first annual decline since 2007 (Chart 4.26). In particular, primary market activity shrank noticeably in the third quarter as the turbulence in global financial markets during the summer break made issuers more cautious. At the same time, a series of monetary easings in Mainland China made it more attractive for Mainland companies to issue bonds in the onshore market (Chart 4.27). Furthermore, in an effort to develop the local bond market, the Mainland authorities have relaxed the regulations for corporate bond issuance, thus encouraging more Mainland enterprises to tap the onshore bond market.[32] As a result, non-Certificate of Deposit debt securities issued by private Mainland issuers decreased by 80.7% to RMB20.7 billion. Nonetheless, overseas issuers remained active in the offshore renminbi bond market, with their issuance increasing by 25.1% to RMB102.4 billion. Notwithstanding the fall in total issuance, with less debt matured than issued, the outstanding amount of the offshore renminbi debt securities managed to grow by 6.7% to RMB659.7 billion in 2015 (Chart 4.28).

Chart 4.26
New issuance of offshore renminbi debt securities



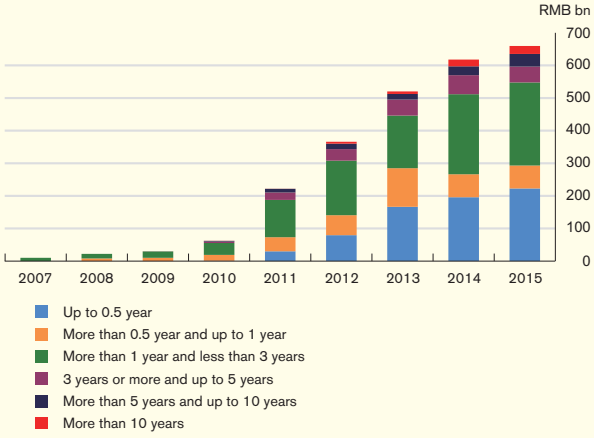
Sources: Newswires and HKMA staff estimates.

Chart 4.27
Average yields of onshore vs. offshore renminbi bond indices



Sources: Bloomberg and China Central Depository & Clearing Co., Ltd.

Chart 4.28
Outstanding amount of offshore renminbi debt securities by remaining tenor



Sources: Newswires and HKMA staff estimates.

In the near term, the road ahead for the market is expected to remain challenging. On the one hand, escalated volatility and uncertainty in global financial markets will continue to weigh on investor appetite. On the other hand, offshore issuance by Mainland corporations is likely to remain subdued in the period ahead as regulatory changes may make it easier for these corporations to tap the onshore market. Further out, however, the picture appears to be more positive. In particular, the International Monetary Fund's decision to include renminbi in

[32] For instance, the CSRC expanded the pool of eligible exchange corporate bond issuers to all onshore-registered corporates in January 2015.

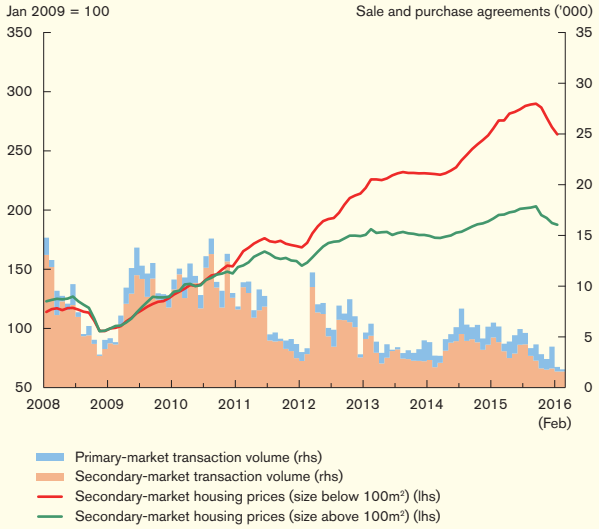
its Special Drawing Rights basket may boost the demand for renminbi-denominated assets in the long run.

4.5 Property markets

Residential property market

The residential property market has weakened since the second half of 2015 amid heightened financial market volatility and subdued growth momentum. Housing transactions dropped by 26% in the second half, with average monthly secondary-market transactions falling to a low level of 2,605 units (Chart 4.29). In contrast, average monthly primary-market transactions dropped only slightly to 1,349 units, as property developers increased new launches towards the end of the year. As a result, the share of primary market transactions increased to about one-third of the total housing transaction volume in the second half of 2015, much higher than the historical average share of about one-fifth. Although primary-market transactions held up, the pace of sales in new flats has slowed since the last quarter of 2015, according to the first-day sales and the sell-through rates. Meanwhile, speculative and investment activities generally remained subdued, whereas the pick-up in the share of company holdings in secondary-market transactions was due partly to the acquisitions of flats in old buildings (Chart 4.30). In early 2016, housing market activities remained sluggish, with the overall transaction volume reaching a record low at 1,807 units in February.

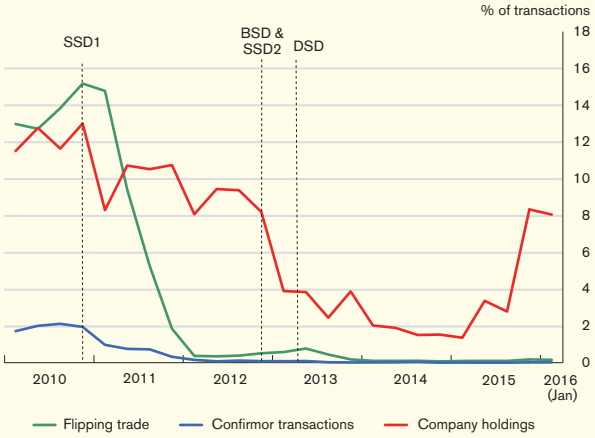
Chart 4.29
Residential property prices and transaction volume



Sources: Rating and Valuation Department (R&VD) and Land Registry.

With lacklustre property market sentiment, secondary-market housing prices started to decline in October, dragging the cumulative increase in housing prices in 2015 to 2.4%, down from 13.5% a year earlier (Chart 4.29). Prices of both large flats (with saleable area of at least 100m^2) and the small and medium-sized flats (with saleable area of less than 100m^2) declined at a similar pace in the last quarter of 2015. More recent data has suggested that housing prices continued to fall in early 2016, with the latest Centa-City leading index registering a decline of 13.2% from its peak in mid-September.

Chart 4.30
Confirmor transactions, flipping trade and company purchasers



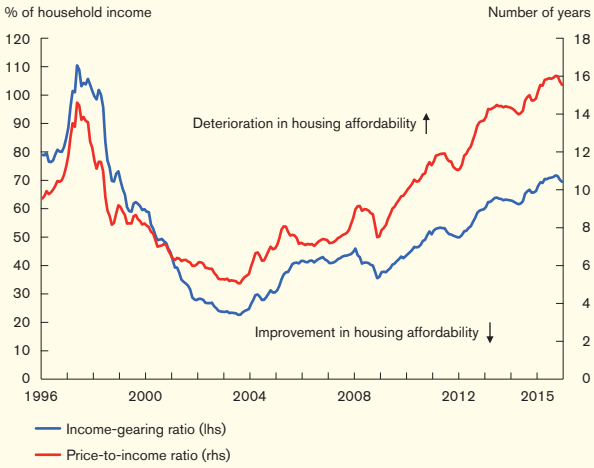
Note: SSD1 and SSD2 refer to the Special Stamp Duties introduced in November 2010 and October 2012, respectively; BSD refers to Buyer Stamp Duty introduced in October 2012; DSD refers to the doubling of the ad valorem stamp duty introduced in February 2013.

Source: Centaline Property Agency Limited.

The price premium of primary market flats relative to secondary market flats remained narrow. In view of the softening sales momentum, property developers offered different types of discounts and concessions, as well as mortgage plans with loan-to-value (LTV) ratios above the normal permissible caps on banks in order to lure homebuyers.

Despite the recent decline in housing prices, housing affordability remained stretched. The housing price-to-income ratio remained high at 15.7 in the fourth quarter, above the 1997 peak of 14.6, while the income-gearing ratio was 70.3%, well above its long-term average of about 50% (Chart 4.31).[33] The recent increases in interbank interest rates were small and would have limited impact on the debt-servicing costs of HIBOR-based mortgage loans given that HIBOR rates are still at ultra-low levels. However, if the mortgage interest rate were to increase to a more normal level, the mortgage debt-servicing burden on homeowners would soar. Under an illustrative scenario with a rise in the mortgage interest rate by 300-basis-point, the income gearing ratio could rise to 91.8%. Meanwhile, as the rate of increases in housing prices and rentals were very close in 2015, the buy-rent gap as a measure of relative user costs stayed flat but remained elevated during the year (Chart 4.32).[34] Residential rental yields stayed at record low levels of 2.3–3.1%, while their spreads relative to the long-term Government bond yields remained narrow.

Chart 4.31
Indicators of housing affordability

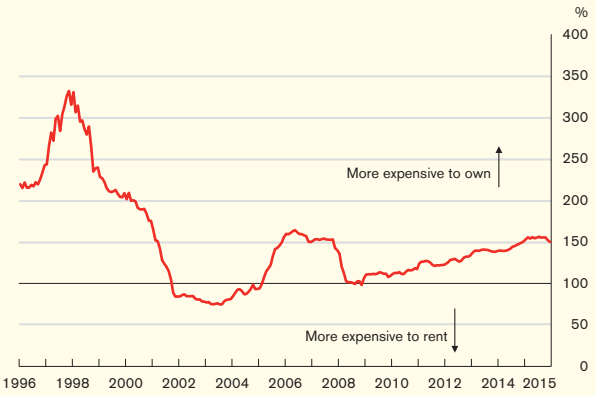


Sources: R&VD, C&SD and HKMA staff estimates.

[33] The price-to-income ratio measures the average price of a typical 50m² flat relative to the median income of households living in private housing. Alternately, the income-gearing ratio compares the amount of mortgage payment for a typical 50m² flat (under a 20-year mortgage scheme with a 70% loan-to-value ratio) to the median income of households living in private housing. The income-gearing ratio is not the same as a borrower's actual debt-servicing ratio, which is subject to a maximum cap by the HKMA prudential measures.

[34] The buy-rent gap estimates the cost of owner-occupied housing (under a 20-year mortgage scheme with a 70% loan-to-value ratio) relative to rentals.

Chart 4.32
Buy-rent gap



Note: This indicator is calculated as the ratio of the cost of purchasing and maintaining a 50m² flat with that of renting it.
Sources: R&VD, C&SD and HKMA staff estimates.

The seven rounds of macro-prudential measures introduced by the HKMA since 2009 have helped bring down the average loan-to-value ratio for new mortgages to 50.7% in January from 64% before the measures were introduced. The debt-servicing ratio (DSR) for new mortgages also fell by about 6 percentage points to 34.3%.

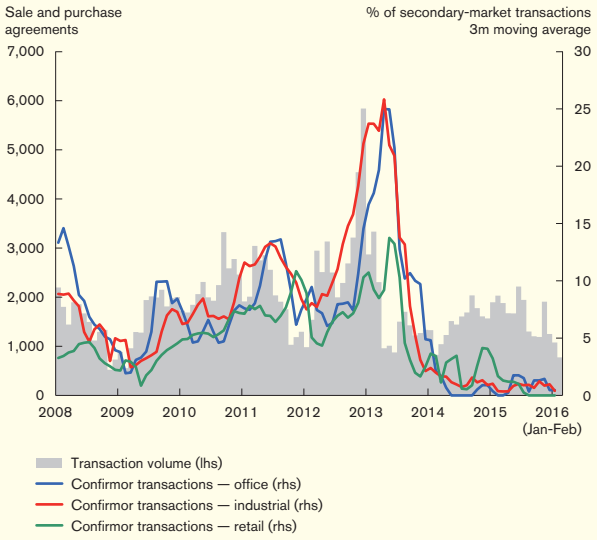
Downside risks in the housing market seem to have increased. Global financial market volatility, capital outflow pressure, and the softened growth momentum could dampen property market sentiment further. As the US rate hike cycle has begun, local mortgage rates would eventually rise and adversely affect the debt-servicing ability of homeowners and potential homebuyers. The gradual narrowing in the housing demand-supply gap may also pose some downward pressure on housing prices over time. While Hong Kong dollar assets, including properties, could become attractive as a store of value to the Mainland residents due to the depreciation in the renminbi, the reduced purchasing power due to the weaker currency, together with the slowdown in the Mainland economy, may restrain their demand for Hong Kong properties. Reflecting these risk factors, the property market has already seen downward adjustments over the past few months. However, more time is needed to observe whether the property market has indeed entered a down cycle given the highly uncertain and rapidly evolving economic environment.

Non-residential property market

The non-residential property market softened amid the generally weak property market sentiment. Transaction volume dropped by 23% in the second half due to eased demand for office and retail space, while speculative activity remained inactive, as indicated by the low levels of confirmor transactions (Chart 4.33). After experiencing solid increase in the first three quarters of 2015, prices of non-residential properties started to decline in the final quarter. Prices of retail space have fallen by 7.6% since September last year, while prices of office have declined by 5.2% since last October (Chart 4.34). Rentals also followed a similar trend, with retail space and flatted factories rentals registering a decline of 3.1% and 1.7% respectively since the last quarter. Rental yields continued to stay low at 2.5–3.0%.

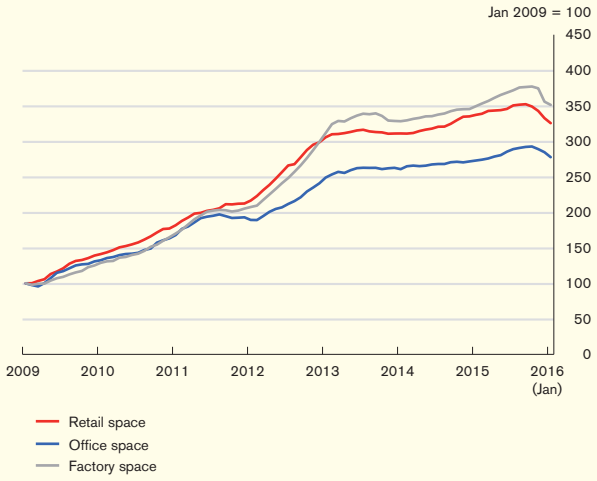
Looking ahead, the non-residential property market is likely to face headwinds from the slower economic momentum, financial market volatility and local interest rate rises, with the retail segment being further dragged by the weak retail sales outlook. While office prices and rentals also face downward pressures, the low office vacancy rate may provide some support to rentals and capital values in this market segment.

Chart 4.33
Transactions in non-residential properties



Sources: Land Registry and Centaline Property Agency Limited.

Chart 4.34
Non-residential property price indices



Source: R&VD.

5. Banking sector performance

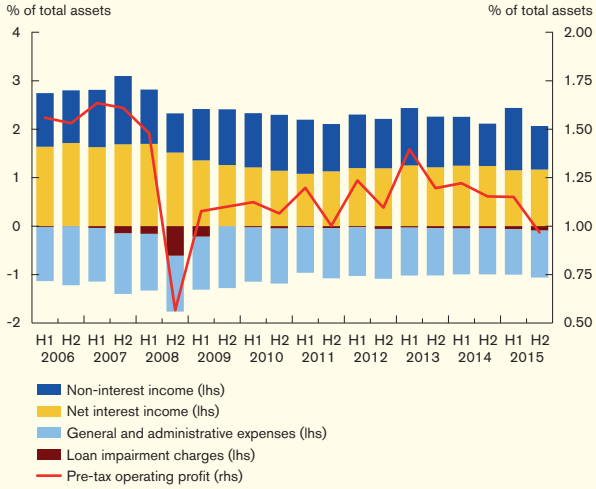
Retail banks recorded thinner profit in the second half of 2015 mainly due to lower non-interest income. Meanwhile, the banking sector witnessed the first contraction in loan book since the global financial crisis, alongside slight deterioration in asset quality. Nevertheless, capital and liquidity positions remained structurally robust and strengthened further. Looking ahead, the banking sector faces challenges on various fronts. Banks should pay close attention to the impacts of more volatile interest rates and possible capital outflows amid normalisation of US interest rates. This coupled with potential global economic slowdown and financial market turbulence could put pressure on the credit quality of banks' assets in general. In particular, credit risk in relation to corporate exposures may increase further as corporates' leverage and debt-servicing burdens continued to rise. Banks should maintain prudent credit risk management in this more challenging operating environment.

5.1 Profitability and capitalisation

Profitability

The profitability of retail banks[35] declined in the second half of 2015 mainly due to lower non-interest income, while rises in operating costs and higher loan impairment charges also contributed. With pre-tax operating profit of retail banks reducing by 15.5%, their return on assets[36] receded to 0.97% in the second half of 2015 from 1.15% in the first half (i.e. the red line in Chart 5.1).

Chart 5.1
Profitability of retail banks



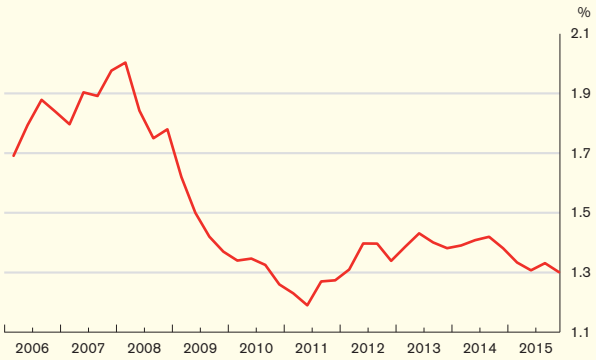
Note: Semi-annually annualised figures.
Source: HKMA.

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

[36] Return on assets is calculated based on aggregate pre-tax operating profits.

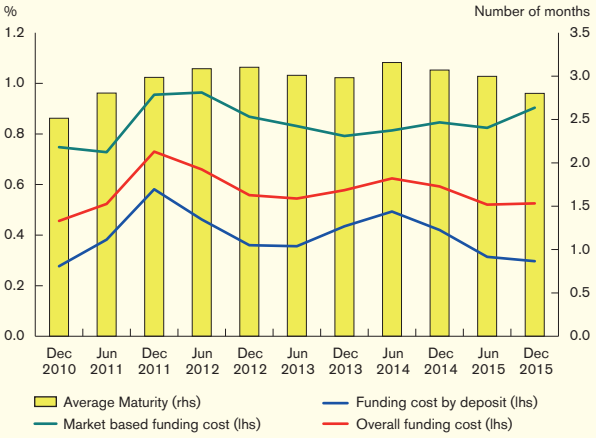
The net interest margin of retail banks hovered in a narrow range and stayed at 1.30% in the fourth quarter of 2015 (Chart 5.2) attributable partly to stable funding conditions. For licensed banks as a whole, overall funding costs remained steady at 0.53% at the end of December 2015 (Chart 5.3).[37] Meanwhile, the composite interest rate, a measure of the average cost of Hong Kong dollar funds for retail banks, declined slightly by 3 basis points during the second half of 2015 to 0.26% at the end of December 2015 (Chart 5.4). Hong Kong interbank interest rates remained largely steady in the second half of 2015, before seeing some notable upward adjustments from low levels in January 2016.

Chart 5.2
Net interest margin of retail banks



Note: Quarterly annualised figures.
Source: HKMA.

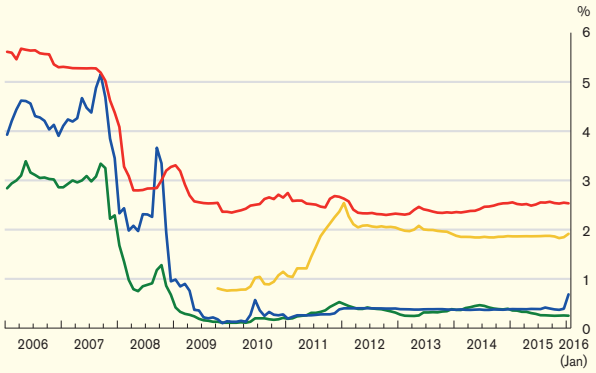
Chart 5.3
Hong Kong and US dollar funding cost and maturity of licensed banks



Source: HKMA.

HIBOR-based and the best lending rate based (BLR-based) mortgage rates were also broadly stable (Chart 5.4). However, the share of the former amongst the newly approved mortgage loans dropped to 79.7% at the end of 2015 from 85.8% at the end of June, partly reflecting the market response to the anticipated normalisation of HIBORs following the rise in US interest rates.

Chart 5.4
Interest rates



Notes:
(a) End of period figures.
(b) Period-average figures for newly approved loans.
Sources: HKMA and staff estimates.

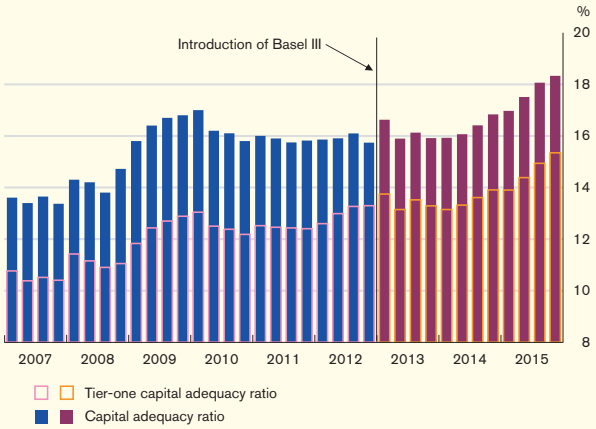
Capitalisation

Capitalisation of the banking sector continued to be strong and remained well above the minimum international standards. The consolidated capital adequacy ratio of locally incorporated AIs rose to 18.3% at the end of December from 17.5% at the end of June (Chart 5.5), while the tier-one capital adequacy ratio[38] increased to 15.3% from 14.4%. The strong capital position suggests that the Hong Kong banking sector is well positioned to meet the countercyclical capital buffer requirement, which came into effect from 1 January 2016.

[37] Market based funding cost is measured by the interest costs of banks' non-deposit interest bearing liabilities.

[38] The ratio of tier-one capital to total risk-weighted assets.

Chart 5.5
Capitalisation of locally incorporated AIs



Notes:

1. Consolidated positions.
2. With effect from 1 January 2013, a revised capital adequacy framework (Basel III) was introduced for locally incorporated AIs. The capital adequacy ratios from March 2013 onwards are therefore not directly comparable with those up to December 2012.

Source: HKMA.

5.2 *Liquidity, interest rate and credit risks*

Liquidity and funding

The liquidity position of the banking sector, as measured by the Basel III Liquidity Coverage Ratio (LCR)[39] requirement, continued to be favourable and strengthened further during the review period. The average LCR of category 1 institutions rose to 142.9% in the fourth quarter of 2015, while the average Liquidity Maintenance Ratio (LMR) of category 2 institutions also increased to 53.9% (Table 5.A). Both ratios remained well above their regulatory minimums,[40] suggesting that the Hong Kong banking sector is able to withstand potential liquidity risks arising from possible capital outflows from Hong Kong.

Table 5.A
Liquidity ratios

Quarterly average ratios (%)	2015 Q1	2015 Q2	2015 Q3	2015 Q4
Liquidity Coverage Ratio (Consolidated) — Category 1 institutions	129.9	131.7	136.4	142.9
Liquidity Maintenance Ratio (Consolidated) — Category 2 institutions	50.8	53.4	53.6	53.9

Source: HKMA.

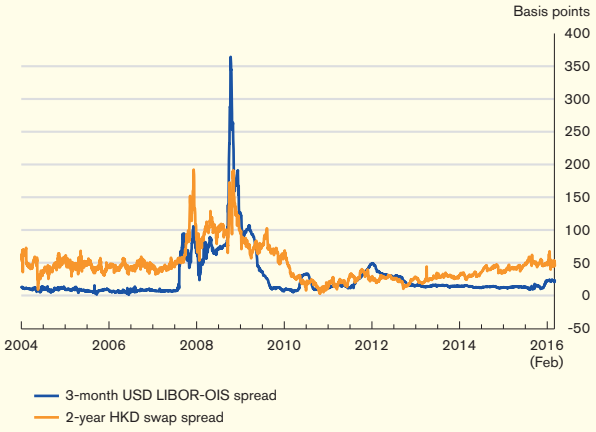
Mainly reflecting market concerns about European banks' exposure to the energy and commodity sectors and the associated potential impact on their default risks, credit default swap spreads for some European banks have widened notably coupled with falls in prices of their contingent convertible bonds since February 2016. Nevertheless, the increase in European banks' counterparty risk so far has had only a limited impact on bank funding liquidity. The spread between three-month US dollar LIBOR and its corresponding overnight index swap (OIS) rate widened moderately to 24 basis points by the end of February 2016 (Chart 5.6). In the domestic market, funding liquidity remained broadly stable, with the two-year Hong Kong dollar swap spread little changed at around 48 basis points.[41]

[39] The Basel III LCR requirement, phased-in from 1 January 2015, is designed to ensure that banks have sufficient high-quality liquid assets to survive a significant stress scenario lasting 30 calendar days. In Hong Kong, AIs designated as category 1 institutions adopt the LCR; while category 2 institutions adopt the LMR, which is a modified form of the original statutory liquidity ratio requirement.

[40] For a category 1 institution, the minimum requirement for LCR began at 60% on 1 January 2015, rising in equal annual steps of 10 percentage points to reach 100% on 1 January 2019. A category 2 institution must maintain an LMR of not less than 25% on average in each calendar month.

[41] The determinants of variations in the Hong Kong dollar swap spreads were investigated in C. Hui and L. Lam (2008), "What drives Hong Kong dollar swap spreads: Credit or liquidity?", *HKMA Working Paper* 10/2008.

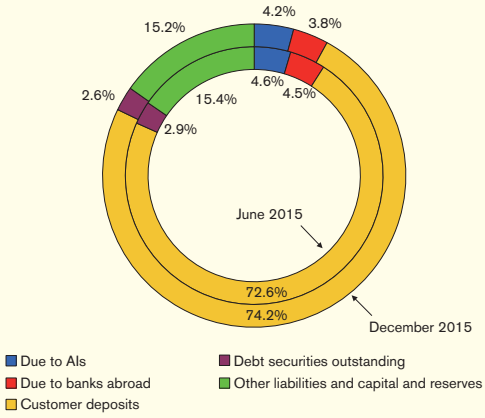
Chart 5.6
3-month US dollar LIBOR-OIS spread[42] and 2-year Hong Kong dollar swap spread[43]



Source: Bloomberg.

Customer deposits continued to be the primary funding source for retail banks. The share of customer deposits to banks' total liabilities edged up to 74.2% at the end of December 2015 (Chart 5.7) from 72.6% six months earlier. The share of other funding sources remained broadly stable during the review period.

Chart 5.7
Liabilities structure of retail banks



Notes:
1. Figures may not add up to total due to rounding.
2. Figures refer to the percentage of total liabilities (including capital and reserves).
3. Debt securities comprise negotiable certificates of deposit and all other negotiable debt instruments.

Source: HKMA.

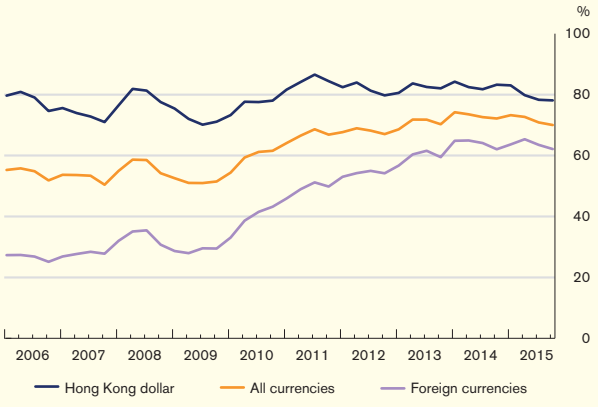
As total loans and advances declined and deposits increased moderately during the review period, the all-currency loan-to-deposit (LTD) ratio of all AIs declined by 2.6 percentage points to 70.1% at the end of December. The Hong Kong dollar LTD ratio of all AIs fell by 1.7 percentage points to 78.2% (Chart 5.8), while the foreign-currency LTD ratio dropped more significantly by 3.2 percentage points to 62.2%.

The LTD ratios of retail banks exhibited a similar picture (Chart 5.9). The Hong Kong dollar LTD ratio declined slightly by 0.6 percentage points to 71.5% at the end of December, while the foreign-currency LTD ratio fell by 1.5 percentage points to 37.8%. As a whole, the all-currency LTD ratio of retail banks reduced to 56.5% at the end of December from 57.8% six months earlier.

[42] An OIS is an interest rate swap in which the floating leg is linked to an index of daily overnight rates. The two parties agree to exchange at maturity, on an agreed notional amount, the difference between interest accrued at the agreed fixed rate and interest accrued at the floating index rate over the life of the swap. The fixed rate is a proxy for expected future overnight interest rates. As overnight lending generally bears lower credit and liquidity risks, the credit risk and liquidity risk premiums contained in the overnight index swap rates should be small. Therefore, the LIBOR-OIS spread generally reflects the credit and liquidity risks in the interbank market.

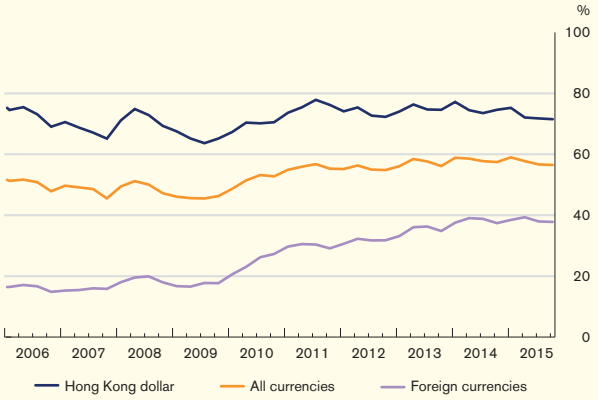
[43] Swap spreads are differences between "fixed-for-floating" interest rate swap rates and corresponding Exchange Fund paper yields of the same maturity.

Chart 5.8
Average loan-to-deposit ratios of all AIs



Source: HKMA.

Chart 5.9
Average loan-to-deposit ratios of retail banks

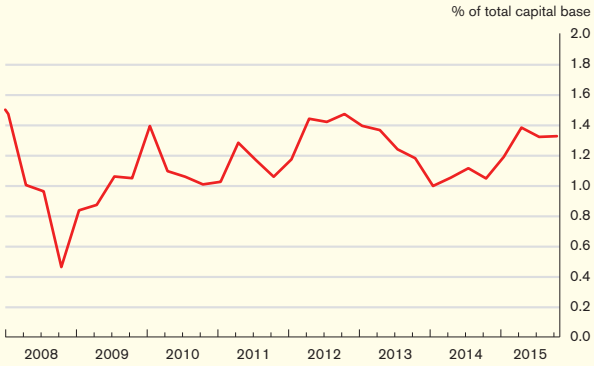


Source: HKMA.

Interest rate risk

Interest rate risk exposure of retail banks remained low compared to their strong capital positions. It is estimated that under a hypothetical shock of an across-the-board 200-basis-point increase in interest rates, the economic value of retail banks' interest rate positions could be subject to a decline equivalent to 1.32% of their total capital base as of December 2015 (Chart 5.10). Nevertheless, given the high uncertainty about the pace and timing of further US interest rate rises, banks should pay close attention to their interest rate risk management.

Chart 5.10
Impact of interest rate shock on retail banks



Notes:

1. Interest rate shock refers to a standardised 200-basis-point parallel rate shock to institutions' interest rate risk exposures.
2. The impact of the interest rate shock refers to its impact on the economic value of banking and trading book[44], expressed as a percentage of the total capital base of banks.

Source: HKMA staff estimates.

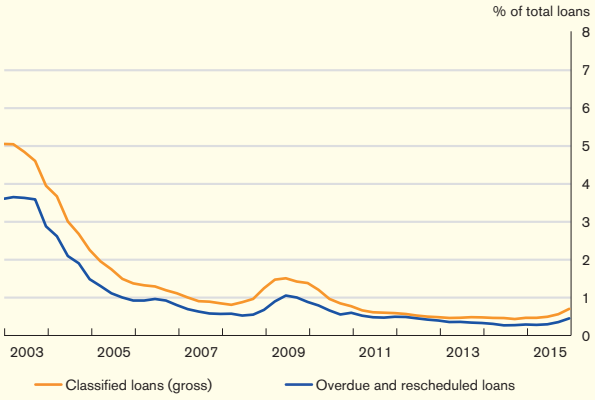
Credit risk

The asset quality of retail banks remained healthy, although there have been clearer signs of deterioration. The classified loan ratio increased to 0.70% at the end of December[45] from 0.49% at the end of June, while the ratio of overdue and rescheduled loans rose to 0.45% from 0.29% (Chart 5.11). Nevertheless, both ratios stayed at low levels by historical standards.

[44] Locally incorporated AIs subject to the market risk capital adequacy regime are required to report positions in the banking book only. Other locally incorporated AIs exempted from the market risk capital adequacy regime and overseas incorporated institutions are required to report aggregate positions in the banking book and trading book.

[45] Figures prior to December 2015 are related to retail banks' Hong Kong offices and overseas branches. Starting from December 2015, the coverage was expanded to include locally incorporated retail banks' major overseas subsidiaries. The classified loan ratio covering retail banks' Hong Kong offices and overseas branches was 0.63% at the end of December 2015.

Chart 5.11
Asset quality of retail banks



Notes:
1. Classified loans are those loans graded as "sub-standard", "doubtful" or "loss".
2. Figures prior to December 2015 are related to retail banks' Hong Kong offices and overseas branches. Starting from December 2015, the coverage was expanded to include the banks' major overseas subsidiaries as well.

Source: HKMA.

The weakening global economic outlook raises a question mark on how banks' asset quality would fare if the macro risk intensifies. Stress-testing exercises are one useful tool for such assessments. In an attempt to provide a more comprehensive and realistic assessment, Box 5 develops a macro stress-testing framework with macro-financial feedback linkages. Theoretically, deterioration in banks' asset quality arising from an economic slowdown could lead banks to curtail lending and/or raise lending rates. The resulting tighter credit conditions could further worsen economic fundamentals, amplifying the initial macro shock. We show in a stress-scenario analysis that the macro-financial feedback effect alone could in some extreme cases lead to a notable increase in the stressed classified loan ratio after the occurrence of an initial macro shock. One implication for the current juncture is that while the recent deterioration in asset quality is not alarming, banks should remain vigilant and prepare for the possible worsening of asset quality associated with the macro-financial feedback effect.

Domestic lending[46] of the banking sector reversed its significant growth of 5.0% in the first half of 2015 and registered a mild contraction of 1.1% in the second half. The decline was primarily driven by lower demand for corporate loans, which dropped by 3.0% in the second half. Meanwhile, household loan[47] growth decelerated to 3.6% in the second half of 2015 from 5.0% in the first half.[48]

Looking ahead, the weaker credit demand may persist in the near term, as the HKMA Opinion Survey on Credit Condition Outlook of December 2015 revealed that all surveyed AIs expected that loan demand in the next three months would either remain the same or decrease (Table 5.B).

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

% of total respondents	Mar-15	Jun-15	Sep-15	Dec-15
Considerably higher	0	0	0	0
Somewhat higher	10	0	0	0
Same	86	95	86	86
Somewhat lower	5	5	14	14
Considerably lower	0	0	0	0
Total	100	100	100	100

Note: Figures may not add up to total due to rounding.
Source: HKMA.

Household exposure

Credit risk of household loans stayed low during the review period. Banks' mortgage portfolios remained healthy, with the delinquency ratio staying low at 0.03% at the end of 2015. Moreover, the average loan-to-value ratio of new mortgage loans approved decreased further to

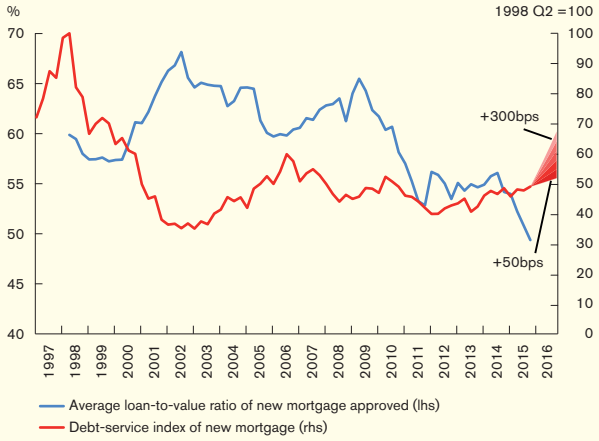
[46] Defined as loans for use in Hong Kong plus trade-financing loans.

[47] Loans to households constitute lending to professional and private individuals, excluding lending for other 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 2015, the share of household lending in domestic lending was 30.3%.

[48] For detailed analysis of loans to different economic sectors, see chapter 4.

49.4% in the fourth quarter of 2015 from 52.2% in the second quarter (the blue line in Chart 5.12).

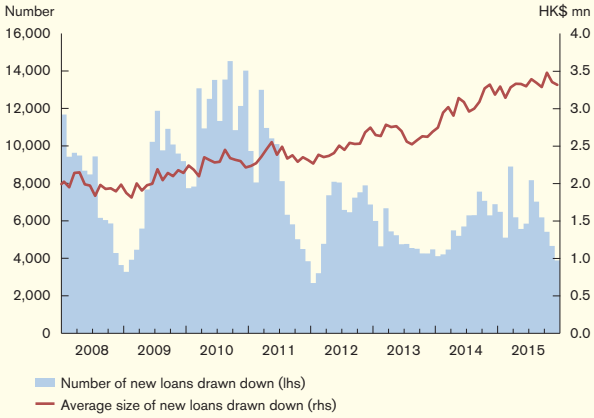
Chart 5.12
Average loan-to-value ratio and household debt-servicing burden in respect of new mortgages



Note: The calculation of the index is based on the average interest rate for BLR-based mortgages.
Sources: HKMA and staff estimates.

Mainly reflecting further rises in the average size of new mortgage loans (Chart 5.13), the debt-service index of new mortgages[49] edged up to 49.0 in the fourth quarter of 2015, from 48.1 in the second quarter (i.e. the red line in Chart 5.12). However, a sensitivity test shows that the debt-service index could rise significantly to 67.4 in a four-quarter period if interest rates were to increase by 300 basis points[50] and other things being constant. Banks should therefore be vigilant to the risks associated with rising debt-servicing burden amid interest rate normalisation.

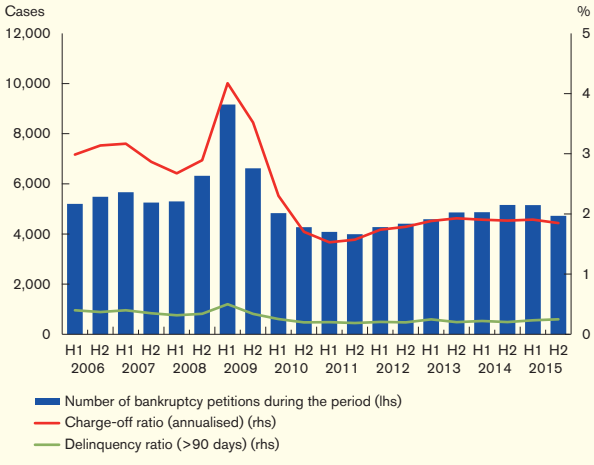
Chart 5.13
New mortgage loans of surveyed AIs



Source: HKMA Residential Mortgage Survey.

Credit risk of unsecured household exposure remained contained. Both the annualised credit card charge-off ratio and the delinquency ratio were largely unchanged at 1.88% and 0.25% respectively in the second half of 2015 (Chart 5.14). The number of bankruptcy petitions also stayed at a relatively low level.

Chart 5.14
Charge-off ratio and delinquency ratio for credit card lending and bankruptcy petitions



Sources: Official Receiver's Office and the HKMA.

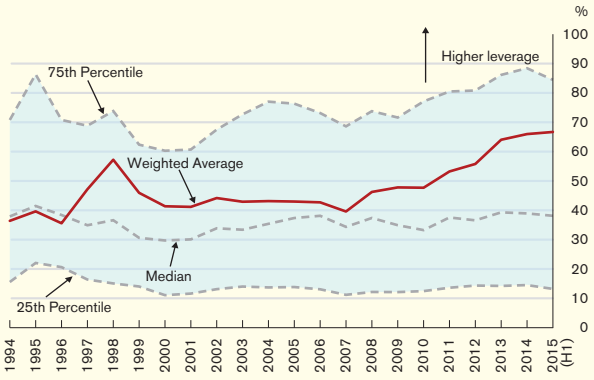
[49] A higher value of the debt-service index indicates that there is either a drop in household income, or an increase in interest rates, or an increase in the average mortgage loan amount drawn by households. Historical movements in the index suggest that a sharp rise in the index may lead to deterioration in the asset quality of household debt.

[50] The assumption of a 300-basis-point rise in interest rates is consistent with the prudential measure that requires AIs to have a 3-percentage-point mortgage rate upward adjustment for stress testing property mortgage loan applicants' debt servicing ability.

Corporate exposure[51]

The path of US interest rate normalisation remained one key factor affecting credit risk of corporate exposure, given the rising trends of the corporate sector's leverage and debt-servicing burden. The leverage of the corporate sector, as measured by the weighted average of debt-to-equity ratio, edged up further to 66.7% in the first half of 2015 (Chart 5.15), though there were tentative signs of improvement for higher leveraged corporates (i.e. the 75th percentile line). The general rise in debt-service ratio, as measured by total interest expenses divided by earnings before interest and taxes (EBIT), suggested a broad-based deterioration in the debt-servicing ability for local corporates (Chart 5.16).

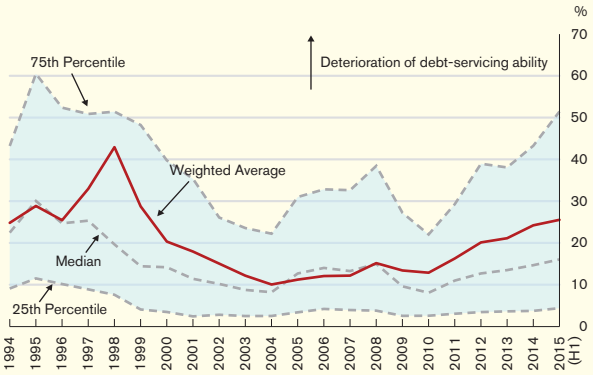
Chart 5.15
Leverage ratio of listed non-financial corporations in Hong Kong



Notes:
1. The leverage ratio is defined as the ratio of debt to equity. A higher value indicates higher leverage.
2. All non-financial corporations listed on the Hong Kong Stock Exchange are selected.
3. Figures are calculated based on information up to end-February 2016.

Source: HKMA staff estimates based on data from Bloomberg.

Chart 5.16
Debt-service ratio of listed non-financial corporations in Hong Kong



Notes:
1. Debt-service ratio is calculated by the total interest expenses divided by the earnings before interest and tax (EBIT). Companies with negative EBIT are excluded from the calculation.
2. All non-financial corporations listed on the Hong Kong Stock Exchange are selected.
3. Figures are calculated based on information up to end-February 2016.

Source: HKMA staff estimates based on data from Bloomberg.

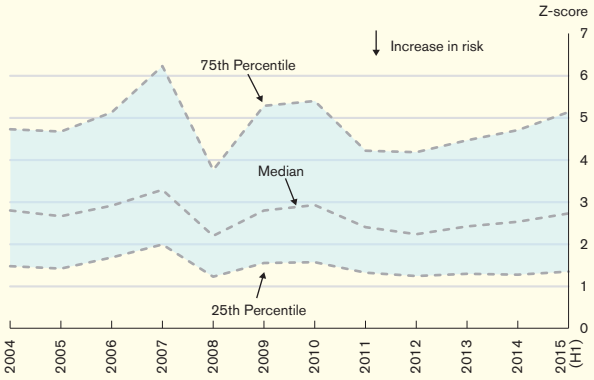
Nevertheless, the Altman's Z-score, which is a more comprehensive credit risk measure based on five key accounting ratios[52], showed an upward trend till the first half of 2015 for firms with lower default risks (above the median line in Chart 5.17), suggesting a further improvement in their default risk.

However, it should be borne in mind that the time lag in availability of accounting data precludes a timely assessment on how the recent rise in US interest rates and financial market turmoil would affect the corporate sector's fundamentals and thus default risk. On the one hand, corporates with significant US dollar exposure may begin, or quicken, their deleveraging processes amid the US interest rate normalisation, which may ultimately lead to healthier balance sheets. On the other hand, the recent financial market turmoil may reflect weaker global growth prospects, which may adversely affect corporates earnings. The net impact on the corporate sector's default risk remained highly uncertain.

[51] Excluding interbank exposure. At the end of 2015, the share of corporate loans in domestic lending was 69.4%.

[52] These accounting ratios are (i) working capital/tangible assets, (ii) retained earnings/tangible assets, (iii) EBIT/tangible assets, (iv) market value of equity/book value of total liabilities, and (v) sales/tangible assets.

Chart 5.17
Altman's Z-score: A bankruptcy risk indicator of listed non-financial corporations



Notes:
1. A lower Z-score indicates a higher likelihood of a company default.
2. All non-financial corporations listed on the Hong Kong Stock Exchange are selected.
3. Figures are calculated based on information up to end-February 2016.

Source: HKMA staff estimates based on data from Bloomberg.

Corporates' currency mismatches are another key factor to watch for. The prolonged low interest rate environment in major advanced economies over the past years may have encouraged corporates to take on excessive foreign exchange exposure without regard to the possible impact on the currency mismatch between their assets and liabilities.[53] Such currency mismatch could translate into significant losses and thus increase their default risk if exchange rates move unfavourably. In particular, corporates with higher leverage and debt-servicing burdens would be more vulnerable to US interest rate hikes and concurrent US dollar appreciation, as they may face a double-hit in the form of rising interest repayments and foreign exchange losses with thin capital. Banks should remain vigilant to corporates' currency mismatch risk.

[53] Under the Linked Exchange Rate System, Hong Kong dollars and US dollars are regarded as the same currency in the context of foreign exchange risk. For example, a company that earns mainly Hong Kong dollar-denominated revenues and is funded by US dollar-denominated debt does not result in significant foreign exchange risks.

Mainland-related lending and non-bank exposures

During the review period, the banking sector's Mainland-related lending began to decline. Total Mainland-related lending decreased by 4.5% to HK$3,326 billion (15.5% of total assets) at the end of 2015 from HK$3,485 billion (15.9% of total assets) at the end of the second quarter (Table 5.C). Other Mainland-related non-bank exposures also dropped by 4.2% to HK$1,033 billion (Table 5.D).

Table 5.C
Mainland-related lending

HK$ bn	Mar 2015	Jun 2015	Sep 2015	Dec 2015
Mainland-related loans	3,438	3,485	3,376	3,326
Mainland-related loans excluding trade finance	3,052	3,112	3,060	3,050
Trade finance	387	373	316	276
By type of AIs:				
Overseas-incorporated AIs	1,467	1,475	1,447	1,432
Locally-incorporated AIs*	1,420	1,453	1,380	1,358
Mainland banking subsidiaries of locally-incorporated AIs	551	557	549	536
By type of borrowers:				
Mainland state-owned entities	1,575	1,548	1,418	1,401
Mainland private entities	652	652	673	655
Non-Mainland entities	1,212	1,285	1,285	1,271

Notes:
1. * Including loans booked in the Mainland branches of locally-incorporated AIs.
2. Figures may not add up to total due to rounding.

Source: HKMA.

Table 5.D
Other Mainland-related non-bank exposures

HK$ bn	Mar 2015	Jun 2015	Sep 2015	Dec 2015
Negotiable debt instruments and other on-balance sheet exposures	620	669	668	646
Off-balance sheet exposures	365	409	406	386
Total	985	1,078	1,073	1,033

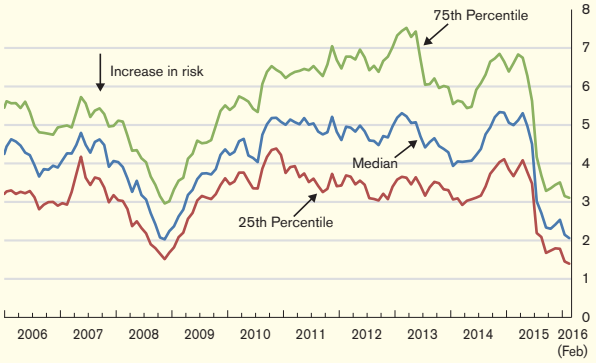
Note: Figures may not add up to total due to rounding.

Source: HKMA.

While the decline in Mainland-related lending may be mainly attributable to the slowdown of the Mainland economy, unwinding US dollar debt by some Mainland corporates to reduce the foreign currency risk arising from RMB depreciation was also one contributor.

The recent turbulence in the Mainland stock markets may signal higher credit risk associated with the Mainland-related exposure of banks. The distance-to-default index[54], a market based default risk indicator, points to a broad-based increase in the credit risk of the Mainland corporate sector since June 2015 to similar levels recorded during the global financial crisis (Chart 5.18). The increase in default risk for the Mainland corporate sector, however, was largely driven by heightened financial market volatility rather than an abrupt increase in the leverage ratio of the Mainland corporate sector (Chart 5.19).

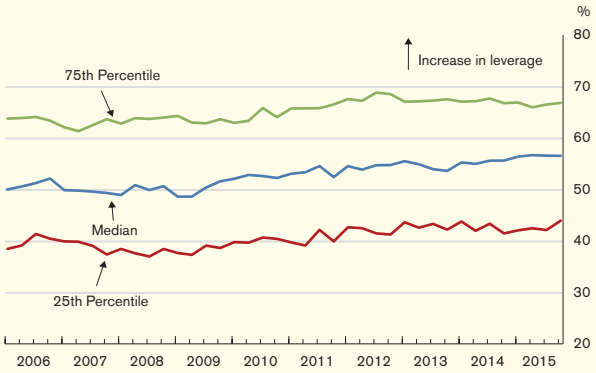
Chart 5.18
Distance-to-default index for the Mainland corporate sector



Note: Distance-to-default index is calculated based on the 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.

Chart 5.19
Leverage ratio for the Mainland corporate sector



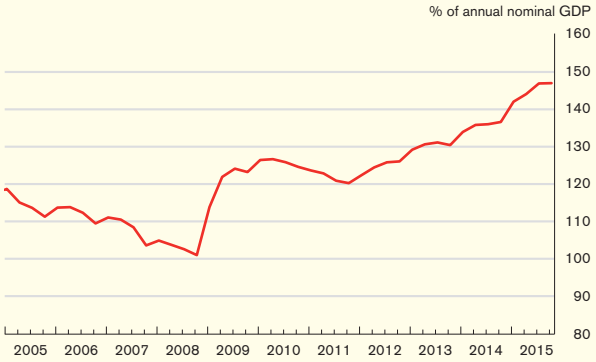
Notes:

1. The leverage ratio is defined as the ratio of total liabilities to total assets.
2. It is calculated based on the 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 based on data from Bloomberg.

Banks should remain attentive to the credit risk management of their Mainland-related lending in view of the rising default risk of Mainland corporates, a possible further slowdown of the Mainland economy, and the relatively high level of credit-to-GDP ratio (Chart 5.20).

Chart 5.20
Credit-to-GDP ratio in Mainland China



Note: Credit-to-GDP ratio is defined as the ratio of total bank loans (all currencies) to the sum of quarterly nominal GDP for the latest four quarters.

Sources: CEIC and HKMA staff estimates.

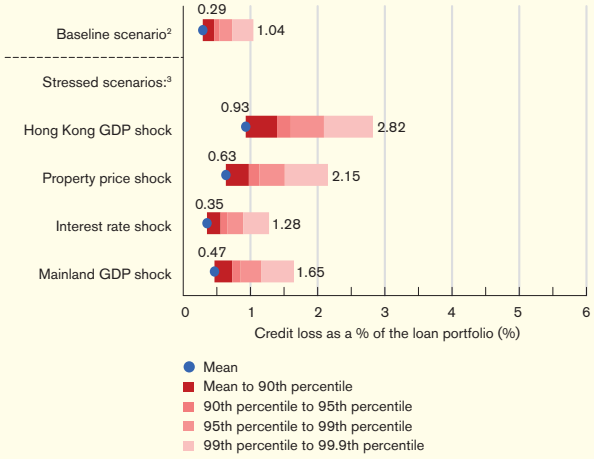
[54] The distance-to-default is a market based default risk indicator based on the framework by R. Merton (1974), "On the pricing of corporate debt: the risk structure of interest rates", *Journal of Finance*, Vol. 29, pages 449 - 470, in which equity prices, equity volatility, and companies' financial 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.

Macro stress testing of credit risk[55]

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 experienced during the Asian financial crisis. Chart 5.21 presents the simulated future credit loss rate of retail banks in the fourth quarter of 2017 under four specific macroeconomic shocks[56] using information up to the fourth quarter of 2015.

Taking account of tail risk, banks' credit losses (at the confidence level of 99.9%) under the stress scenarios range from 1.28% (Interest rate shock) to 2.82% (Hong Kong GDP shock), which are significant, but smaller than the estimated loan loss of 4.39% following the Asian financial crisis.

Chart 5.21
The mean and value-at-risk statistics of simulated credit loss distributions[1]



Notes:

1. The assessments assume the economic conditions in 2015 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 2016 Q1 to 2016 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 2016 Q1 to 2016 Q4.

   Interest rate shock: A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. 2016 Q1), followed by no change in the second and third quarters and another rise of 300 basis points in the fourth quarter (i.e. 2016 Q4).

   Mainland GDP shock: Slowdown in the year-on-year annual real GDP growth rate to 4% in one year.

Source: HKMA staff estimates.

The Countercyclical capital buffer (CCyB) for Hong Kong

The CCyB is part of the internationally agreed Basel III standards and is designed to enhance the resilience of the banking sector against system-wide risks associated with excessive aggregate credit growth. Hong Kong is implementing the CCyB in line with the Basel III implementation schedule. The Monetary Authority announced on 14 January 2016 that the CCyB for Hong Kong will increase to 1.25%

55 Macro stress testing refers to a range of techniques used to assess the vulnerability of a financial system to "exceptional but plausible" macroeconomic shocks. The credit loss estimates presented in this report are obtained based on a revised framework from J. Wong et al. (2006), "A framework for stress testing banks' credit risk", *Journal of Risk Model Validation*, Vol. 2(1), pages 3 - 23. All estimates in the current report are not strictly comparable to those estimates from previous reports.

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

with effect from 1 January 2017, from the current 0.625%.[57] This is reflective of the fact that under the Basel III phase-in arrangements, the maximum CCyB under Basel III will increase to 1.25% of banks' risk-weighted assets on 1 January 2017 from 0.625% effective from 1 January 2016.[58]

In setting the CCyB rate, the Monetary Authority considered a series of indicators (Table 5.E), including an "indicative buffer guide" (which is a metric providing a guide for CCyB rates based on credit-to-GDP and property price-to-rent gaps[59]). Based on the information considered on the last announcement date, both the credit-to-GDP gap and the property price-to-rent gap narrowed to 15.3% and 13.1% respectively, compared to 20.8% and 16.0% in the second quarter of 2015, suggesting a slower pace of credit growth and initial signs of easing in the property market. However, both gaps remained at elevated levels and the risks associated with credit and property market conditions have not abated. A simple mapping from the indicative buffer guide (absent any phase-in arrangement) would signal a CCyB of 2.5%, remaining unchanged at the upper end of the Basel III range.

In addition, the information drawn from other reference indicators[60] was, in the view of the Monetary Authority, consistent with the signal from the indicative buffer guide.

Table 5.E
Information related to the Hong Kong jurisdictional CCyB rate

	27-Jan-15	Q2-2015	14-Jan-16
Announced CCyB rate	0.625%		1.25%
Date effective	01/01/2016		01/01/2017
Indicative buffer guide	2.5%	2.5%	2.5%
Basel Common Reference Guide	2.5%	2.5%	2.5%
Property Buffer Guide	2.5%	2.5%	2.5%
Composite CCyB Guide	2.5%	2.5%	2.5%
Indicative CCyB Ceiling	None	None	None
Primary gap indicators			
Credit/GDP gap	32.8%	20.8%*	15.3%
Property price/rent gap	14.2%	16.0%	13.1%
Primary stress indicators			
3-month HIBOR spread (percentage points)	0.17%	0.18%	0.30%
Quarterly change in classified loan ratio (percentage points)	-0.01%	0.01%	0.07%

Notes:

1. The values of all CCyB guides, the Indicative CCyB Ceiling and their respective input variables are based on public data available prior to the corresponding decision, and may not be the most recent available as of each quarter end. (Refer to SPM CA-B-1 for explanations of the variables). If there is a CCyB announcement, the date of the announcement is shown at the top of the respective column. If there is no CCyB announcement, the quarter in which a CCyB review takes place (normally close to quarter end) is shown at the top of the column.
2. *This gap was calculated based on end-Q1 2015 credit data excluding from the credit measure IPO loans of HK$201 billion at end-March 2015. If such loans are included, the Credit/GDP gap increases to 28.9%. See press release at: http://www.hkma.gov.hk/eng/key-information/press-releases/2015/20150430-5.shtml

Source: HKMA.

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

[57] Further details of the decision may be found in the press release "Monetary Authority Announces Countercyclical Capital Buffer for Hong Kong" issued on 14 January 2016 which is available on the HKMA website.

[58] Under the Basel III phase-in arrangements, the maximum CCyB rate was capped at 0.625% on 1 January 2016, with the cap rising by 0.625 percentage points each subsequent year until it reaches 2.5% on 1 January 2019.

[59] The gaps between the ratio of credit to GDP and its long term trend, and between the ratio of residential property prices to rentals and its long-term trend.

[60] These included measures of bank, corporate and household leverage; debt servicing capacity; profitability and funding conditions within the banking sector and macroeconomic imbalances.

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

	Dec 2014	Sep 2015	Dec 2015
Interest rate			
1-month HIBOR fixing[2] (quarterly average)	0.23	0.24	0.22
3-month HIBOR fixing (quarterly average)	0.38	0.39	0.39
BLR[3] and 1-month HIBOR fixing spread (quarterly average)	4.77	4.76	4.78
BLR and 3-month HIBOR fixing spread (quarterly average)	4.62	4.61	4.61
Composite interest rate[4]	0.39	0.26	0.26
		Retail banks	
Balance sheet developments[5]			
Total deposits	2.0	-0.1	0.1
Hong Kong dollar	0.9	-1.9	0.5
Foreign currency	3.4	2.3	-0.4
Total loans	1.6	-2.0	-0.1
Domestic lending[6]	1.2	-0.8	0.2
Loans for use outside Hong Kong[7]	3.2	-6.8	-1.7
Negotiable instruments			
Negotiable certificates of deposit (NCD) issued	-4.6	-20.2	3.9
Negotiable debt instruments held (excluding NCD)	-2.9	4.2	-0.9
Asset quality			
As a percentage of total loans[8]			
Pass loans	98.44	98.08	97.86
Special mention loans	1.10	1.36	1.44
Classified loans[9] (gross)	0.46	0.56	0.70
Classified loans (net)[10]	0.32	0.40	0.50
Overdue > 3 months and rescheduled loans	0.29	0.35	0.45
Classified loan ratio (gross) of Mainland related lending[11]	0.57	0.81	0.78
Profitability			
Loan impairment charges as percentage of average total assets[12]	0.05	0.07	0.08
Net interest margin[12]	1.40	1.32	1.32
Cost-to-income ratio[13]	43.4	44.2	45.4
		All AIs	
Liquidity ratios (quarterly average, consolidated)[14]			
Liquidity Coverage Ratio — category 1 institutions	n.a.	136.4	142.9
Liquidity Maintenance Ratio — category 2 institutions	n.a.	53.6	53.9
		Surveyed institutions	
Asset quality			
Delinquency ratio of residential mortgage loans	0.03	0.03	0.03
Credit card lending			
Delinquency ratio	0.20	0.24	0.25
Charge-off ratio — quarterly annualised	1.85	1.90	1.86
— year-to-date annualised	1.83	1.89	1.82
		All locally incorporated AIs	
Capital adequacy (consolidated)			
Common Equity Tier 1 capital ratio	13.7	14.3	14.6
Tier 1 capital ratio	13.9	14.9	15.3
Total capital ratio	16.8	18.1	18.3

Notes:

1. Figures are related to Hong Kong offices only except where otherwise stated.
2. The Hong Kong Dollar Interest Settlement Rates are 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. Including "others" (i.e. unallocated).
8. Figures prior to December 2015 are related to retail banks' Hong Kong offices and overseas branches. Starting from December 2015, the coverage was expanded to include locally incorporated retail banks' major overseas subsidiaries. Under the expanded coverage, the classified loan ratio (gross) was 0.52% at end-December 2014 and 0.65% at end-September 2015.
9. Classified loans are those loans graded as "substandard", "doubtful" or "loss".
10. Net of specific provisions/individual impairment allowances.
11. Figures are related to retail banks' Hong Kong offices, Mainland branches and subsidiaries.
12. Year-to-date annualised.
13. Year-to-date figures.
14. A new data series was introduced for liquidity ratios which are defined in accordance with the Basel III framework starting from January 2015. For a category 1 institution, the minimum requirement for Liquidity Coverage Ratio began at 60% on 1 January 2015, rising in equal annual steps of 10 percentage points to reach 100% on 1 January 2019. A category 2 institution must maintain a Liquidity Maintenance Ratio of not less than 25% on average in each calendar month.

Box 5
A stress-testing framework with macro-financial feedback linkages

Introduction

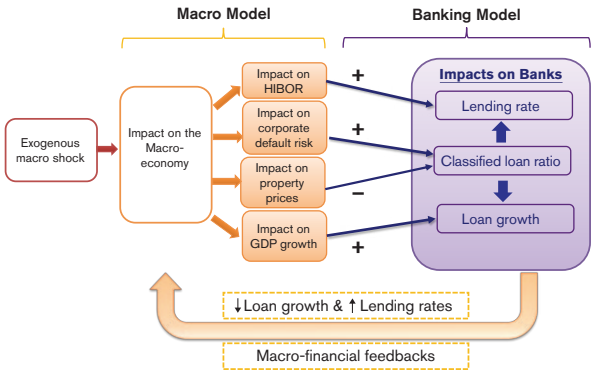
Macro stress-tests have become more popular among central banks as a main tool to assess key vulnerabilities of banks since the global financial crisis. This tool, however, is not without limitations. In particular, although most of the existing stress-testing frameworks are capable of analysing how macro-economic shocks would affect a banking system or individual banks, the potential feedback effect from the banking sector to the real sector is generally not considered. Theoretically, such feedback effect may exist in most financial systems. For example, banks would experience significant deterioration in their asset quality due to an economic slowdown, and in response, they would curtail lending and/or raise lending rates. The resulting tighter credit conditions could further worsen economic fundamentals, amplifying the initial macro shock.[61] Therefore, ignoring the feedback loop between the financial and real sectors in stress-testing exercises may be prone to underestimation of risks.

This box aims to shed light on this issue by developing a stress-testing framework with macro-financial feedback linkages. We then apply the framework on the Hong Kong banking sector and assess the economic significance of the feedback effect.

The stress-testing framework

The stress-testing framework consists of two main building blocks, namely the macro model and the banking model (Chart B5.1).

Chart B5.1
Structure of the stress-testing framework with the macro-financial feedback effect



Note: The inflation rate variable is not shown in the chart, as estimation results find that the variable is not a significant determinant of the banking variables. Nevertheless, we still keep the inflation rate variable in the macro model because the variable may affect the dynamics of other macro variables.

The macro model (highlighted in orange in Chart B5.1) is a vector autoregressive model that describes the dynamics and the interdependences of five key macro variables of Hong Kong. These variables include nominal GDP growth rate, inflation rate, interbank interest rates, market-based default probability for the Hong Kong corporate sector (CPD) and property price growth rate (PP). The model also includes some exogenous variables: world GDP growth[62], the VIX index, aggregate loan growth and lending rate in Hong Kong. The seemingly-unrelated regression method is adopted to estimate the model using data from the first quarter of 1999 to the second quarter of 2015.[63]

By construction of the macro model, a shock on any macro variable would propagate to others in two specific ways: First, the shock will transmit

[61] There are other channels through which an initial macro-economic shock could be amplified. For example, the interaction between credit and liquidity risks of banks, inter-connectedness among financial institutions via interbank and derivative markets, and asset fire sales among banks. For details, see BIS (2015), "Making supervisory stress tests more macro-prudential: Considering liquidity and solvency interactions and systemic risk", *BCBS Working Papers* No. 29.

[62] World GDP growth is included in the macro model to facilitate the assessment of external macro shocks, such as slowdown of the Mainland economy. Specifically, changes in Mainland GDP growth would feed into changes in World GDP growth, which in turn affects all other macro variables through the macro model.

[63] This method takes into account the contemporaneous correlation of error terms between the five key endogenous variables.

directly to those macro variables that are estimated to be explained by the lagged shock variable in the regression equations. Second, the shock will also affect other macro variables indirectly through the interactions between shocks that are captured by the estimated variance-covariance matrix of the error terms. This modelling structure aims to estimate self-consistent impacts on the five macro variables of an initial macro shock.

For instance, a negative shock on nominal GDP growth is estimated to directly produce a downward movement of PP as lagged nominal GDP growth is estimated to be statistically significant in the PP equation. Meanwhile, the GDP shock would produce an indirect impact on other macro variables (e.g., interbank interest rates and CPD) through the empirical relationships between GDP and other macro variables captured by the estimated variance-covariance matrix.

Apart from the estimated dynamics between the five key macro variables, estimation results of the macro model show that tighter credit conditions in Hong Kong would adversely affect the macroeconomic conditions. Specifically, it is estimated that lower lagged aggregate loan growth (LG) would reduce GDP growth in Hong Kong, while a higher lagged aggregate lending rate (LR) would worsen corporate default risk and drive down property prices (see Panel A of Table B5.A).

Meanwhile, empirical findings from the banking model, which is estimated using a panel dataset of 19 locally incorporated banks in Hong Kong[64], reveal that an unfavourable macroeconomic environment could lead banks in Hong Kong to curtail lending and increase lending rates. Specifically, the banking model (highlighted in purple in Chart B5.1) contains three empirical equations, which describe how individual banks' lending rates and their loan growth would respond directly to changes in the macro variables in the macro model and indirectly through impacts on banks' classified loan ratios. Estimation results (summarised in Panel B of Table B5.A) show that higher corporate default risk (proxied by a rise in CPD) and household default risk (proxied by a fall in PP) would increase banks' classified loan ratios, which in turn would reduce banks' loan growth and increase their lending rates (i.e. the indirect impact). Estimation results also reveal that banks' loan growth and lending rates would respond directly to GDP growth and interbank interest rates respectively.

Table B5.A
Key estimation results of the macro and banking models

Panel A: The estimated effect of banking variables on macro variables in the macro model			
Explanatory variables	Dependent variables		
	HK GDP growth	Corporate default probability	Property price growth
Aggregate loan growth	+ve		
Aggregate lending rate		+ve	-ve
Panel B: The estimated effect of macro variables on banking variables in the banking model			
Explanatory variables	Dependent variables		
	Individual banks' classified loan ratios	Individual banks' loan growth	Individual banks' lending rates
Classified loan ratio		-ve	+ve
Corporate default probability	+ve		
Property price growth	-ve		
HK GDP growth		+ve	
Interbank interest rates			+ve

Note: +ve (-ve) refers to an estimated positive (negative) relationship between the variables.
Source: HKMA staff estimates.

[64] Panel data are used instead of aggregate data for the banking model as responses of banks' asset quality, credit growth and lending rates to the changes of macro variables may vary significantly across banks, depending on their balance sheet characteristics.

Stressed scenario analysis

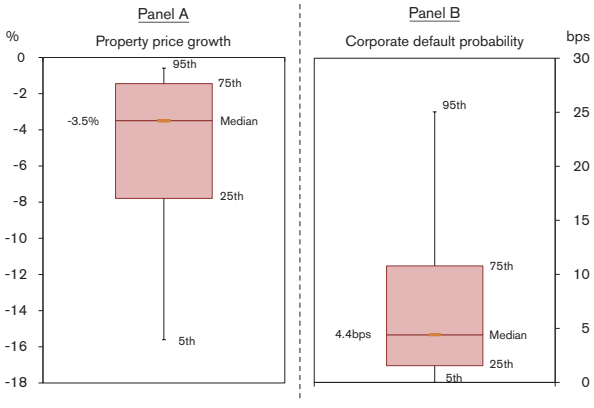
The estimation results from the macro and banking models together show that a macro-financial feedback linkage that is similar to the example discussed in *Introduction* does exist. Based on the empirical results, we further assess the economic significance of the feedback effect and how this would affect stress-test estimates. To this end, we compare stress-testing estimates between two cases (with and without the feedback effect) under a stress scenario. The stress scenario assumes a four-quarter GDP shock similar to that which occurred during the Asian financial crisis.[65] We generate our estimates using information up to the second quarter of 2015 and assume an eight-quarter stress horizon starting from the third quarter of 2015 to the second quarter of 2017.

A Monte Carlo simulation (MC) method with a sequential updating procedure is adopted to obtain the stress-testing estimates with the feedback effect. In each quarter, with the assumed GDP shock, the MC method is employed to simulate other macro variables by 10,000 trials using the macro model. For each trial, the simulated macro variables are used to estimate the impact on banks' classified loan ratios, loan growth and lending rates based on the banking model. We further compute the aggregate LG and LR by taking a weighted average of individual banks' estimates.[66] We then put the resulting LG and LR as inputs in the macro model for the next quarter simulation. The sequential updating procedure is repeated for the remaining quarters up to the second quarter of 2017.

For the case without the feedback effect, the simulation procedure is similar, except that LG and LR in the simulation are not updated sequentially, but using the actual time series for time points up to the second quarter of 2015 and assuming unchanged thereafter.

Panel A of Chart B5.2 presents the difference in the simulated cumulative impact on property prices in the second quarter of 2017 between the two cases (defined as the estimate with the feedback effect minus that without the feedback effect). As revealed from the distributional statistics, the feedback effect would significantly amplify property price declines in the stress scenario, with the median additional drops in property prices being 3.5%. In some extreme cases (i.e. at the 5th percentile or below), the feedback effect would produce an additional decline in property prices by more than 15% as compared to the estimate without the feedback effect, indicating that the feedback effect is significant. Panel B of Chart B5.2, which compares the results for simulated corporate default probability, also exhibits a similar picture such that the feedback effect would significantly intensify the deterioration in corporate default risk in the stress scenario.[67]

Chart B5.2
Difference in the simulated impacts between the framework with and without the feedback effect for property price growth and corporate default probability



Note: Difference in the simulated impact is defined as the estimate with the feedback effect minus that without the feedback effect.
Source: HKMA staff estimates.

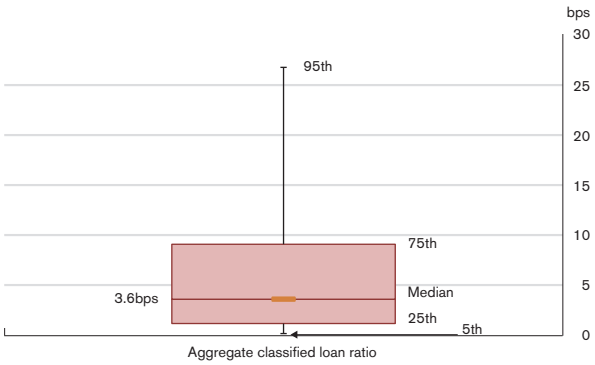
[65] As a reference, the four-quarter cumulative decline in real GDP during the Asian financial crisis was 8.1%, while that for nominal GDP was 7.2% during the same period.

[66] Weighted by individual banks' outstanding loans at the end of the second quarter of 2015.

[67] The 95th percentile estimate suggests that the feedback effect could in extreme cases produce an additional increase of around 25 basis points in the corporate default probability relative to the case without the feedback effect, which is significant given the corporate default probability was at a low level of 29 basis points at the end of the second quarter of 2015.

Finally, we present the result for the aggregate classified loan ratio in Chart B5.3. As expected, the aggregate classified loan ratio is found to be higher under the framework with feedback effect than that without the feedback effect by around 4 basis points at the median and by 27 basis points at the 95th percentile. The difference is regarded as substantial given that the aggregate classified loan ratio was at a low level of 0.70% at the end of the fourth quarter of 2015.[68]

Chart B5.3
Difference in the simulated aggregate classified loan ratio between the framework with and without the feedback effect



Note: Difference in the simulated impact is defined as the estimate with the feedback effect minus that without the feedback effect.
Source: HKMA staff estimates.

Conclusion

This box provides a feasible way to incorporate macro-financial feedback channels based on a conventional macro stress-testing framework adopted by central banks. The refined framework would allow for a more comprehensive and realistic assessment of the impact of different macro shocks on the resilience of banks. Our stress scenario analysis also shows that the feedback effect alone could in some extreme cases lead to an additional increase in the stressed classified loan ratio by 27 basis points, which is comparable to 40% of the current classified loan ratio of 0.70%. Although the large estimated percentage change may be partly due to a low-base effect, the implications of macro-financial feedback linkages for financial stability analysis should not be dismissed.

[68] Figures prior to December 2015 are related to retail banks' Hong Kong offices and overseas branches. Starting from December 2015, the coverage was expanded to include locally incorporated retail banks' major overseas subsidiaries. The classified loan ratio covering retail banks' Hong Kong offices and overseas branches was 0.63% at the end of December 2015.

Glossary of terms

Aggregate Balance

The sum of balances in the clearing accounts and reserve accounts maintained by commercial banks with the central bank. In Hong Kong, this refers to the sum of the balances in the clearing accounts maintained by the banks with the HKMA for settling interbank payments and payments between banks and the HKMA. The Aggregate Balance represents the level of interbank liquidity, and is a part of the Monetary Base.

Authorized Institution (AI)

An institution authorized under the Banking Ordinance to carry on the business of taking deposits. Hong Kong maintains a Three-tier Banking System, which comprises licensed banks, restricted licence banks and deposit-taking companies.

Best Lending Rate

A benchmark interest rate that banks use to price loans. In Hong Kong, the Best Lending Rate is used as a base for quoting interest rates on mortgage loans.

Certificates of Indebtedness (CIs)

Certificates issued by the Financial Secretary under the Exchange Fund Ordinance, to be held by note-issuing banks as cover for the banknotes they issue.

Composite Consumer Price Index (CCPI)

The headline consumer price index (CPI) for Hong Kong. The Census and Statistics Department compiles three separate CPI series relating to households in different expenditure ranges. The CPI(A) relates to about 50% of households in the relatively low expenditure range; the CPI(B) relates to the next 30% of households in the medium expenditure range; and the CPI(C) relates to the next 10% of households in the relatively high expenditure range. The Composite CPI is compiled based on the aggregate expenditure pattern of all of the above households taken together.

Composite Interest Rate

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. Data from retail banks, which account for about 90% of the total customers' deposits in the banking sector, are used in the calculation. It should be noted that the composite interest rate represents only average interest expenses. There are various other costs involved in the making of a loan, such as operating costs (e.g. staff and rental expenses), credit cost and hedging cost, which are not covered by the composite interest rate.

Convertibility Undertaking (CU)

An undertaking by a central bank or currency board to convert domestic currency into foreign currency and vice versa at a fixed exchange rate. In Hong Kong, the HKMA operates Convertibility Undertakings on both the strong side and the weak side. Under the strong-side Convertibility Undertaking, the HKMA undertakes

to buy US dollars from licensed banks at 7.75. Under the weak-side Convertibility Undertaking, the HKMA undertakes to sell US dollars at 7.85. Within the Convertibility Zone between 7.75 and 7.85, the HKMA may choose to conduct market operations consistent with Currency Board principles with the aim of promoting the smooth functioning of the money and foreign exchange markets.

Convertibility Zone

The Hong Kong dollar-US dollar exchange rate band, defined by the levels of the strong- and weak-side Convertibility Undertakings, within which the HKMA may choose to conduct market operations consistent with Currency Board principles.

Exchange Fund Bills and Notes (EFBN)

Debt instruments issued by the HKMA for the account of the Exchange Fund. These instruments are fully backed by the foreign reserves. The HKMA has undertaken that new Exchange Fund paper will only be issued when there is an inflow of funds, thus enabling the additional paper to be fully backed by the foreign reserves. Since 1 April 1999, interest payments on Exchange Fund paper have been allowed to expand the Monetary Base. Additional Exchange Fund paper is issued to absorb such interest payments. This is consistent with the Currency Board discipline since interest payments on Exchange Fund paper are backed by interest income on the US dollar assets backing the Monetary Base.

Monetary Base

A part of the monetary liabilities of a central bank. The monetary base is defined, at the minimum, as the sum of the currency in circulation (banknotes and coins) and the balance of the banking system held with the central bank (the reserve balance or the clearing balance). In Hong Kong, the Monetary Base comprises Certificates of Indebtedness (for backing the banknotes issued by the note-issuing banks), government-issued currency in circulation, the balance of the clearing accounts of banks kept with the HKMA, and Exchange Fund Bills and Notes.

Nominal and Real Effective Exchange Rate (NEER and REER)

An indicator of the overall exchange rate value of the Hong Kong dollar against a basket of currencies of Hong Kong's principal trading partners. The nominal effective exchange rate (NEER) is a weighted average of the exchange rates between Hong Kong and its principal trading partners. The real effective exchange rate (REER) is obtained by adjusting the NEER for relative movements in the seasonally adjusted consumer price indices of those selected trading partners.

Abbreviations

3m moving average	Three-month moving average
3m-on-3m	Three-month-on-three-month
ASEAN	Association of Southeast Asian Nations
AIs	Authorized Institutions
BIS	Bank for International Settlements
bn	Billion
BLR	Best lending rate
BoJ	Bank of Japan
BoP	Balance of Payments
BSD	Buyer's stamp duty
CAR	Capital Adequacy Ratio
CBRC	China Banking Regulatory Commission
CCPI	Composite Consumer Price Index
CCyB	Countercyclical capital buffer
CDs	Certificates of deposit
CDS	Credit default swap
CEPA	Closer Economic Partnership Arrangement
CFETS	China Foreign Exchange Trade System
CIs	Certificates of Indebtedness
CNH	Offshore renminbi in Hong Kong
CNY	Onshore renminbi
C&SD	Census and Statistics Department
CPI	Consumer Price Index
CSRC	China Securities Regulatory Commission
CU	Convertibility Undertaking
DF	Deliverable forward
DI	Direct investment
DSD	Doubling of the ad valorem stamp duty rates
DSR	Debt servicing ratio
ECB	European Central Bank
EBIT	Earnings before interest and taxes

EFBN	Exchange Fund Bills and Notes
EMEs	Emerging Market Economies
EPIFs	External primary income flows
ETFs	Exchange traded funds
EUR	Euro
FDI	Foreign direct investment
Fed	Federal Reserve
FOMC	Federal Open Market Committee
FSB	Financial Stability Board
FX	Foreign exchange
GBs	Government Bonds
GDP	Gross Domestic Product
GFC	Global Financial Crisis
G-SIBs	Global systemically important banks
HIBOR	Hong Kong Interbank Offered Rate
HK	Hong Kong
HKD	Hong Kong dollar
HKEx	The Hong Kong Exchanges and Clearing Limited
HKMA	Hong Kong Monetary Authority
HK$M3	Hong Kong dollar broad money supply
HSCEI	Hang Seng China Enterprises Index
HSI	Hang Seng Index
I/E	Import/Export
IMF	International Monetary Fund
IPO	Initial Public Offering
IT	Information technology
IVS	Individual Visit Scheme
LCR	Liquidity Coverage Ratio
LEI	Composite index of leading economic indicators
LERS	Linked Exchange Rate System
LIBOR	London Interbank Offered Rate
LMR	Liquidity Maintenance Ratio
lhs	Left-hand scale
IRB	Internal-Ratings Based Approach
LTD	Loan-to-deposit
LTV	Loan-to-value ratio

MCI	Monetary condition index
mn	Million
MDBs	Multilateral Development Banks
MLF	Medium-term leading facility
MRF	Mutual Recognition of Funds
MTN	Medium-term Note
NBS	National Bureau of Statistics
NCD	Negotiable certificate of deposit
NEER	Nominal effective exchange rate
NIE	Newly industrialised economies
NPL	Non-performing loan
OIS	Overnight indexed swap
OTC	Over-the-counter
p.a.	Per annum
PBoC	People's Bank of China
PI	Portfolio investment
PMI	Purchasing Managers' Index
PPI	Producer Price Index
PSL	Pledged Supplementary Lending
qoq	Quarter-on-quarter
QDII	Qualified Domestic Institutional Investor
QE	Quantitative Easing
QFII	Qualified Foreign Institutional Investor
QQE	Quantitative and Qualitative Easing
R&VD	Rating and Valuation Department
REER	Real effective exchange rate
Repo	Repurchase operation
rhs	Right-hand scale
RMB	Renminbi
ROA	Return on assets
RRR	Required reserve ratio
RTGS	Real time gross settlement
SHIBOR	Shanghai Interbank Offered Rate
SLO	Short-term Liquidity operation
SME	Small and medium-sized enterprise
SOEs	State-owned enterprises

SSD	Special stamp duty
SSE	Shanghai Stock Exchange
SWIFTs	Society for Worldwide Interbank Financial Telecommunication
S&P	Sale and Purchase Agreements of Building Units
S&P 500	Standard & Poor's 500 Index
TLTRO	Targeted Longer-Term Refinancing Operation
TFP	Total factor productivity
TWI	Trade Weighted Index
UK	United Kingdom
US	United States
USD	US dollar
VAR	Vector auto-regressive
VHSI	HSI Volatility Index
VIX	Chicago Board Options Exchange Market Volatility Index
WMPs	Wealth management products
yoy	Year-on-year

Full text of this Report is available on the
HKMA website at **www.hkma.gov.hk.**

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Printed in Hong Kong
ISSN 2221-5727 (Print version)
ISSN 2222-1514 (Online version)
HK$60