2. Global setting and outlook

Global economic conditions improved with a synchronous cyclical rebound in real activities, diminished political and policy uncertainties in major advanced economies, and a more favourable macroeconomic backdrop for emerging market economies (EMEs). The improved prospects, in turn, drove up asset market valuations. Nonetheless, the global economy is still subject to numerous uncertainties, including the sustainability of global growth momentum, the impact of monetary policy normalisation by the US Federal Reserve and possibly other major central banks, as well as heightened geopolitical tensions.

Benefiting from stronger external demand, growth momentum in East Asia remained stable in the first half of 2017. However, the region faces multiple headwinds. While weaker-than-expected growth in the US could disrupt East Asia's export recovery, the recent pick up in credit growth and the increasingly stretched financial asset valuation amid resumed portfolio inflows are amplifying the region's vulnerability to shocks, particularly given the rise in Sino-US trade tensions amid protectionist sentiment and the ongoing situation on the Korean Peninsula.

In Mainland China, growth momentum improved further in the first half of 2017. While the near-term growth outlook remains positive, it also hinges on how the authorities strike a balance between supporting the economy and preventing systemic risks. During the review period, Mainland authorities stepped up measures to curb speculative activities in the property market and pushed ahead with financial and corporate deleveraging. Externally, capital outflow pressures continued to ease in tandem with improved economic conditions, but the uncertainties in global monetary conditions and market sentiment would still play an important role in shaping the near-term outlook of cross-border fund flows.

2.1 External environment

Global growth experienced a cyclical rebound from the latter part of 2016 along with a pickup in world trade and industrial production (Chart 2.1). The previously uneven pace of global recovery, characterised by the outperformance of US growth vis-à-vis other advanced economies, has also converged amid stronger performance in Japan and the euro area. The diminishing political and policy

uncertainties in the US and Europe since early 2017 were also conducive to the improvement, partly reflecting easing concerns over the rise of populist and anti-establishment sentiments in the run-up to elections in Europe (Chart 2.2). Outside the major advanced economies, EMEs enjoyed a more favourable macro-economic backdrop, benefiting from stronger global trade flows and a softening of the US dollar. The softer US dollar, in turn, was fostered by reduced market expectations of a near-term US fiscal

stimulus that led to a retreat in US inflation expectations and weighed on the prospects of interest rate hikes (Chart 2.3), as well as market expectations of a tapering in asset purchases by the European Central Bank (ECB) that lent support to the euro exchange rate at the expense of the US dollar. These developments helped insulate EMEs from capital outflow pressures, notwithstanding two additional Fed rate hikes in the first half of 2017. In July, the International Monetary Fund (IMF) projected global output growth to accelerate from an estimated 3.2% in 2016 to 3.5% in 2017.

Chart 2.1
World trade and industrial production in volume terms
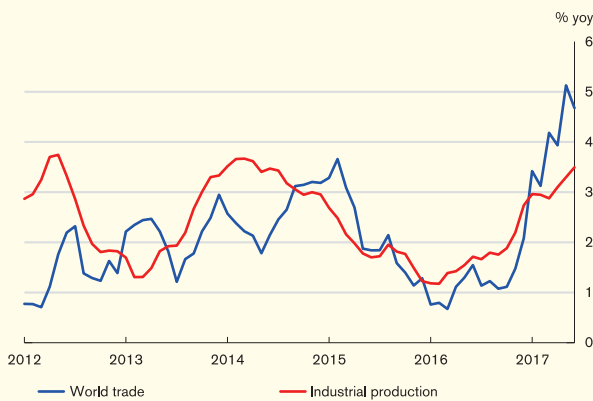
Note: Figures shown are 3-month moving averages.
Source: CPB Netherlands Bureau for Economic Policy Analysis.

Chart 2.2
Policy uncertainty index in the US and Europe
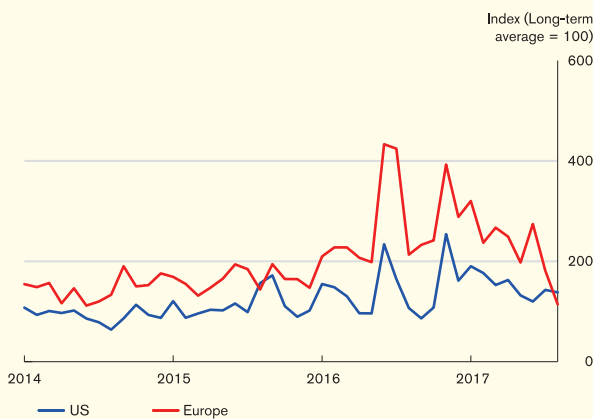

Source: Economic Policy Uncertainty.

Chart 2.3
US dollar index and market-based US inflation expectations

Sources: Bloomberg and St. Louis Fed.

Supported by the recent improvements in global economic conditions and a more dovish US interest rate expectation, global equity markets sustained their post US election rallies, with the S&P 500 index hitting an all-time high in August 2017. Accordingly, despite the recent corrections amid escalating geopolitical tensions between the US and North Korea, equity market valuations rose to elevated levels. Indeed, the latest cyclically adjusted price earnings (PE) ratio of the S&P 500 index surpassed its peak reached just prior to the global financial crisis (GFC) and was not far from the level seen in the run-up to the 1929 stock market crash (Chart 2.4).

Chart 2.4
**Cyclically adjusted PE ratio of the S&P 500**
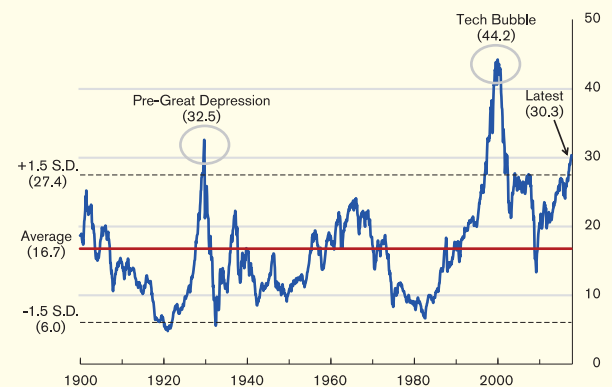
Note: The cyclically adjusted PE ratio is calculated by dividing the price of the S&P 500 by the average inflation-adjusted earnings from the previous 10 years.
Source: Multpl.com.

Notwithstanding the current benign global macroeconomic and financial market environment, two major developments in the US – emergent signs of a maturing economic expansion and the Fed's impending balance sheet normalisation, could pose downside risks to the global economic outlook and financial market stability. In the US, core consumer price index (CPI) inflation decelerated from 2.2% year-on-year (yoy) in the first quarter to 1.8% yoy in the second quarter, partly attributable to one-off factors such as a sharp fall in the prices of wireless telephone services and used vehicles. Meanwhile, real Gross Domestic Product (GDP) growth accelerated from 1.2% to 3.0% on a quarter-on-quarter annualised (qoqa) comparison over the same period, supported by a rebound in consumer spending and a reduced drag from inventory destocking. While the combination of modest inflation and firming growth is generally observed during an early-to-intermediate stage of recovery, developments in several other segments of the economy nonetheless are suggestive of a more advanced stage of expansion. For example, the recent flattening in the US Treasury yield curve and compressed corporate bond spreads resembled financial conditions usually observed during the late-cycle stage of economic expansion, while the increasingly tight labour market conditions (with the unemployment rate falling to 4.4% in August, below the Fed's estimated natural rate of 4.6%) also point to a maturing economic expansion. Box 1 assesses the latest stage in the US economy's business cycle, by examining how various economic indicators behaved during different stages of business cycles using a statistical classification technique known as cluster analysis.

Another development of significance is the Fed's intention to implement balance sheet normalisation in the near term. Following the June Federal Open Market Committee (FOMC) meeting, the Fed described in detail the strategy for reducing the size of its balance sheet by

gradually raising the limits beyond which principal payments from its securities holdings would be reinvested going forward. More specifically, the Fed expects that eventually only payments of principal in excess of US$30 billion (for Treasury securities) and US$20 billion (for agency debt and mortgage-backed securities) will be reinvested every month. As noted by Fed Chair Yellen's remarks in the July semi-annual Monetary Policy Report to the Congress, the FOMC expected the long-run level of the reserve balance to be "appreciably below recent levels but larger than before the financial crisis" (Chart 2.5). Given the measured pace of balance sheet reduction, it is likely that the resulting rise in longer-term yields would be gradual. Yet, it remains to be seen how it would affect the US Treasury market and its spillover effects on domestic and international financial conditions.

Chart 2.5
Size of Fed's balance sheet

Source: CEIC.
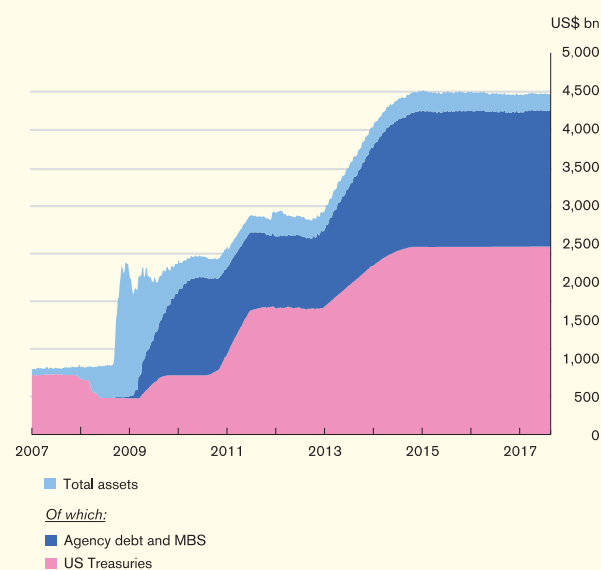
Outside the US, the monetary policy outlook in other major advanced economies also remains uncertain. In the euro area, the economy enjoyed a broad-based recovery underpinned by both domestic demand and exports, with real GDP expanding by 0.6% on a quarter-on-quarter

(qoq) comparison in the second quarter of 2017, up from 0.5% in the preceding quarter. Labour market slack continued to diminish, with the unemployment rate edging down to 9.1% in July, the lowest since February 2009. At the same time, the political situation stabilised following the victory of Emmanuel Macron, a pro-Europe candidate, in France's presidential election in May, mitigating concerns about the rise in Eurosceptic sentiment that prevailed in the run-up to the election. In spite of the stronger growth momentum, however, inflation remained subdued across member countries and stayed well below the ECB's 2% target (Chart 2.6), partly constrained by weak wage growth amid the still-substantial labour market slack. Against this background, the ECB is likely to face a delicate balancing act in its future monetary policymaking, in the midst of a strengthening growth momentum on one hand but below-target inflation on the other.

Chart 2.6
**Core CPI inflation in selected member countries of the euro area**
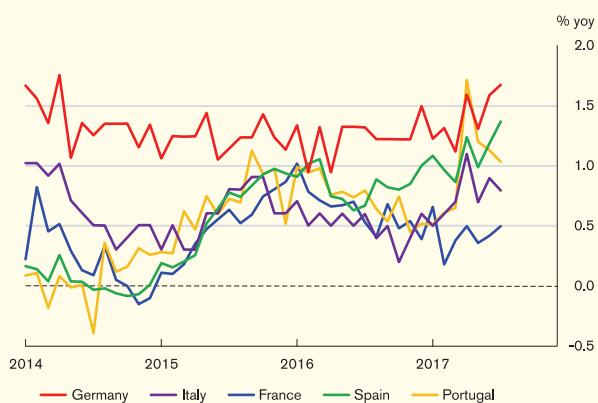
Source: Datastream.

In Japan, the economic outlook also improved, with real GDP expanding for the sixth straight quarter by a solid 0.6% qoq in the second quarter of 2017, supported by growth in private consumption and public spending. The economic and labour market slack has also been dwindling, with the closing of the output gap according to estimates by the Bank of Japan (BoJ)

and the unemployment rate falling to a 23-year low of 2.8% in July. Nonetheless, the problem of dual labour market, characterised by an increasing share of part-time workers, is likely to continue to constrain wage growth and complicate the BoJ's effort in achieving its 2% inflation target.

For the rest of the world, especially EMEs, the synchronous improvement in global activities and the recent unwinding of the post US election strength of the US dollar is likely to continue to provide a favourable macro-economic backdrop in the near term. Indeed, in spite of two additional Fed rate hikes in the first half of 2017, EMEs continued to enjoy portfolio capital inflows (Chart 2.7), partly reflecting investor optimism over their economic prospects. That said, as discussed before, the risks of tighter global financial conditions stemming from the Fed's balance sheet normalisation plan could heighten the risks of capital flow reversals in EMEs in the period ahead.

**Chart 2.7**
Portfolio capital flows into EMEs
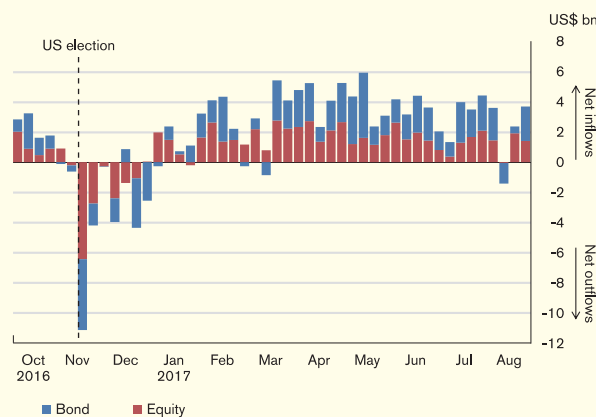
Source: EPFR.

In addition, despite the diminished economic policy and political risks in advanced economies, there has been a recent escalation in geopolitical tensions. In particular, elevated tensions between North Korea and the US could cloud the Asian and global economic outlook, and the risks

of military conflicts, while still deemed low at present, cannot be ruled out. At the same time, there is a risk that the rise in Sino-US trade tensions amid US investigations into Mainland's trade practices could fuel protectionist sentiment and pose downside risks to the nascent recovery in global trade flows. In the presence of rising geopolitical tensions, market perceptions of tail risks have recently risen sharply above the long-run average (Chart 2.8).

Chart 2.8
SKEW index by the Chicago Board Option Exchange (CBOE)
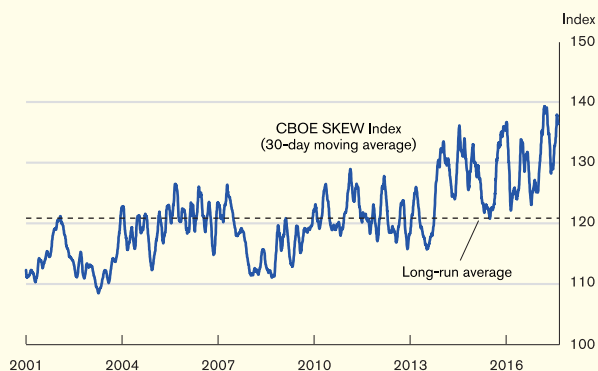
Note: The SKEW index, derived from prices of the S&P 500 out-of-money options, is a measure of market perceptions of tail risks, with a higher value indicating a greater perceived probability of tail events.

Source: Bloomberg.

Box 1
Identifying the latest stage of the US business cycle with cluster analysis

Introduction

According to the National Bureau of Economic Research (NBER), the US economy has remained in expansion since June 2009, making it the third longest recovery episode in post-World War II history (Chart B1.1), although it is also much shallower than past recoveries (Chart B1.2). While a prolonged expansion does not necessarily imply imminent risks of recession, it nonetheless raises concerns that the US expansion may have already entered the late-cycle stage.

Chart B1.1
Length of post-World War II recovery episodes in the US
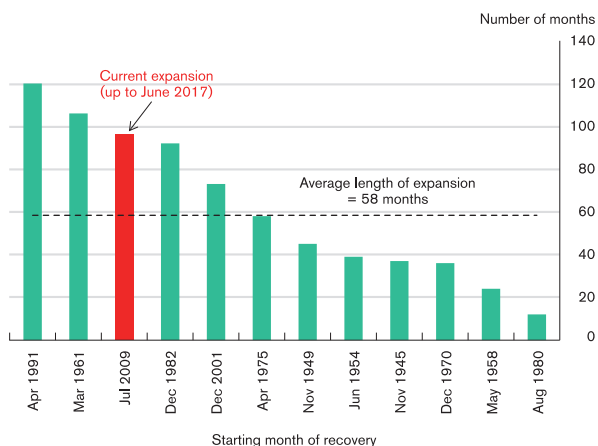
Source: NBER.

Chart B1.2
Changes in real GDP from end of recessions
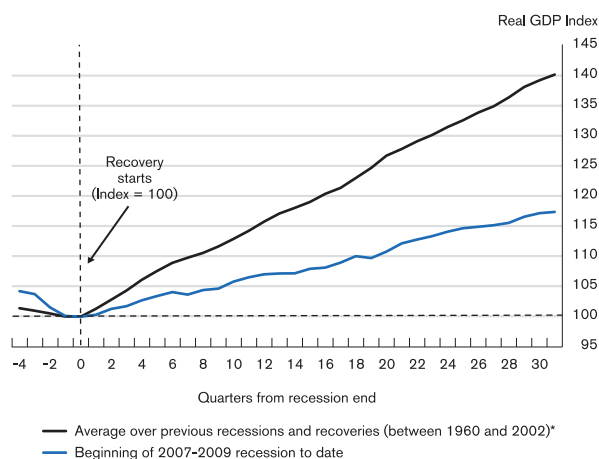
Note: (*) Excluding the 1970, 1974 and 1980 double-dip recessions.
Sources: US Bureau of Economic Analysis and HKMA staff calculations.

Determining whether the US economy is in the late-cycle stage of expansion is important. If this were indeed the case, the optimistic earnings prospects on which the presently rich US equity market valuation is predicated would likely be called into question. A maturing expansion could also have profound implications for the future pace of US monetary policy normalisation.

To identify the latest stage of the US business cycle, this analysis applies a statistical classification technique known as k-medians clustering to partition the post-1960 period into four distinct classes that correspond to four different stages of a business cycle: (1) early expansion, (2) mid-cycle expansion, (3) late-cycle expansion and (4) recession. Based on the classification results, we then calculate the average duration of each of these four stages to gain an idea of how long the US economy can be expected to stay in the current stage before progressing to the next one.

Dating of US business cycle stages using k-medians clustering

Conceptually, k-medians clustering is a statistical classification technique that divides a set of uncategorised data into a predetermined number of groups or clusters (k), in such a way that observations in the same cluster are more "similar" (in terms of a given metric, usually Euclidean distance) to each other than to those in other clusters.

Adopting the ideas from Theis and Weihs (2000) and Dawsey (2014), we apply k-medians clustering to a set of 20 US economic indicators between January 1960 and March 2017, with the aim of partitioning this time interval into four clusters that can be associated with the four stages of a business cycle. These 20 indicators, listed in Table B1.A, relate to five key aspects of the US economy and are assumed to jointly determine the stage of the US business cycle.

By themselves, the four clusters obtained from k-medians clustering do not carry any economic meaning. Nonetheless, they can be associated with the notions of early expansion, mid-cycle expansion, late-cycle expansion and recession, based on their temporal proximity to NBER recessions. More specifically, clusters that include observations immediately before, during and after NBER recessions can be taken to represent late-cycle expansions, recessions and early expansions respectively, while the remaining cluster, which happens to straddle early and late-cycle expansions, is taken to represent mid-cycle expansions.

Table B1.A
**Economic indicators used in cluster analysis**

Aspects of the US economy	Economic indicators
Financial conditions	• Treasury yield curve slope (difference between 10-year and 3-month Treasury yields) • 12-month change in real Fed funds rate • Realised monthly volatility of S&P 500 index • Yield spread between Baa-rated and Aaa-rated US corporate bonds • 12-month change in real commercial and industrial loans
Labour market conditions	• Employment gap (as defined in Erceg and Levin (2013)) • Unemployment rate • Average weekly hours worked in manufacturing sector • Real average hourly earnings*
Growth	• 12-month change in real GDP • Difference between actual and potential real GDP growth • ISM manufacturing PMI • 12-month change in industrial production
Inflation	• Core CPI inflation index* • Unit labour cost index* • 12-month change in GDP deflator • 12-month change in import prices of goods and services
Business conditions	• Industrial utilisation rate • Manufacturing inventory-to-shipping ratio* • Corporate profits

Note: All data series are standardised to have zero mean and one standard deviation. Quarterly data are converted into monthly data by interpolation. Indicators marked with (*) are detrended using Hodrick-Prescott filter prior to standardisation.

Results and discussions

The classification results from k-medians clustering are illustrated in Chart B1.3, which shows the model-based chronology of the US business cycles between January 1960 and March 2017. Our results appear to be reasonable, being able to capture all but one of the NBER recessions since 1960 and showing generally smooth transitions of the US economy from recession to early, mid and late stages of expansion over time (except the mid-1980s with relatively erratic results). Of particular interest is that, based on the model results, the US economy could still be classified as in the mid-cycle stage of expansion at the end of the sample period (i.e. March 2017).

Chart B1.3
Chronology of US business cycles based on k-medians clustering
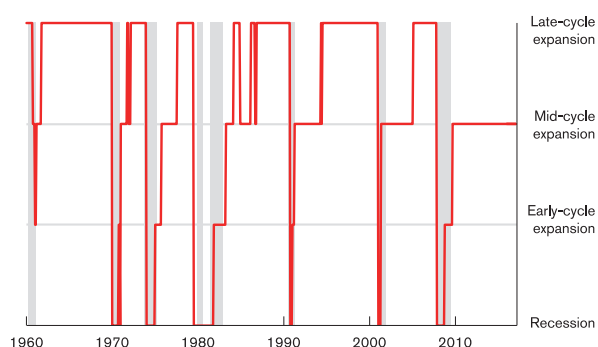
Note: Periods shaded in grey are recessions as defined by NBER.
Sources: NBER and HKMA staff calculations.

Next, we perform out-of-sample classification of the latest US economic situation using partially available data for the second quarter of 2017[1]. To do so, we compute the centroids of the four clusters, followed by a comparison of the Euclidean distances between the latest data vector and the four centroids, with a shorter distance implying a closer match[2]. The results (Table B1.B) show that the US economy has since transitioned to the late-cycle stage of expansion, based on partially available data for the second quarter.

Table B1.B
Distances between the vector of latest observations and the four cluster centroids

	Recession	Early	Mid	Late
Financial conditions	2.3	3.8	1.6	1.3
Labour market	2.4	4.1	2.3	1.0
Growth	1.8	3.6	0.4	0.9
Inflation	3.5	3.4	0.7	0.8
Business conditions	1.3	3.1	0.7	1.5
Overall	5.3	8.1	3.0	2.6

Note: Cells highlighted in green refer to the closest match to the latest observations.
Source: HKMA staff calculations.

[1] Missing values are not allowed in cluster analysis algorithms.

[2] In our case, a centroid is a 20-dimensional vector of the individual means of the 20 economic data series within a cluster. The Euclidean distance between the centroid of a cluster (x) and the data vector (y) is given by

$$dist(x, y) = \sqrt{\sum_{i=1}^{20} (x_i - y_i)^2}$$

The distances between the centroids and the vector of latest data for each of the five sub-sets are calculated analogously.

The classification results are broadly in line with intuition. In terms of financial conditions, the recent flattening of the Treasury yield curve, subdued equity market volatility and compressed corporate bond spreads are common indicators of a late-stage expansion. Meanwhile, the progressive tightening of labour market conditions (with the unemployment rate falling to 4.4% in August, below the Fed's estimated natural rate of 4.6%) and above-average real wage growth are also suggestive of a late-stage expansion of the employment cycle. On the other hand, the unusually weak pickup in GDP growth compared with previous recoveries, the recent softening of inflation and the still-below-average industrial utilisation rate have led the model to classify the latest growth, inflation and business conditions sub-cycles as in the mid-stage expansion. Taking the 20 economic indicators together, their latest values are closest in distance to the cluster representing the late-cycle stage of expansion.

Next, we calculate the historical average length of each of the four stages of the business cycle, based on results from the classification exercise (Table B1.C). Of particular interest is that the late-cycle expansion stage in the US typically lasted for four years on average, with a range between two and eight years. These results suggest that the current US economic expansion, while likely just having entered the late-cycle stage, could still last for some time before transitioning to a recession.

Table B1.C
Summary statistics on the past length of the four business cycle stages (in years)

	Recession	Early	Mid	Late
Average length	0.9	0.8	3.0	4.2
Range	0.3 – 2.3	0.2 – 1.8	0.6 – 7.6	1.8 – 8.3

Source: HKMA staff calculations.

Limitations of methodology

As a statistical technique, clustering algorithms solely rely on patterns of historical data to classify current observations. Nonetheless, due to structural changes in the US economy since the GFC, economic indicators may behave differently from the past, thereby introducing the risk of misclassification. In particular, the latest signal of a late financial cycle from the flattening of the yield curve could simply be the result of distortions by the Fed's quantitative easing, which could potentially be reversed when the Fed implements balance sheet normalisation. Moreover, the notable post-GFC decline in the labour force participation rate, if turned out to be temporary, could imply a larger-than-expected degree of labour market slack and hence a lower-than-envisaged natural rate of unemployment. These possibilities could help prolong the current expansion relative to historical norms, and suggest that it should be classified as in the mid-cycle, rather than late-cycle, stage.
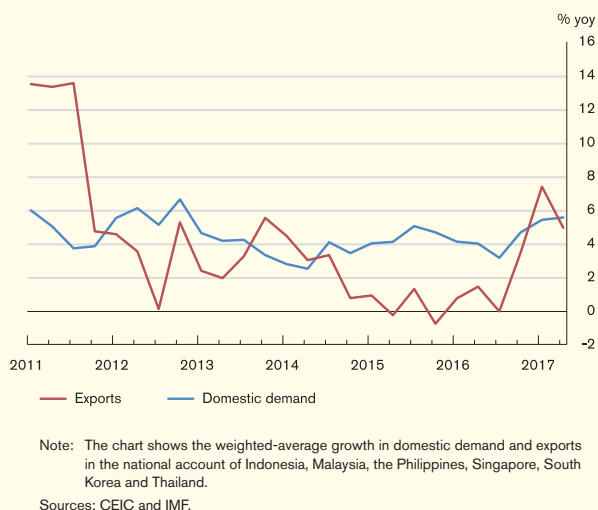
Conclusion

In summary, our empirical results suggest that the US economy has just transitioned to the late-cycle stage of expansion, although it could be expected to last for a certain period based on past experience. Yet, structural changes in the US economy since the GFC may prolong the current expansion relative to historical norms and introduce risks of misclassification due to the backward-looking nature of clustering analysis.

References

Dawsey, K. (2014), "Don't call the expansion old", Goldman Sachs client note.

Erceg, C. J., & Levin, A. T. (2013), "Labor force participation and monetary policy in the wake of the great recession", IMF Working Paper 13/245.

Theis, W. & Weihs, C. (2000), "Clustering techniques for the detection of business cycles", In *Classification and Information Processing at the Turn of the Millennium* (pp. 127 – 134). Springer, Berlin, Heidelberg.

In East Asia[3], real economic growth remained stable in the first half of 2017, maintaining the momentum that commenced in late 2016. Benefiting from the stronger-than-expected demand from advanced economies and Mainland China, the external sector has been a key driver of economic growth in the region (Chart 2.9). Trade-dependent economies such as South Korea, Singapore and Taiwan have seen a strong rebound in merchandise exports since late 2016, while net commodity exporters such as Indonesia and Malaysia have also benefited from improved global demand.
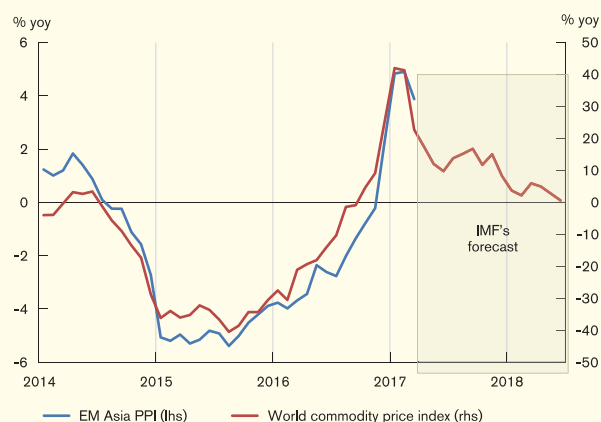
Chart 2.9
East Asia: Domestic demand and exports

Note: The chart shows the weighted-average growth in domestic demand and exports in the national account of Indonesia, Malaysia, the Philippines, Singapore, South Korea and Thailand.
Sources: CEIC and IMF.

Meanwhile, concerns over the return of inflationary pressure in the region have receded in recent months. Stable global commodity prices, including food and oil, have helped restrain inflation. Indeed, the surge in producer price index in the region since late 2015 is likely to have peaked in early 2017 amid the slowdown in commodity inflation (Chart 2.10). In addition, the region's moderate domestic demand is not likely to bolster inflation in the near-term.

Chart 2.10
East Asia: Producer price index and commodity prices

Note: The chart shows the simple average producer price index inflation of Indonesia, Malaysia, the Philippines, Singapore, South Korea and Thailand.
Sources: CEIC and IMF.

In the face of marginal yet continued improvement in real activities, financial markets in the region rallied in recent months. Regional currencies have generally strengthened against the US dollar since early this year, with the Bloomberg Asia Dollar index rising by 4.9% in the first eight months of 2017. Equity prices have also increased significantly since the second quarter of this year, with the valuation in terms of the PE ratio of the Morgan Stanley Capital International (MSCI) Asia ex-Japan index rebounding significantly over the past few months (Chart 2.11). Meanwhile, the return of portfolio fund inflows since the second quarter has also kept domestic sovereign bond yields in East Asian economies at low levels.

Chart 2.11
PE of MSCI Asia ex-Japan

Source: Bloomberg.

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

Although the real sectors and financial markets have stayed on a positive note recently, East Asian economies still face multiple headwinds:

–   Firstly, on the trade front, concerns over a trade war between the US and Mainland China have been intensifying as the US government is planning to impose stronger trade restrictions on Mainland China. A deteriorating Sino-US trade relationship might have a large negative spill over effect on other East Asian economies amid the high degree of regional trade integration. The weaker-than-expected economic performance in the US in recent months could also put a brake on the region's export recovery.

–   Secondly, on the domestic front, the pace of private sector credit growth in many regional economies has picked up recently after a brief period of deleveraging in 2015-2016, with the total outstanding private credit rebounding to a relatively high level (Chart 2.12). Against this background, any tightening in financial conditions could put pressure on the debt repayment capability of those heavily indebted companies and households. In that case, as credit growth has been providing significant support to the region's domestic demand over the past few years, any deleveraging triggered by financial tightening could weigh on Asian economic growth.

–   Thirdly, on the financial market front, while the valuation of the region's financial assets is still relatively attractive and continues to induce more portfolio inflows, a further stretch in valuation would narrow the gap with advanced economies and thus increase the risk of fund flow reversals and price corrections.

In addition to these challenges, the recent intensifying geopolitical tensions on the Korean Peninsula have cast a great shadow over the stability of the region. Should any tail-risk events materialise, including military conflicts, the corresponding shock could abruptly destabilise the region's economy and financial markets.

Given the challenges ahead and the still subdued inflationary pressure, most regional central banks are likely to keep their policy interest rates unchanged in the near-term, maintaining an accommodative monetary policy stance to support growth.

Chart 2.12
East Asia: Credit to private sector
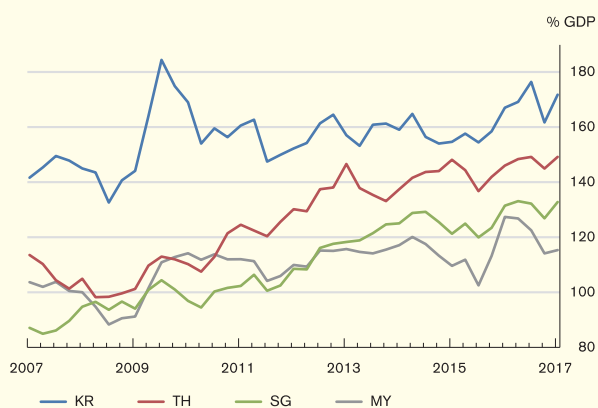
Sources: CEIC and HKMA staff calculations.

2.2   Mainland China

Real sector

Growth momentum in Mainland China improved further in the first half of 2017 underpinned by solid consumption, a rebound in investment growth and better export performance. In particular, real GDP expanded by 6.9% year on year in the first and second quarters from 6.8% in the fourth quarter of 2016 (Chart 2.13).
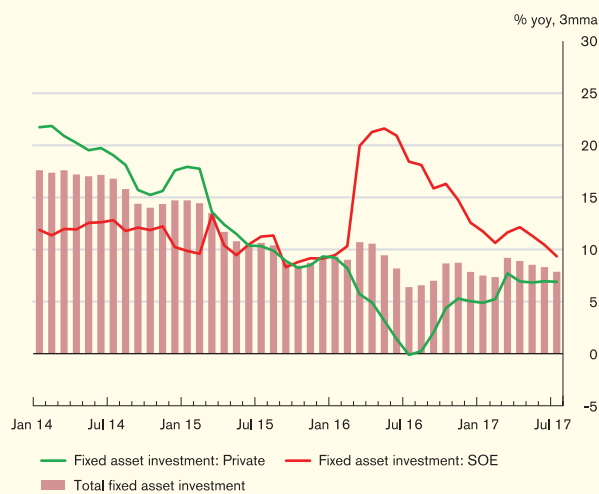
Chart 2.13
Mainland China: contribution to GDP growth by demand component
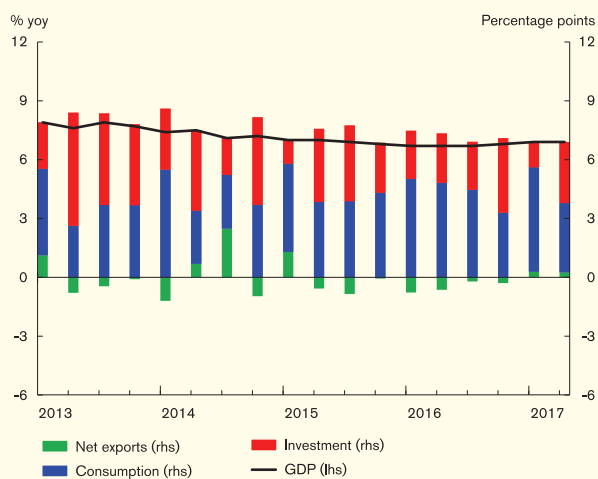
Sources: CEIC, NBS and HKMA staff estimates.

Among major GDP components, consumption remained the major contributor to the growth in the first half of 2017 amid firm labour market conditions and faster increases in household income. In particular, real per capita disposable income growth accelerated to 7.3% year on year in the first half of 2017 from 6.3% in 2016. In comparison, the contribution of investment to GDP growth picked up during the period on the back of a rebound in private investment since early 2017 amid buoyant property market conditions and solid infrastructure spending (Chart 2.14). The contribution of net exports turned positive in the first half of 2017 as greater external demand led to a larger expansion in exports compared to imports.

Chart 2.14
Mainland China: Fixed asset investment by type of firms

Sources: CEIC and HKMA staff estimates.

In value added terms, the tertiary industry grew at a slower pace in the first half of 2017 (Chart 2.15). Among major service sectors, growth of the real estate and financial sectors moderated likely due to prudential measures introduced by the authorities to contain risks in the property market and the financial system, while growth of transport and storage, wholesale and retail trade as well as accommodation and catering trade expanded at a faster pace. In comparison, growth of the secondary industry picked up in the first half of 2017 as industrial activities improved along with better external and domestic demand conditions. With the growth rate of tertiary industry continuing to outpace other industries, the share of tertiary industry in GDP rose further to 54.1% in the first half of 2017 from 51.6% in 2016.

Chart 2.15
Mainland China: GDP growth by industry
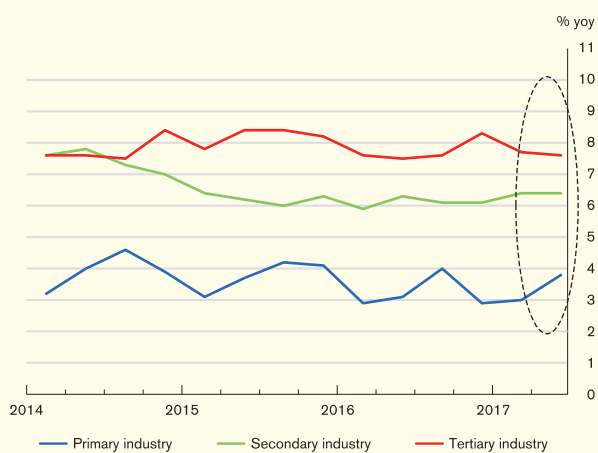
Sources: CEIC, NBS and HKMA staff estimates.

The near-term growth outlook for the Mainland economy remains positive. On the external front, further improvement in the advanced economies may continue to underpin export performance. On the domestic front, stabilised economic environment and recovery in business confidence should render support to private investment. Meanwhile, tight labour market conditions and solid household income growth should also bode well for private consumption.

Nonetheless, the future outlook also hinges on how the authorities strike a balance between supporting the economy and preventing the build-up of financial risks. During the review period, the authorities further introduced tightening measures amid the house price rally and pushed ahead with financial deleveraging in view of increased bank exposure to off-balance sheet activities, while having lowered the growth target for 2017 to the level around 6.5% from 6.5%–7% for 2016. The better-than-expected economic performance in recent quarters may give more room for the authorities to bring forward the tightening measures on the property market as well as financial deleveraging, which would in turn weigh on growth especially through the investment channel. Latest consensus forecasts by market analysts expected that real GDP would grow by 6.7% for 2017,

slightly higher than the government target of around 6.5%.

While overall economic conditions continued to improve, consumer price inflation remained benign during the review period. Headline consumer price inflation eased from 2.2% year on year in the last quarter of 2016 to an average of 1.4% in the first half of 2017 (Chart 2.16), as food prices declined during the period. However, core inflation, after excluding food and energy prices, inched up from 1.9% year on year to 2.1% during the same period on the back of faster increases in service prices. At the wholesale level, producer price inflation tapered from the recent peak of 7.8% year on year in February to 5.5% in June, as upstream prices such as raw material costs came down somewhat in the second quarter.

Going forward, upside risks to inflation may remain in the near term should growth momentum show further improvement. However, the tightening policies in place aimed at containing systemic risks may, to some extent, provide an offset. In addition, the renminbi exchange rate may also affect import prices and thus the near-term inflation outlook.

Chart 2.16
Mainland China: Consumer price and producer price inflation
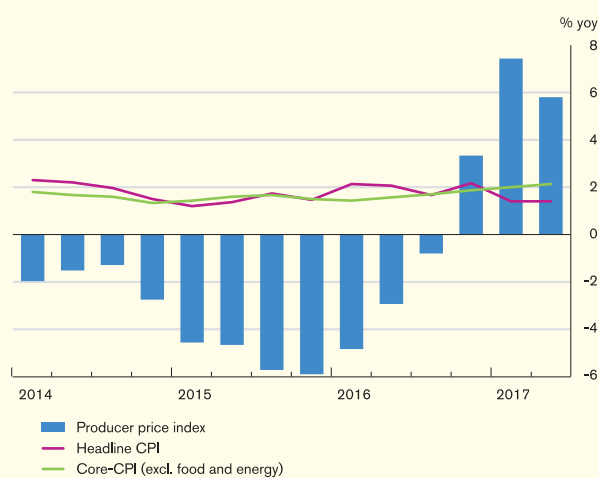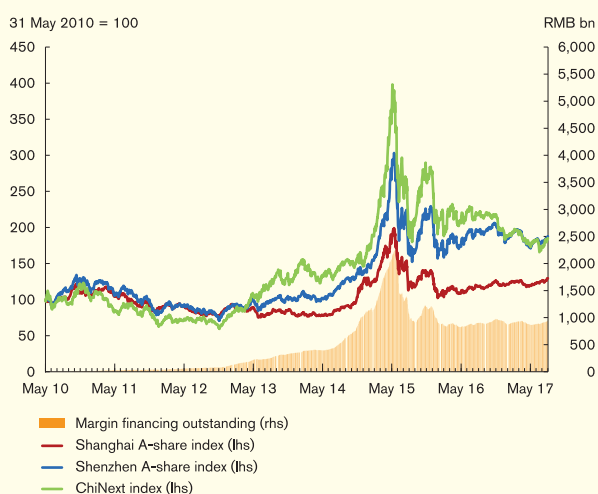

Sources: NBS and HKMA staff estimates.

Asset Markets

During the review period, the tightening measures introduced by the authorities to contain systemic risks continued to affect the asset market performance in Mainland China. For instance, Mainland commodity prices came down early this year amid tightening liquidity conditions associated with financial deleveraging but rebounded afterwards, likely due to improved market sentiment amid better-than-expected economic conditions in recent periods.

In the equity market, investors' sentiment remained benign, with leveraged trading having subsided. Tightened liquidity conditions appeared to have suppressed market risk appetite, increasingly shifting the preference of investors from growth to value during the review period. As a result, the prices of large-cap stocks inched up on the Shanghai Stock Exchange, while the small-cap stocks with rich valuation continued to report losses on the Shenzhen Stock Exchange, especially on the start-ups board (ChiNext) (Chart 2.17). In fact, the ChiNext index in the Shenzhen Stock Exchange fell by around 5.1% on 17 July right after the announcement by policy makers to further contain financial risks by establishing the Financial Stability and Development Committee.

Chart 2.17
Mainland China: Major stock market indices

Sources: CEIC and HKMA staff estimates.

Tightened interbank liquidity conditions also drove up the issuance costs in the bond market, with both government and enterprise bond yields picking up during the review period (Chart 2.18). The yield spread between corporate bonds and government bonds also increased, despite improved corporate financial positions amid better-than-expected economic performance. Increased corporate bond yield spread might have in part reflected stronger financing needs of Mainland firms during this round of tightening in bank lending as well as suppressed risk appetite of investors.

Chart 2.18
### Mainland China: 10-year enterprise and government bond yields
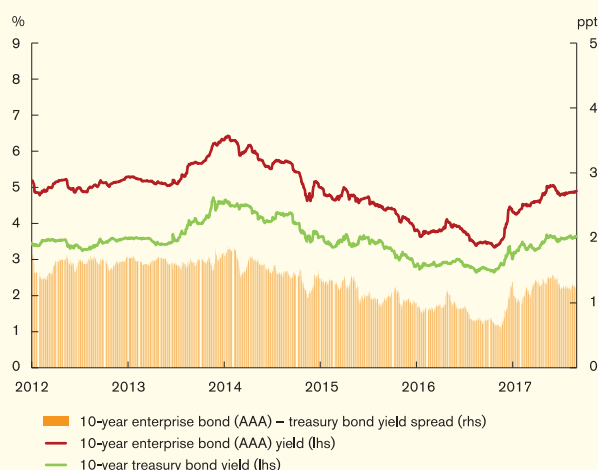
Sources: WIND and HKMA staff estimates.

Mainland property markets remained buoyant, with both house prices and transactions continuing to pick up in the first half of 2017. While buoyant property market conditions provided some support to the economy, a prolonged period of exuberance would likely sow the seeds for future instability in the financial system. In view of this, the authorities further stepped up tightening measures including tightened down-payment requirements and linking land supply to housing inventory in different cities.

As a result, property market performance exhibited signs of divergence in different tiers of cities in recent periods, after house price growth accelerated somewhat in the first quarter of 2017 (Chart 2.19). In tandem with declined transactions, house price growth moderated on a sequential basis recently in higher-tier cities where the property market was overheating. In first-tier cities, house prices even fell on a sequential basis for a second consecutive month in July. In comparison, both house price growth and transactions, during the same period, inched up in lower-tier cities where house stock overhang issues prevailed. That said, more time is needed to discern whether such trend may sustain.

Chart 2.19
Mainland China: Residential prices by tier of cities and floor space sold

Sources: CEIC and HKMA staff estimates.
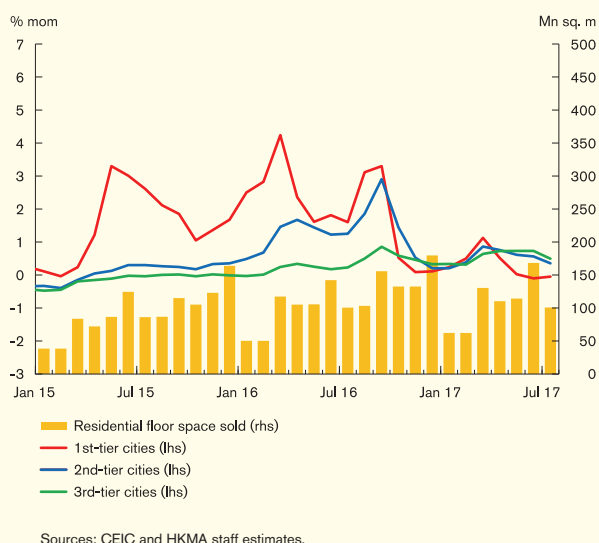
Bank lending and asset quality

Amid improved economic activities, corporate loan demand improved during the review period. According to a quarterly survey by the People's Bank of China (PBoC), for instance, loan demand from both the manufacturing and non-manufacturing sectors rebounded notably in the first half of 2017 (Chart 2.20).

Chart 2.20
Mainland China: Loan demand index by industry


Sources: PBoC and HKMA staff estimates.
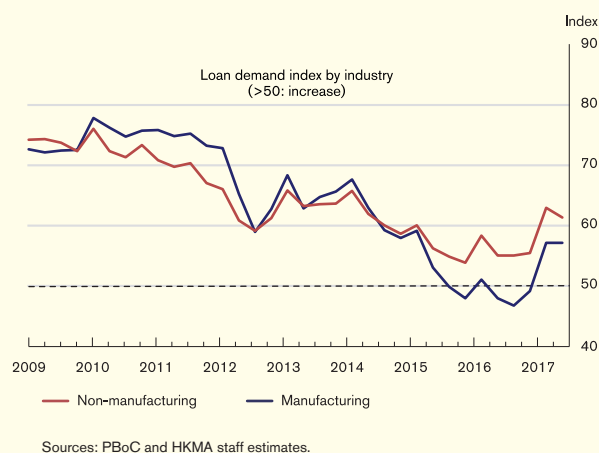
Despite improved loan demand, growth in renminbi bank loans remained largely stable during the review period amid the tightening measures aimed at corporate deleveraging. In particular, banks continued to tighten their loan underwriting standards to vulnerable borrowers, such as inefficient state-owned enterprises (SOEs) and firms in overcapacity sectors. As a result, the leverage of firms in the overcapacity sectors further declined in the first half of 2017, while that of SOEs rose slightly (Chart 2.21).

Chart 2.21
Mainland China: Corporate leverage: SOEs and overcapacity sectors

Sources: Bloomberg and HKMA staff estimates.
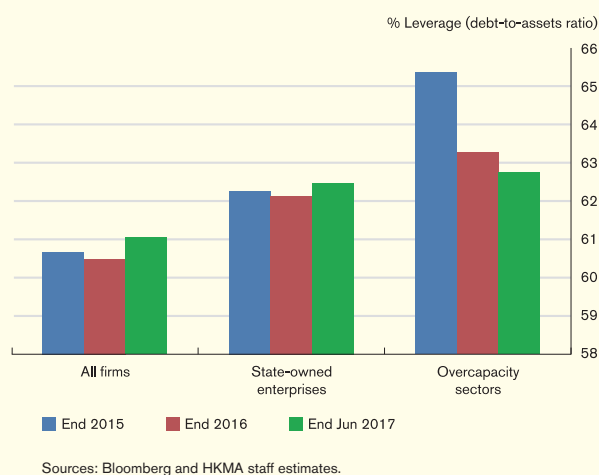
In view of the potential risks associated with the exuberance in the property market, Mainland banks also tightened their loan underwriting standards to property developers. As a result, the growth of developer loans stayed subdued albeit picking up slightly to 9.8% year on year at the end of June 2017 from 8.4% at the end of 2016 (Chart 2.22).

Chart 2.22
Mainland China: Loan growth for property development and housing mortgage


Sources: PBoC and HKMA staff estimates.
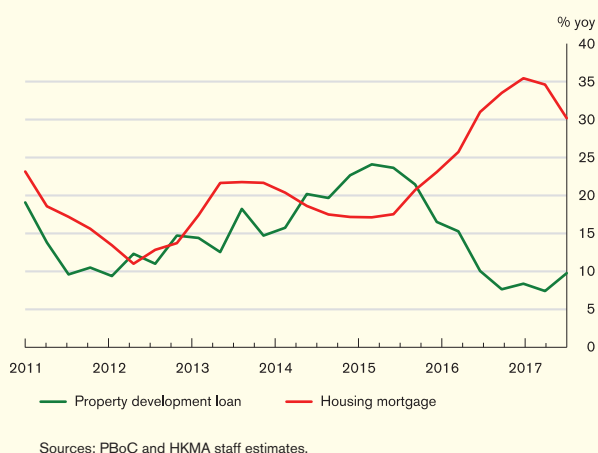
In comparison, after having accelerated for more than one year, mortgage loan growth started to moderate in the first half of 2017 amid the tightening measures on the property market. For now, the risk associated with the fast growth in mortgage loans should be manageable. In particular, the leverage of Mainland households remained relatively low, as the outstanding size of mortgage loans was only equivalent to about 35% of household deposits in June, thanks to macro-prudential measures in place, such as the tightened down-payment requirements.

While the direct exposure of banks to the property market should be manageable, bank exposure to the property market through the collateral channel should not be ignored, given the key role played by the property market in the collateral-based lending system in Mainland China. Box 2 discusses the risk associated with

banks' exposure to the property market by examining the effect of property prices on corporate borrowing through the collateral channel. Our analysis shows that property price changes have a positive effect on firms' debt growth, especially for financially constrained firms such as smaller and non-state-owned companies. Our findings therefore suggest that while collateral-based lending may help alleviate the financing difficulties facing smaller or private Mainland firms, banks' heavy reliance on properties and land as collateral may also lead to a pro-cyclical swing in the indebtedness of these firms.

As tightened bank lending may not be able to fulfil the increased financing needs of Mainland corporates, signs of resurgence in shadow banking activities emerged in recent quarters. In particular, trust loan growth increased from 15.8% year on year at the end of 2016 to 33.5% in July 2017, notably outpacing the growth in bank lending (Chart 2.23). Despite the fast increase in trust loan growth, the outstanding size of trust loans has so far remained relatively small. By July 2017, the outstanding size of trust loans stood at RMB7.7 trillion, equivalent to 6.6% of total bank loans.

Chart 2.23
Mainland China: Bank loans and trust loans growth

Sources: CEIC and HKMA staff estimates.
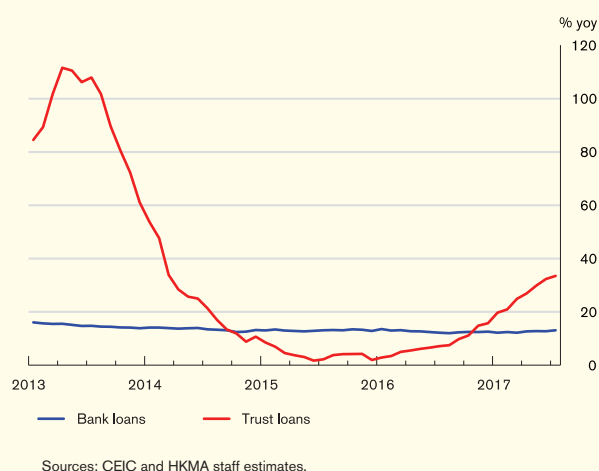
Although there is little information about which sectors have received loans from trust companies, breakdown by trust funds allocation suggests that in total about 25% of trust funds had been invested in vulnerable sectors such as real estate and basic industries as of June 2017 (Chart 2.24). That said, given the complex and opaque nature of shadow banking products, the overall exposure of trust companies to these vulnerable sectors could be larger through the holdings of financial instruments such as equities, bonds and investment funds.

Chart 2.24
Mainland China: Trust funds by sector at the end of June 2017
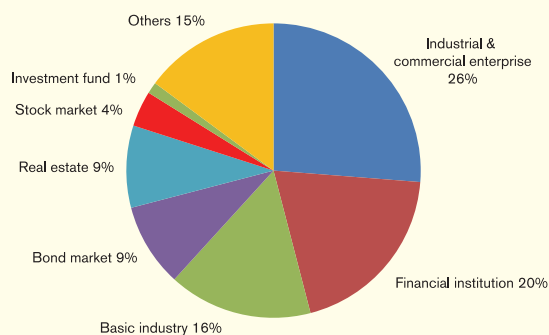
Sources: CEIC and HKMA staff estimates.

In view of the risk associated with expanding shadow banking activities, the China Banking Regulatory Commission (CBRC) has stepped up supervision of banks' lending to non-bank financial institutions in the interbank market as this was deemed to be an important funding source for shadow banking activities. As a result, the growth in banks' claims on non-bank financial institutions came down significantly in the first half of 2017 (Chart 2.25). In addition, the growth in the outstanding size of Wealth Management Products (WMPs), another important funding source of shadow banking activities, also declined following the inclusion of off-balance sheet WMPs into the Macro Prudential Assessment (MPA) for Mainland banks by the authorities which started from the first quarter of 2017.

Chart 2.25
Mainland China: Banks' claims on non-bank financial institutions and outstanding wealth management products
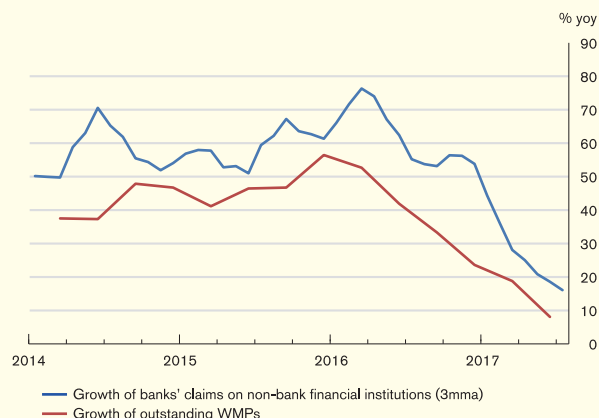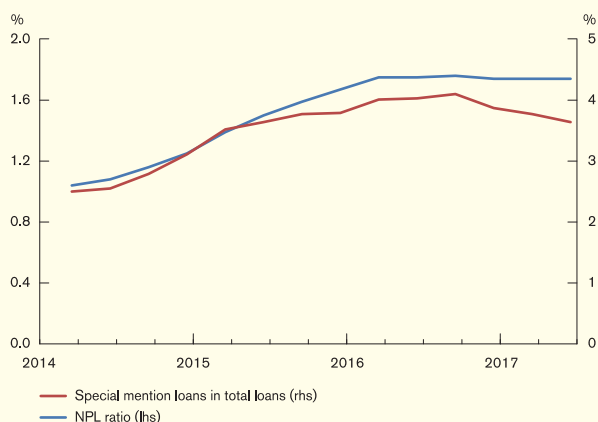

Sources: CEIC, WIND and HKMA staff estimates.

In addition to the tightening measures in place, the policy makers also announced at the Financial Work Conference in July to establish the Financial Stability and Development Committee. The set-up of the new committee highlighted the ongoing drive by the authority to deepen financial reform and formulate a coordinated supervision framework to better contain financial risks, especially those associated with corporate leverage and local government debt.

Thanks to the improved business and financial conditions of Mainland corporates and the stricter loan underwriting standards, the asset quality of Mainland banks showed signs of improvement during the review period. While the non-performing loans (NPL) ratio remained stable at a relatively low level of 1.74% in the second quarter of 2017, the share of special mention loans in total loans further declined to around 3.6% from about 3.9% at the end of 2016 (Chart 2.26).

Chart 2.26
Mainland China: NPL ratio and share of special mention loans in total loans

Special mention loans in total loans (rhs)
NPL ratio (lhs)

Sources: CBRC and HKMA staff estimates.

Exchange rate and cross-border capital flows

Against the backdrop of improved economic conditions and market sentiment, as well as the weakening of the US dollar, the renminbi exchange rate strengthened against the US dollar recently. In particular, during the period March to August 2017, the renminbi appreciated by 4.1% against the US dollar (Chart 2.27). In comparison, the China Foreign Exchange Trade System (CFETS) RMB index, a trade-weighted index capturing the movement of the renminbi against a basket of currencies, edged down slightly by 0.1% during the review period.

Chart 2.27
Mainland China: The CFETS RMB index and the renminbi exchange rate against the US dollar


CFETS RMB index* (lhs)   CNY/USD (rhs)
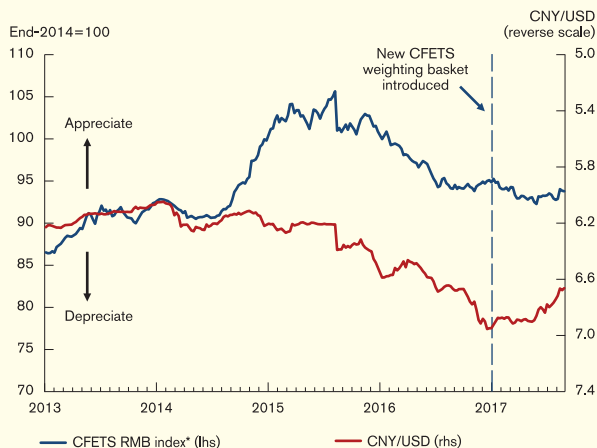
* Index before December 2015 is estimated according to the weight of the CFETS RMB basket.
Sources: CEIC and HKMA staff estimates.

The recent stabilisation in the CFETS RMB index was also due in part to the refinement of the onshore renminbi (CNY) fixing formation formula. According to the authorities, a counter-cyclical factor was added into the CNY fixing formation formula in May in order to help offset the pro-cyclical movements in the CNY exchange rate driven by market sentiment and herd behaviour in the forex market, and therefore to maintain the renminbi largely stable against the currency basket.

Amid improved market sentiment, capital outflow pressures continued to ease. The declines in both the PBoC's forex purchase position and Mainland's foreign reserves, excluding valuation effects, have narrowed notably since early 2017 (Chart 2.28). As a result, foreign reserves in Mainland China had been standing above US$3,000 billion for the sixth consecutive month in July.

**Chart 2.28**
Mainland China: Changes in PBoC's foreign exchange purchase position and foreign reserves

Change in PBoC FX purchase position
Change in FX reserves excluding valuation effect
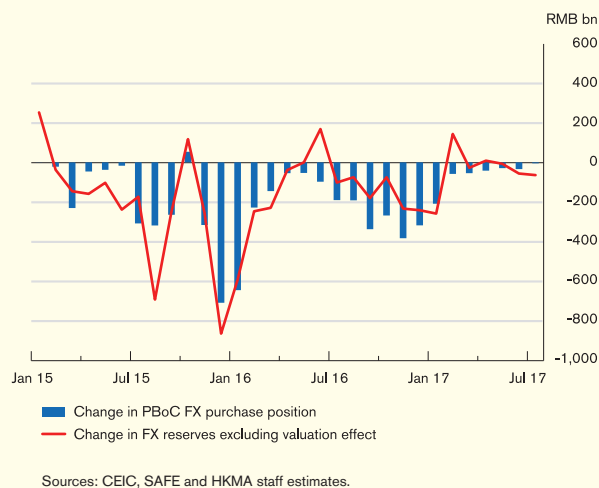
Sources: CEIC, SAFE and HKMA staff estimates.

The latest statistics on the balance of payments also pointed to reduced capital outflow pressures, with cross-border capital flows turning to a net inflow in the first quarter of 2017, the first time since the first quarter of 2014. The turnaround in net cross-border fund flows was mainly driven by a reversal in capital outflows through other investment in the first quarter of 2017 (Chart 2.29). In particular, trade credit saw a seasonal net inflow in the first quarter due to greater repayments of trade credit by non-residents. Meanwhile, external borrowing by Mainland banks and corporates also picked up during the period amid tightened liquidity conditions in the onshore credit market.

Chart 2.29
Mainland China: Net cross-border capital flows by type of flows
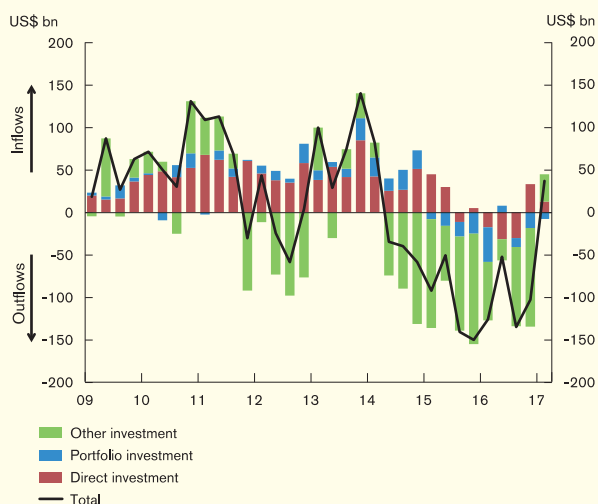
Sources: CEIC, SAFE and HKMA staff estimates.

Lower capital outflow pressures were also reflected in a significant slowdown in the allocation of assets overseas by residents through both direct investment and portfolio investment in recent periods (Chart 2.30). That said, since cross-border fund flows tend to be volatile, more time is needed to discern the new trend in direct investment and portfolio investment.

Chart 2.30
Mainland China: Cross-border capital flows through portfolio and direct investment: asset side
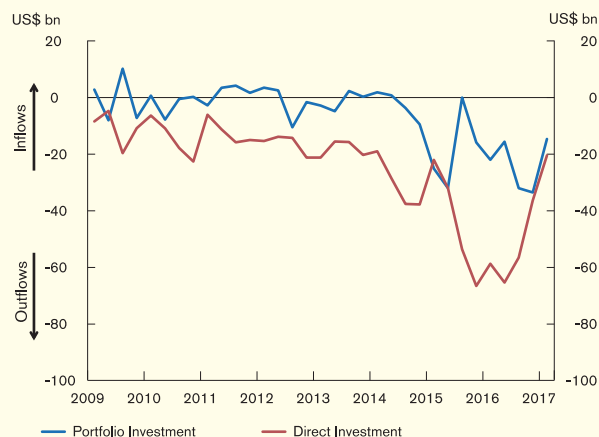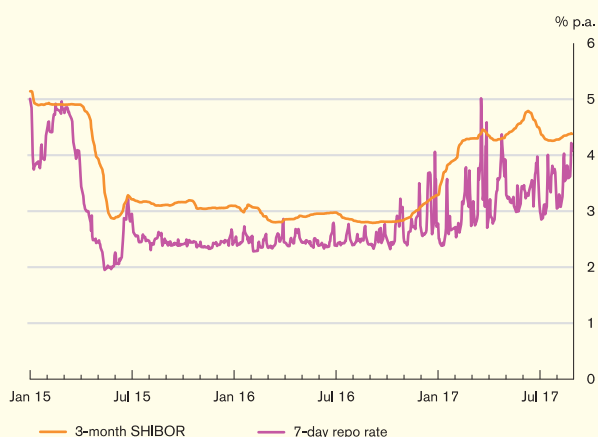

Sources: CEIC, SAFE and HKMA staff estimates.

Looking ahead, the launch of the Bond Connect and the inclusion of A-shares in the MSCI emerging markets index would likely facilitate more capital inflows through the portfolio investment channel. However, uncertainties in monetary conditions among major economies, as well as global market sentiment, may still play an important role in shaping the near-term outlook for cross-border fund flows. Over the longer term, the current account surplus and robust economic and productivity growth would continue to provide support to the renminbi exchange rates.

Fiscal and monetary policy
On the monetary policy front, the PBoC maintained a prudent and neutral policy stance during the review period, while tightening the interbank liquidity conditions in view of increased risks facing the banking system, especially those associated with the exposure of banks to non-bank financial institutions. As a result, both repo rates and Shanghai Interbank Offered Rate (SHIBOR) increased in 2017 (Chart 2.31), with the interbank funding costs of non-bank financial institutions increasing more.

Chart 2.31
Mainland China: 7-day repo rate and 3-month SHIBOR

Sources: CEIC and HKMA staff estimates.

Higher interbank funding costs seemed to have passed through to the end users, though the PBoC utilized targeted measures such as the Medium-term Lending Facility (MLF) to support the funding needs of financial institutions and kept the benchmark lending and deposit rates unchanged. In particular, the weighted average interest rate of loans offered to non-financial enterprises and other sectors increased to around 5.7% in the second quarter of 2017 from about 5.3% in the last quarter of 2016. As a result, an increasing number of banks reported to see a tightening in monetary policy in the first and second quarters of 2017, according to the monetary policy sentiment index compiled by the PBoC (Chart 2.32).

Chart 2.32
**Mainland China: Banks' monetary policy sentiment index**
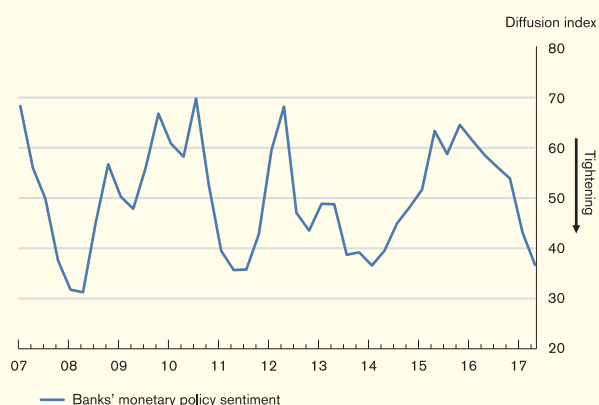
Source: CEIC.

On the fiscal policy front, the authorities continued to adopt a more proactive policy stance. In particular, in order to facilitate private spending, the government announced to further cut taxes and fees for business owners by RMB 283 billion in June in addition to the measures rolled out early this year which have already led to a cut of RMB718 billion.

On the spending side, to facilitate infrastructure investment at the local level, the authorities encouraged the participation of private capital in local infrastructure projects. For instance, the scale of registered infrastructure projects under the public-private partnership program increased markedly by 54.3% year on year in the second quarter of 2017 to RMB16.4 trillion. In comparison, the size of projects at the implementation phase also increased to RMB3.3 trillion from RMB1.1 trillion a year earlier.

Reflecting the proactive fiscal policy stance, public expenditure of Mainland China continued to expand at a faster pace than public revenue during the first half of 2017. As a result, the gap between public expenditure and revenue over the past 12 months widened from 3.8% of GDP at the end of 2016 to 4.3% in June 2017 (Chart 2.33).

Chart 2.33
Mainland China: Difference between public spending and public revenue
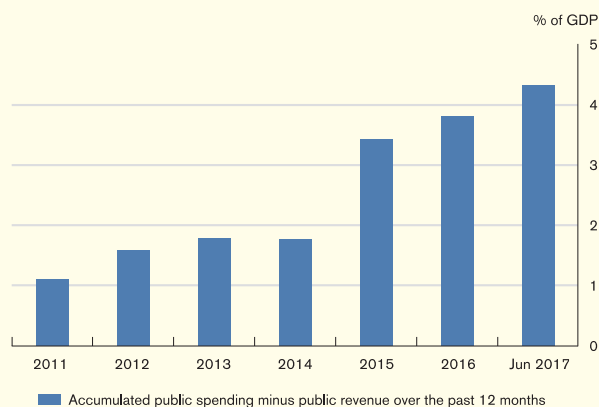
Sources: WIND and HKMA staff estimates.

The widened budget deficit might have led to a further expansion in government debt, especially at the local level. According to the latest report by the National Audit Office issued in June 2017 covering 16 provinces, 16 cities and 14 counties, government debt indeed expanded at a relatively fast pace for some local governments. The report also emphasised that the overall risk of local government debt remained manageable.

To better contain the risks associated with local government debt, the authorities strengthened the management of local government debt issuance. For instance, in June the authorities introduced a pilot scheme of local land reserve bond issuance, to lower the incentives of local governments to borrow from unregulated channels. In addition, the authorities announced, at the Financial Work Conference, to impose fiscal discipline for local governments and curb ballooning debt by establishing a lifetime responsibility mechanism for local government officials.

Box 2
Real estate prices and corporate borrowing in Mainland China

Introduction

Property prices in Mainland China have picked up notably since 2015. In first-tier cities including Beijing, Shanghai, Guangzhou and Shenzhen, property prices have, on average, jumped by nearly 60% in the past two years (Chart B2.1). Following the price rally in first-tier cities, second-tier cities have also recorded solid increases in property prices since 2016. The soaring property prices have raised concerns, given the strong link between real estate cycles and financial stability.

Chart B2.1
Residential prices in Mainland China by tier of cities
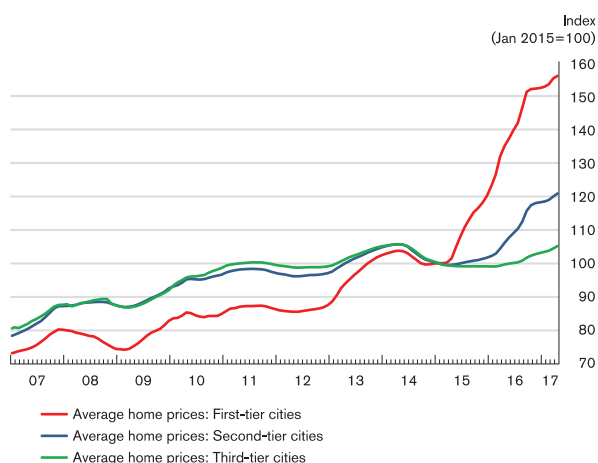
Sources: CEIC and HKMA staff estimates.

For now, the direct exposure of banks to the property market should be manageable. First, the size of the direct exposure of banks to the property market is not very large. By June 2017, only 6% of bank loans had been extended to developers. The share of mortgages in total bank loans was a little higher at around 18%. Second, or more importantly, in view of the potential risks associated with overheated property markets, Mainland authorities had already rolled out prudential measures. For instance, banks had tightened their loan underwriting standards to developers, especially the smaller and more
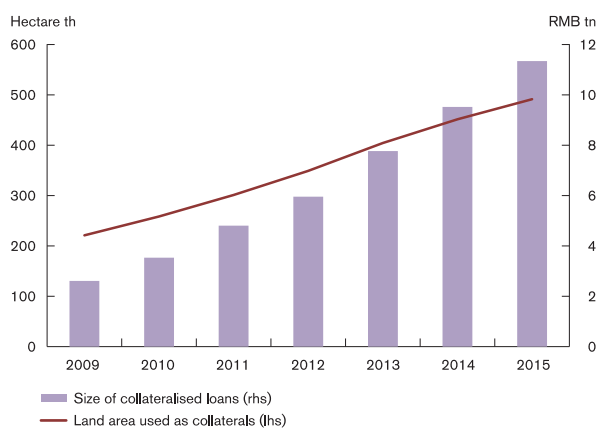
vulnerable ones. For mortgage borrowers, their leverage level remained low thanks to macro-prudential measures in place, such as the tightened down-payment requirements. By June 2017, the outstanding size of mortgages was only equivalent to around 35% of the total household deposits.

While the direct exposure of banks to the property market should be manageable, the bank exposure to the property market through the collateral channel should not be ignored, given the key role played by the property market in the collateral-based lending system in Mainland China.

In particular, to access credit in financial markets, most borrowers in Mainland China are required to hold collateral[4], the majority of which seemed to be properties and land following the development of the real estate markets. According to the statistics compiled by the Ministry of Land and Resources, the total area of land being used as collateral in 84 major cities increased notably by about 120% from 2009 to 2015 (Chart B2.2). The amount of loans backed by land also rose from RMB2.6 trillion to RMB11.3 trillion during the same period.

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[4] According to the latest World Bank Enterprise Survey, collateral was required for around 80% of corporate loans in Mainland China in 2012, and on average, the value of collateral was around 200% of the loan borrowed. In comparison, in some economies, such as the US and Italy where bank lending is risk-based, most borrowers can still access credit, even if they do not hold collateral (Kunieda and Shibata (2011) and Fabbri and Padula (2004)).

Chart B2.2
Land area pledged as collateral in 84 major
cities and size of collateralised loans

Hectare th   RMB tn

600   12

500   10

400   8

300   6

200   4

100   2

0   2009 2010 2011 2012 2013 2014 2015   0

▬ Size of collateralised loans (rhs)
— Land area used as collaterals (lhs)

Source: Ministry of Land and Resources.

The amount of bank loans secured by land and properties together could be even larger, but there is little publicly available information on this. Some anecdotal evidence, for instance, a report by the IMF issued in 2011, pointed out that 30-45% of loans in the five biggest Mainland banks were found to be backed by collateral, the majority of which was real estate.

Given the key role played by the property market in the collateral-based lending system in Mainland China, it is not surprising that property prices, or the value of collateral, will affect firms' borrowing behaviour and therefore banks' exposure to the property market as well as loan quality. However, there have been few studies on this issue, most likely due to data limitation. To fill this gap and shed some light on the risk associated with banks' exposure to the property market, this study looks at the effect of property prices on corporate borrowing through the collateral channel.

Empirical framework

To estimate how property prices, or the value of collateral, could affect firms' borrowing behaviour, we employ the approach of Banerjee and Blickle (2016), and Adelino et. al. (2015) to explain the growth of corporate debt by a set of variables as follows,

$$\Delta Debt = f(Firm\ Characteristics,$$
$$\Delta House\ Price,\ Controlling\ Variables),$$

where $\Delta Debt$ is firms' annual debt growth proxied by annual changes in firms' total liabilities and $\Delta House\ Price$ is the change in the average property prices in the province where the head office of a firm is located.

Apart from the changes in property prices, firm characteristics such as cash position, leverage, profitability and total sales that can reflect a firm's financial positions or operating conditions are also included in the specification, as these factors are relevant to the firm's demand for funds as well as the availability of funds for the firm.

To single out the collateral effect of property prices on corporate borrowing, we also include some controlling variables. For instance, industrial sales growth is included to control for the fact that firms borrow more not because of increased collateral value, but because these firms are in the property-related industries and therefore borrow more to expand when the property market booms. Provincial GDP growth is also included as higher GDP growth may lead to both higher property prices and faster loan growth in a particular province. In addition, time dummy is added to the specification to control for other common factors such as monetary conditions that may drive both overall debt growth and property prices.

Data and results

Using a firm-level panel dataset covering around 2,600 non-financial listed Mainland companies from 2007 to 2015[5], matched with provincial property price changes, our results suggest that on average the debt growth of Mainland corporates seemed to have increasingly reacted to housing prices. Specifically, property prices appeared to have little impact on corporate debt growth in an earlier sample period from 2007 to 2010, as the coefficient is not significant (Table B2.A). In more recent years, however, Mainland corporate debt growth seemed to have positively reacted to property prices. In particular, our results show that for the sample period 2011–2015, on average a one percentage point increase in housing price growth would lead to around a 0.9 percentage point increase in corporate debt growth.

One interesting question is whether borrowings by financially constrained firms in Mainland China would have reacted differently to housing prices compared with large or SOEs which usually have better access to credit markets. By financially constrained firms, we refer to either firms with the smallest 30% of asset size in the sample, or firms that are not SOEs. To answer this question, we introduce the interaction term between the dummy variable for financially constrained firms and the changes in housing prices into the specification[6]. If property prices matter more for financially constrained firms, a statistically significantly positive coefficient of the interaction term should be detected.

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[5] To focus on the exposure of banks to property markets through the collateral channel, property developers are therefore excluded from our sample.

[6] There is no need to include the dummy variable for financially constrained firms into the specification as firm-level dummies have already been included in the panel regression.

Table B2.A
Estimated impact of property prices on corporate borrowing

	Benchmark	Smaller firms as financially constrained firms	Non-SOEs as financially constrained firms
Full sample			
ΔHouse price (t)	0.363	0.392	0.597*
ΔHouse price (t)* dummy for financially constrained firms		-0.139	-0.422
Total effect of Δhouse price (t)	*0.363*	*0.253*	*0.175*
2007-2010			
ΔHouse price (t)	-0.021	-0.066	-0.331
ΔHouse price (t)* dummy for financially constrained firms		0.271	0.661*
Total effect of Δhouse price (t)	*-0.021*	*0.206*	*0.330*
2011-2015			
ΔHouse price (t)	0.927**	0.414	0.644
ΔHouse price (t)* dummy for financially constrained firms		1.970**	0.462
Total effect of Δhouse price (t)	*0.927***	*2.384*****	*1.106****

Note: ***, ** and * denote the estimated coefficient is statistically significant at 1%, 5% and 10% respectively. The significance of *Total effect of Δhouse price* reports the *p*-value of the joint significance of the interaction term and Δhouse price. Independent variables include liquidity, leverage, profitability and total sales of a firm, industry sales growth, and provincial GDP growth. Time and firm dummies are also included in the panel model.

Our results indeed pointed to a positive and statistically significant coefficient for the interaction term between smaller firms and housing price growth for the sample period 2011–2015 (Table B2.A), suggesting that house prices were more relevant for smaller firms to get access to credit markets in recent periods. However, the coefficient of the interaction term between non-SOEs and housing price growth is found to be positive, but not statistically significant for the sample period 2011–2015. In comparison, the borrowing by larger firms or SOEs in Mainland China is found, in general, to be little affected by property price changes.

In a robustness check, we divide our sample by smaller versus larger firms and non-SOEs versus SOEs, and then re-estimate our model for each sub-sample for the period of 2011–2015. The results of the split sample analyses are reported in Table B2.B. The coefficients of housing price growth for the sub-samples of smaller firms and non-SOEs are found to be statistically significantly positive, while the coefficients of housing price growth for larger firms and SOEs

are found to be statistically insignificant. This suggests that the strong correlation between housing price changes and corporate debt growth for the full sample is likely driven by smaller or private firms, which are deemed to have difficulty in gaining access to financial markets.

Table B2.B
Estimated impact of property prices on corporate borrowing during 2011–2015: split sample analyses

	Smaller vs larger firms		Non-SOEs vs SOEs	
	Smaller	Larger	Non-SOEs	SOEs
ΔHouse price (t)	2.689***	0.227	1.664***	0.395

Note: ***, ** and * denote the estimated coefficient is statistically significant at 1%, 5% and 10% respectively. Independent variables include liquidity, leverage, profitability and total sales of a firm, industry sales growth, and provincial GDP growth. Time and firm dummies are also included in the panel model.

These findings actually help alleviate the concern that our results are driven by reverse causality, that is, firms borrow to invest in property markets and thus drive up property prices. If this is the case, we should have observed a much stronger correlation between the debt growth of financially less constrained firms and property prices. Instead, we find the opposite.

Conclusion

Using data of non-financial listed companies and provincial property prices in Mainland China, this study finds that collateral value matters for corporate borrowing in recent years. In particular, we find that property price changes have a positive effect on firms' debt growth, especially for financially constrained firms such as smaller and non-state-owned companies.

Our findings, therefore, suggest that collateral-based lending may help alleviate financing difficulties facing smaller or private Mainland firms, given that the Mainland financial sector remains under-developed and information asymmetries prevail.

However, the use of properties and land as collateral may lead to a pro-cyclical swing in the indebtedness of smaller or private firms. For instance, a property market boom may result in faster accumulation of corporate debt, which may in turn exacerbate the vulnerability facing the financial system. A property market bust, on the other hand, may lead to a sudden decline or even a stop in bank lending to corporates, which would, in turn, cause refinancing problems for firms, or even jeopardise firms' business operations and therefore their repayment ability. Meanwhile, the declines in collateral value would also result in a deterioration in loan quality.

In this sense, the exposure of banks to property markets through the collateral channel also warrants close monitoring together with banks' direct exposure.

Our study, however, has some caveats. First, the sample period is relatively short due to data limitation. Secondly, this study tried to link property prices to corporate borrowing in Mainland China. However, Mainland property markets have barely experienced meaningful busts during our sample period. Lastly, this study focuses only on banks' exposure to the property market through the collateral channel, although property markets can indirectly affect financial stability through many other ways. For instance, property prices can affect the revenue of local governments as well as the profitability of local government financing vehicles and, in turn, their repayment ability. Also, the wealth of households and the growth in upstream and downstream industries of the property sector can also be affected by property market performance, which would also have a feedback effect on banks' asset quality and therefore financial stability. These indirect effects of the property market on financial stability are not covered in this study, which therefore warrant further research.

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