Bucking the trend

Singapore Banking Review

October 2019

Contents

Introduction

Over the past three years the banking industry has faced unprecedented challenges and a confluence of external drivers. At a macro-economic level, we have been ushered into a low interest rate environment amid flat to declining Gross Domestic Product (GDP) growth across most mature markets, and a worsening credit outlook scenario led by increasing tariffs, global uncertainty and a slowdown in China.

Regulatory reforms, more stringent capital requirements and new risk management considerations are inflating the cost of doing business. At the same time, technological and societal changes have been propelling digital disruptions and more demanding consumer preferences.

Against this backdrop, to get a data-driven view on key factors impacting Singapore's traditional major banks, we analysed the aggregate performance of DBS, OCBC and UOB (Singapore banks) over the past three years against peer banks in the United Kingdom (UK) and Australia.

We selected the UK and Australia as these are comparable mature economies and open markets with a similar set up of domestic banks.

We considered ANZ, CBA, NAB and Westpac in Australia (Australian banks) and Barclays, Lloyds and RBS in the UK (UK banks) for our analysis.

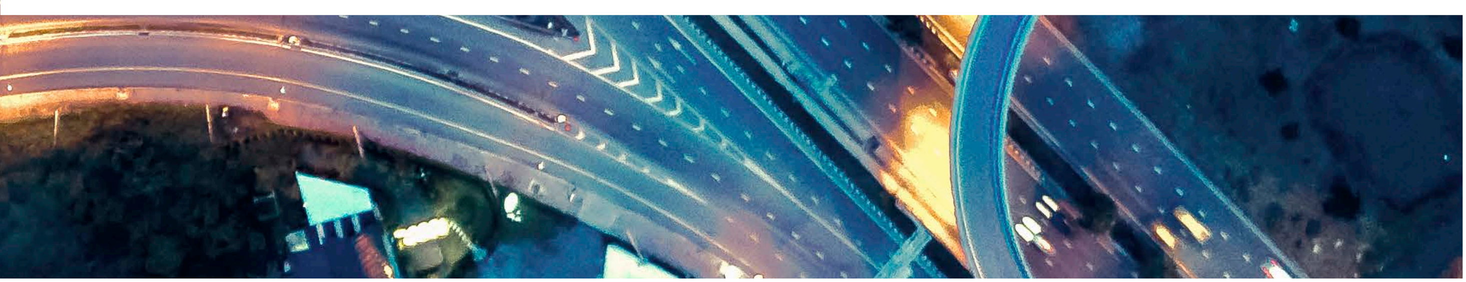
These banks collectively have a majority share of their respective domestic markets, just like the Singapore banks. Indeed larger global banks such as HSBC and Santander are an integral part of UK's banking sector, but have substantial overseas operations where the level of public disclosure of UK specific segments does not lend itself to comparative analysis.

Based on our analysis, we believe Singapore banks have the potential to outgrow their UK and Australian counterparts over the next five to eight years, continuing their current top line growth buoyed by sustained investment in overseas markets. However, as an exercise to stretch minds, we considered four 'What if?' risk scenarios to highlight potential banana skins.

These include interest rates going to zero in mature markets, specific industry credit downturns from tariffs, losing customer trust and the impact of digital banks capturing 20% of domestic market share.

We extended our analysis to illustrate whether Singapore banks are more susceptible to certain scenarios versus the UK and Australian banks and explored what they can do to mitigate these risks and keep up the growth momentum.

> "We believe Singapore banks have the potential to outgrow their UK and Australian counterparts over the next five to eight years."



Highlights of performance analysis

Singapore banks bucking the trend

Singapore banks outperformed UK and Australian banks across all key measures over the past three years (Table 1 and Table 2), achieving annual average growth of 7% in top line income and 14% in profit. In contrast, UK[1] and Australian banks top line income declined in real terms and it is difficult to see where future growth will come from given saturated domestic markets and limited franchise investments overseas.

Bank expansions into offshore markets are challenging. Odds are stacked against foreign entrants from local domestic competition, and gaining access to local deposits can be painstakingly slow. Nonetheless, we observe the Singapore 'small island' syndrome works - Singapore banks persevered with sustained investments in overseas franchises and saw 22% per annum growth in their Hong Kong and China operations (refer to page 9), albeit traction is proving much more difficult in the 'growth' markets of South and South East Asia.

From a cost perspective, continued productivity and digitalisation efforts have seen Singapore banks be the most competitive amongst the three markets, which has helped deliver strong Return on Equity (ROE) despite having the lowest interest margins. Other factors supporting Singapore banks future growth momentum include:

- capacity for continued lending growth from a strong domestic deposit funding base and organic capital generation driven by low dividend payout ratios; and
- less pronounced impact of upcoming Basel reforms on capital requirements compared to the UK and Australian banks, given Singapore's existing conservative regulatory settings for risk exposures, and in particular for market risk.

Table 1: Profit & Loss and Returns - three year trend

	Singapore		Australia		UK	
Annual income CAGR[2]	+7%	▲	-1%	▼	+1%	▲
Profit CAGR	+14%	▲	-2%	▼	(large)	▲
Return on Equity	12.5% (+3 p.p.[3])	▲	11.2% (-1.9 p.p.)	▼	10.7% (+17 p.p.)	▲
Net Interest Margin	1.8% (+15 bps[4])	▲	2% (-8 bps)	▼	2.6% (-17 bps)	▼
Cost-to-Income	42% (-1 p.p.)	▼	46% (+2 p.p.)	▲	57% (-12 p.p.)	▼

[1]UK annual top line growth of 1% in the past three years was lower than UK inflation of approximately 2% per annum, realising a net decline in real terms
[2]Represents cumulative annual growth rate
[3]Represents percentage points
[4]Represents basis points

Table 2: Balance sheet metrics

	Singapore	Australia	UK
Lending asset growth (3 year CAGR)	+5.9% ▲	+3.7% ▲	-0.4% ▼
Provision coverage	1.3%	0.6%	1.3%
Loan to Deposit	91%	131%	94%
Capital (Tier 1) ratio	14%	11%	15%
Dividend pay-out ratio	45%	93%	52%

Our reflections

Aside from the seemingly stellar performance of the Singapore banks, six reflections emerged from our analysis of trends over the past three years:

Is erosion of public trust the largest downside risk? We saw the UK banks recover from a lengthy and costly period of litigation and customer remediation as they seek to repair public trust. Over the last three years, this has cost **£16b**, representing approximately 10% of UK banks' annual income. Interestingly, these costs were also higher than the **£12b** expensed on bad loan write-offs and credit impairment provisions during this period. Australian banks appear to be at an earlier stage in the trust repair journey following the Royal Commission into banking, with a combined cost already at **A$6.5b**. Our takeaway is that the cost of 'repairing trust' can exceed credit costs for several years in markets where banks have lost customer trust and then had to rebuild.

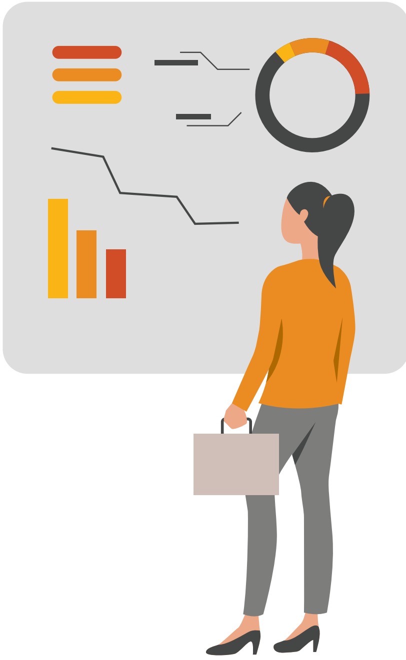
Clearer differences in where banks play. At a macro level, we see the UK banks prioritising retail and trading businesses, Australian banks focusing on retail and Singapore banks targeting business lending. In Australia and UK, two out of every three dollars lent is to retail customers (housing and personal loans and credit cards), as low interest rates have spurned household borrowing whilst businesses borrowed less in light of economic uncertainty. In contrast, retail represents only a third of total lending for Singapore banks whilst two thirds is to businesses, reflecting business lending being the leading product for expansion in growing overseas markets.

Singapore banks have greater exposure to industry sector cycles than UK and Australian banks. The increased weighting of Singapore banks lending to businesses suggests they are more susceptible to specific industry cycles. We saw this in the past few years where the shipping industry downturn led to Singapore banks Non-Performing Loans (NPLs) to the transportation, storage and communications sector reaching circa 9% of sector loans (refer to page 17). Looking ahead, we see the currently benign building and construction sector as the one to watch. Singapore banks business lending to this sector has grown **11%** annually over the past three years, doubling overall lending growth and now represents **24%** of total lending.

Retail credit growth reaching capacity. Over the last three years, low interest rates fuelled retail lending in all three markets, with lending significantly exceeding domestic GDP growth in Australia and Singapore. However, this trend is unlikely to continue as the domestic major banks are at a 'saturation point' in their home markets, in terms of market share and household borrowing capacity.

Are we overly pessimistic? Broad credit downside risks and the impact of new digital disruptors appear overdone (so far). Despite worsening economic sentiment and declining GDP growth forecasts over the past three years, NPLs as a ratio of lending assets in all three economies remained broadly flat. We saw banking margins decline in the UK and in Australia, but these were mainly driven by higher competition from regulatory 'ring fencing' and lower interest rates, respectively, rather than any material impact from new disruptors.

Banks are 'self-disrupting'. Banks in all three markets embraced technology and new ways of working including offshoring to continue the drive to increase productivity and bring down cost-to-income ratios (excluding litigation and customer remediation).



> "The cost of 'repairing trust' can exceed credit costs for several years in markets where banks have lost customer trust and then had to rebuild."

Banana skins for Singapore banks going forward

Looking to the past as a predictor of the future has its flaws. As an exercise to stretch minds and identify relative trends, we leveraged our historical analysis to consider the following four 'What if?' scenarios based on our analysis and conversations with industry participants (refer to page 25):

Scenario 1: Interest rates go to zero in mature markets.

Scenario 2: Tariffs and economic downside risks eventuate in a Greater China building and construction industry downturn.

Scenario 3: Singapore banks face the 'trust deficit' with customers that the UK and Australian banks experienced (this is a Singapore banks specific scenario).

Scenario 4: Digital banks capture 20% of domestic retail market share.

A summary of the illustrative impacts are set out in Table 3. At a headline level, we observe:

- UK banks are already facing a lower interest rate environment relative to Australia and Singapore, and are less impacted if all rates fall to zero.
- Amongst the four scenarios, Singapore banks are more exposed (relative to the Australian and UK banks) to a Greater China building and construction cycle downturn.
- The impact of a customer trust deficit is arguably more severe to Singapore banks than lower interest rates or digital bank new entrants.
- Australian banks, being heavily reliant on retail deposits and lending, are the most vulnerable to a loss in market share from digital entrants.

Table 3: Illustrative impact of risk scenarios on annual ROE and profit

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Singapore banks	-13%	-37%	-18%	-16%
Australian banks	-13%	-10%	N/A	-26%
UK banks	-2%	-	N/A	-24%

What can Singapore banks do to mitigate downside risks?

Scenario 1: Zero interest rates. There is unfortunately limited ammunition available for banks against this scenario. Banks may be able to delay or prolong the impact to earnings of declining rates through interest rate hedging. Of course like any hedging strategy, there is downside in giving up any gains if interest rates rise.

Scenario 2: Greater China building and construction cycle downturn. Credit cycles are notoriously difficult to pick – it is easy to continue lending to industries that look benign from a credit risk point of view – until they are not. We see value in continued stress of severe economic shocks at an industry and country level, so boards and executive management teams can see and assess big picture concentration risks and compare these periodically against appetite.

Scenario 3: Customer trust deficit. We all suffer from 'past conditioning' – ingrained habits are difficult to break. For banks, credit risk is bread and butter and is deeply rooted in organisational systems, policies, structures and mind sets. We believe it is worth challenging whether sufficient management time and organisational risk frameworks are invested in 'Non-Financial' or 'Non-Traditional' risks, including conduct and reputational risks versus traditional credit and market risks.

Scenario 4: New digital entrants capture market share. Like the old adage – 'that which does not kill you, makes you stronger' – we believe competition from digital entrants is healthy for the banking system as a whole. Traditional banks have the upper hand with existing market share – the question is can they continue to 'self-disrupt' harder and faster by truly putting customers at the heart when designing products and services, and relentlessly pursuing lower costs to serve through digitalisation. We have set out more detailed analysis on digital banking in Singapore – visit our Digital Banking microsite for more information pwc.com/sg/digitalbanking.

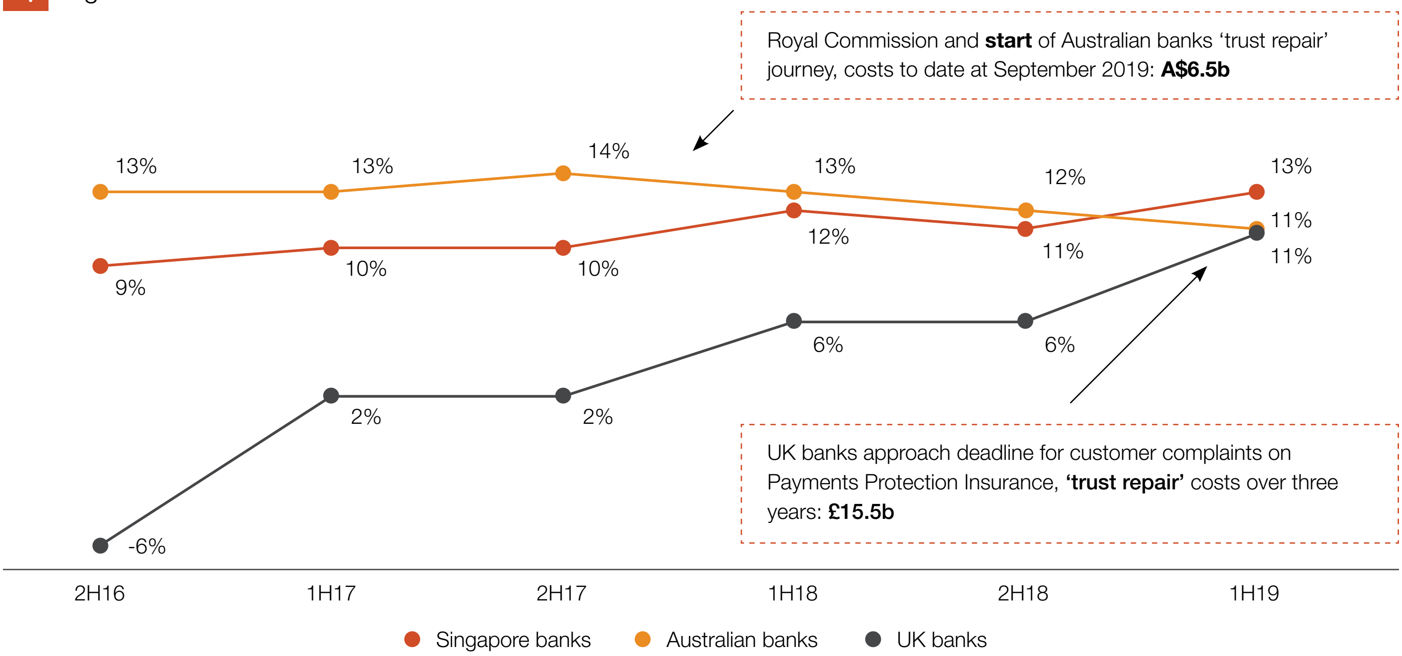
Performance analysis: Profit & Loss and Returns

Profit and ROE

Singapore banks were able to increase Profit and ROE steadily despite a mature local economy through growth in overseas markets, particularly Hong Kong and China. UK and Australian banks profitability was impacted by reduced opportunities for growth and in incurring significant costs associated with repairing customer trust.

	Singapore	Australia	UK
Profit 3 yr CAGR	S$8b +14% ▲	A$13.6b -2% ▼	£7.1b (Large) ▲
ROE 3 yr Δ	12.5% (+3 p.p.) ▲	11.2% (-1.9 p.p.) ▼	10.7% (+17 p.p.) ▲

Figure 1: Banks historical ROE



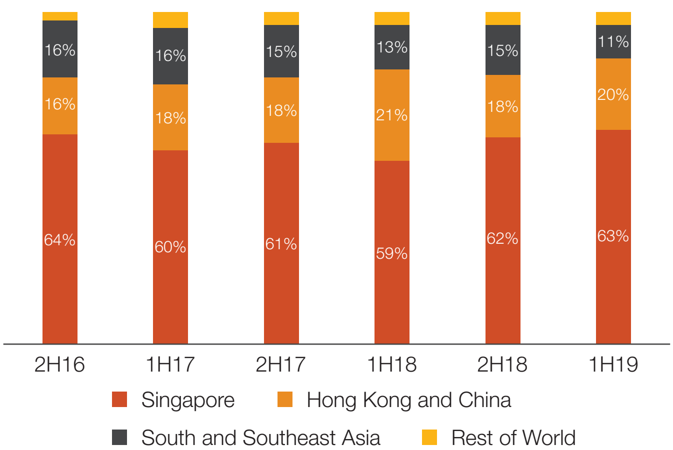
Singapore banks profits by region

Singapore banks profits grew by **12%** annually in Singapore over the last three years despite a relatively flat economy (1.6% p.a.[5] GDP growth). Disciplined cost management, rising interest rates, strong trading and domestic corporates benefiting from Asia growth were key contributors.

Singapore banks profit growth from Hong Kong and China has been **22%p.a.** over the last three years. Profits from South and South East Asia remained flat, reflecting credit growth challenges and higher NPLs in the region (see Figure 2).

[5]Represents per annum

Figure 2: Singapore banks profits* by region



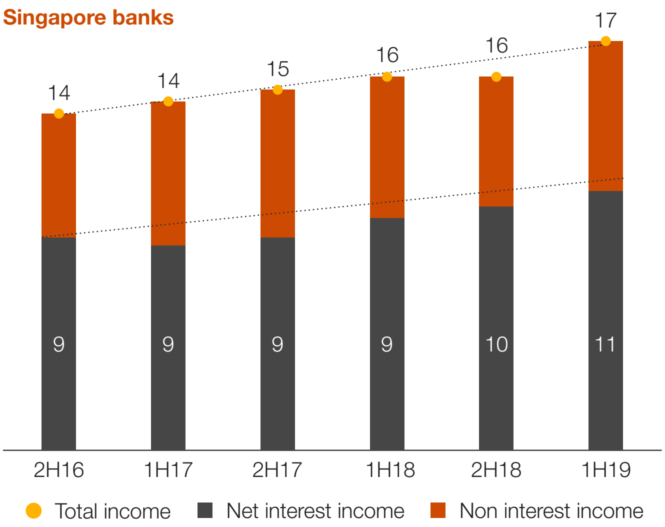
*profit excludes one off items. In calculating regional profit splits we used profit before tax

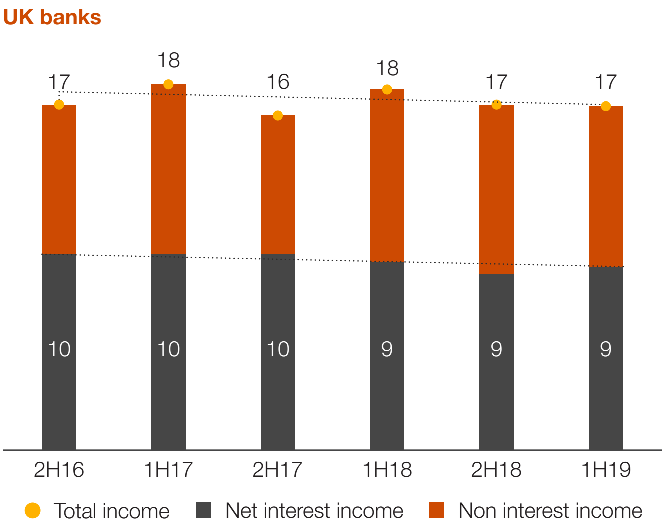
Total income and net interest income

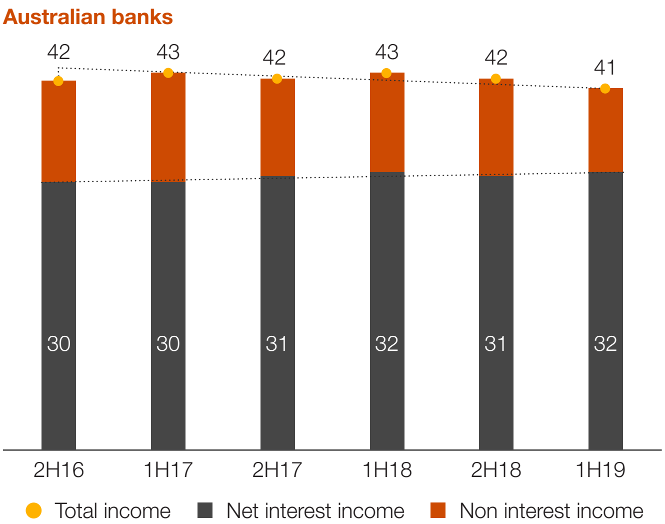
Income remained flat to declining for Australian and UK banks, reflecting limited growth potential outside of 'saturated' home markets, and as decisions were taken to reduce or exit certain businesses. **In contrast, Singapore banks demonstrated top-line annual income growth of 7%** (see Figure 3).

	Singapore	Australia	UK
Annual income 3 yr CAGR	+7% ▲	-1% ▼	+1% ▲
Annual net interest income 3 yr CAGR	+7.5% ▲	+2% ▲	-2% ▼

Figure 3: Banks income breakdown (local currency billion)







Net Interest Margin

Singapore banks consistently delivered stronger Net Interest Margin (NIM) as SIBOR rose, going against the tide of UK and Australian banks.

	Singapore	Australia	UK
Net Interest Margin	1.8% (+15bps) ▲	2% (-8bps) ▼	2.6% (-17bps) ▼

What is NIM?

Net interest income earned on each dollar lent by the bank.

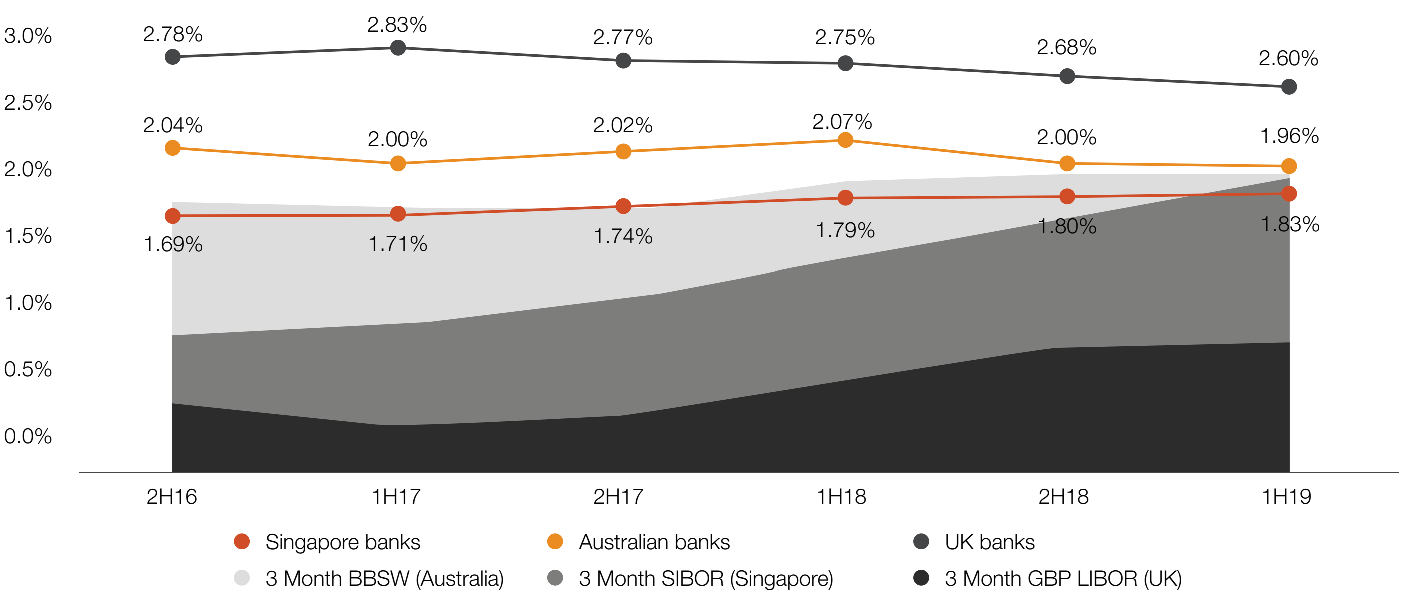
$$NIM = \frac{\text{Interest income - Interest expense}}{\text{Average Interest Earning Assets}}$$

Singapore banks have the lowest NIM amongst the three developed markets, reflecting strong domestic competition. In recent years, Singapore banks benefitted from higher domestic interest rates and maintained margin whilst gaining market share overseas. We observed a **100 bps** increase in 3 month SIBOR which corresponded to a **15 bps** increase in NIM (see Figure 4).

UK banks showed significant decline in interest margin. Coming off a high base, UK banks faced increasing competition as a result of new rules for lenders to "ring-fence" their retail operations and from digital channels, as well as a shift in mix towards lower margin secured lending as Brexit approaches.

Australian banks NIM declined marginally over the past three years as banks' lending mix shifted away from higher-margin 'interest only' loans. The decline in the NIM in 2H18 and 1H19 has been primarily due to higher wholesale funding costs and impacts flowing from the Royal Commission.

Figure 4: NIM and benchmark interest rate trend



Non interest income

Non interest income comprises mainly of trading and fees and commission income. The UK is increasingly reliant on trading income which represents approximately 20% of total income. Australian banks non interest income reliance is less as the banks start to exit their wealth management businesses (see Figure 5).

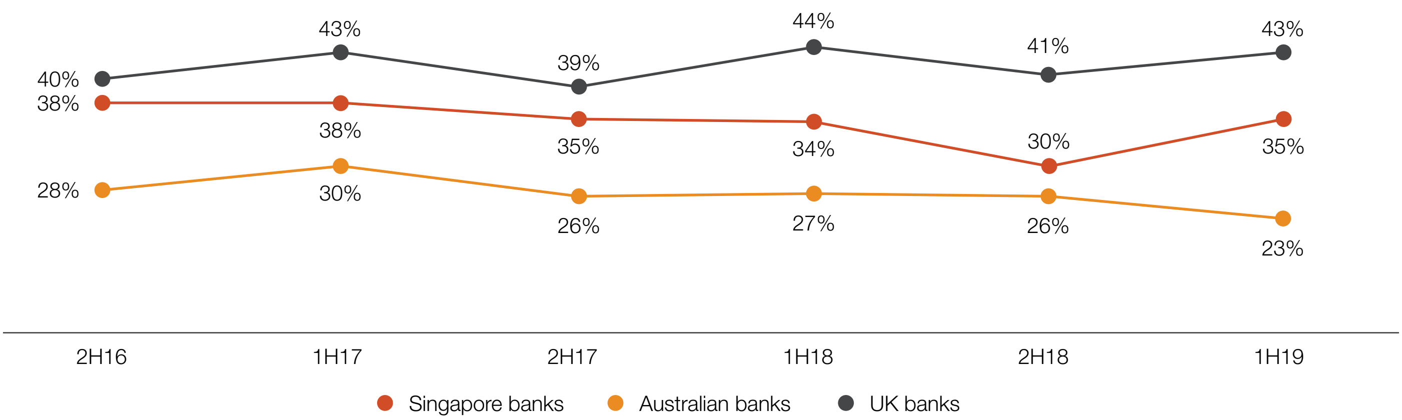
	Singapore	Australia	UK
Non interest income 3 yr CAGR	+4% ▲	-7% ▼	+3% ▲

Singapore banks non-interest income growth was primarily due to higher trading income while fees and commission income remained relatively stable.

Australian banks saw a decrease in non-interest income as fees income reduced through sale or reduced activity in Wealth Management following the Royal Commission. Banking fees are also down due to a slowdown in lending growth.

UK banks net fees and commission income remained largely stable in line with flat lending. Trading income has been volatile, although trended up over the last three years.

Figure 5: Non interest income as a proportion of total income



Expenses

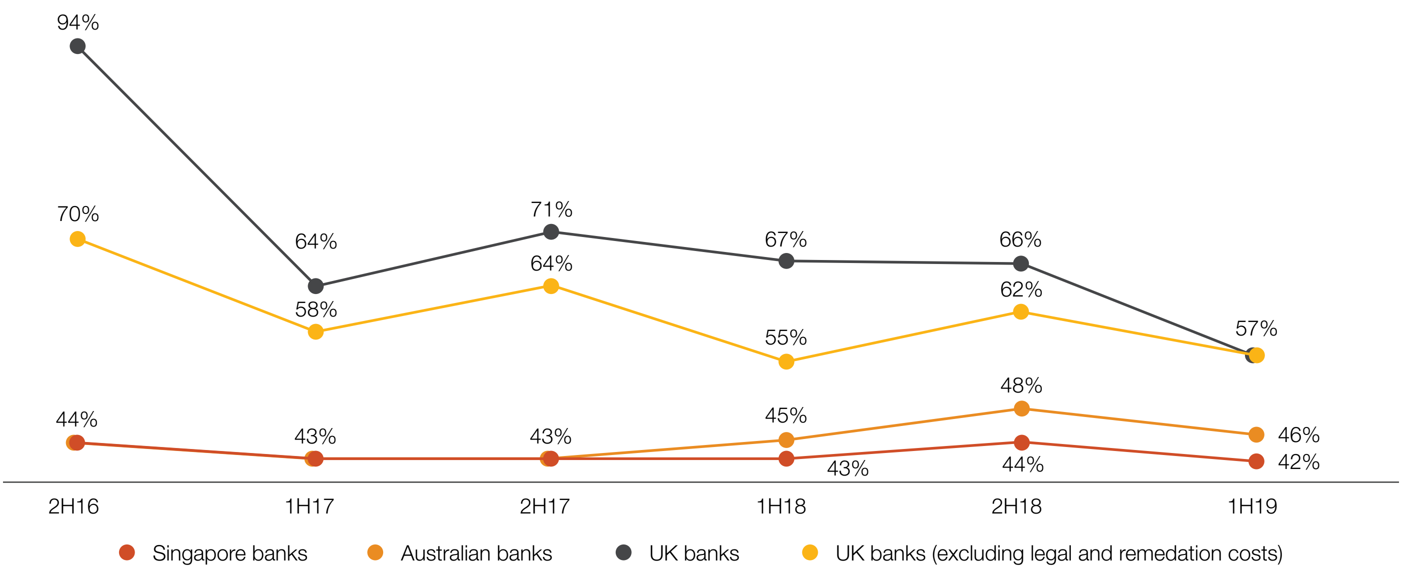
Singapore banks demonstrated disciplined cost management whilst the cost of rebuilding customer trust and maintaining higher compliance costs impacted UK and Australian banks.

	Singapore		Australia		UK	
Expenses 3 yr CAGR	S$7b +6%	▲	A$19b +1%	▲	£15b -14%	▼
Cost-to-income ratio 3 yr Δ	42% (-1 p.p.)	▼	46% (+2 p.p.)	▲	57% (-12 p.p.)	▼

Singapore banks cost-to-income ratio historically tracked Australian banks. However, over the last year, we have seen higher costs in Australia flowing from customer remediation costs and provisions, whilst Singapore banks are beginning to reap the benefits of earlier efforts in digitalisation.

UK banks improved cost-to-income ratios from a high historical base reflecting an end to a period of high legal and remediation expenses to restore consumer trust (see Figure 6).

Figure 6: Cost-to-income ratio

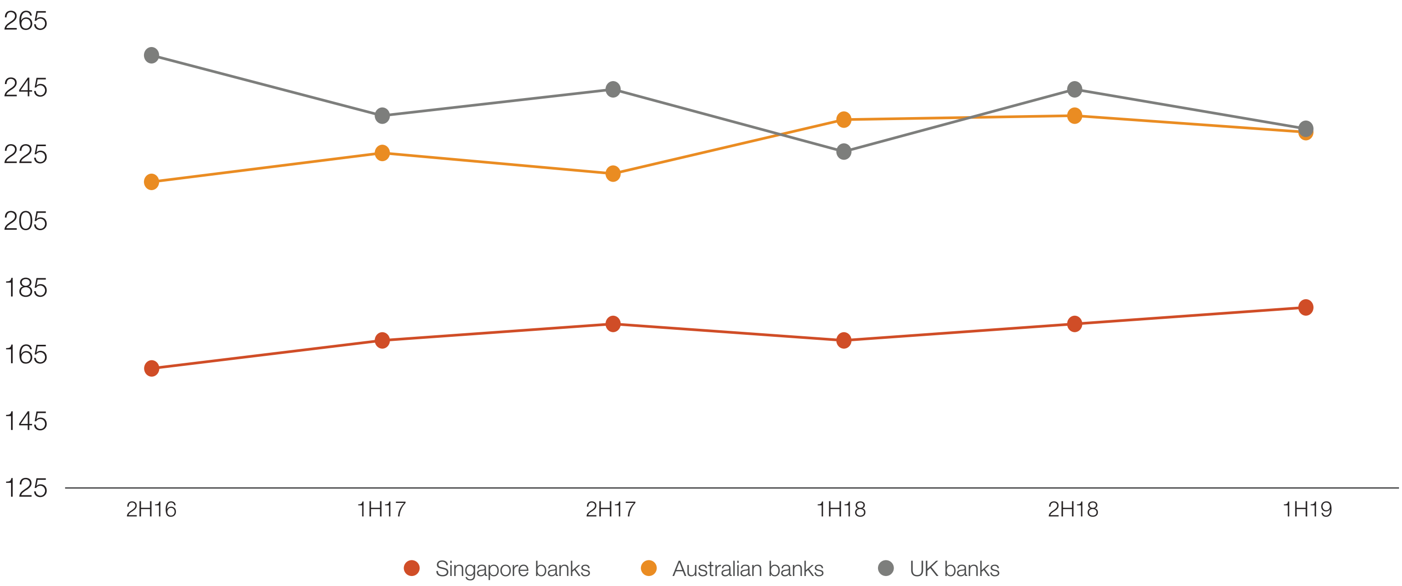


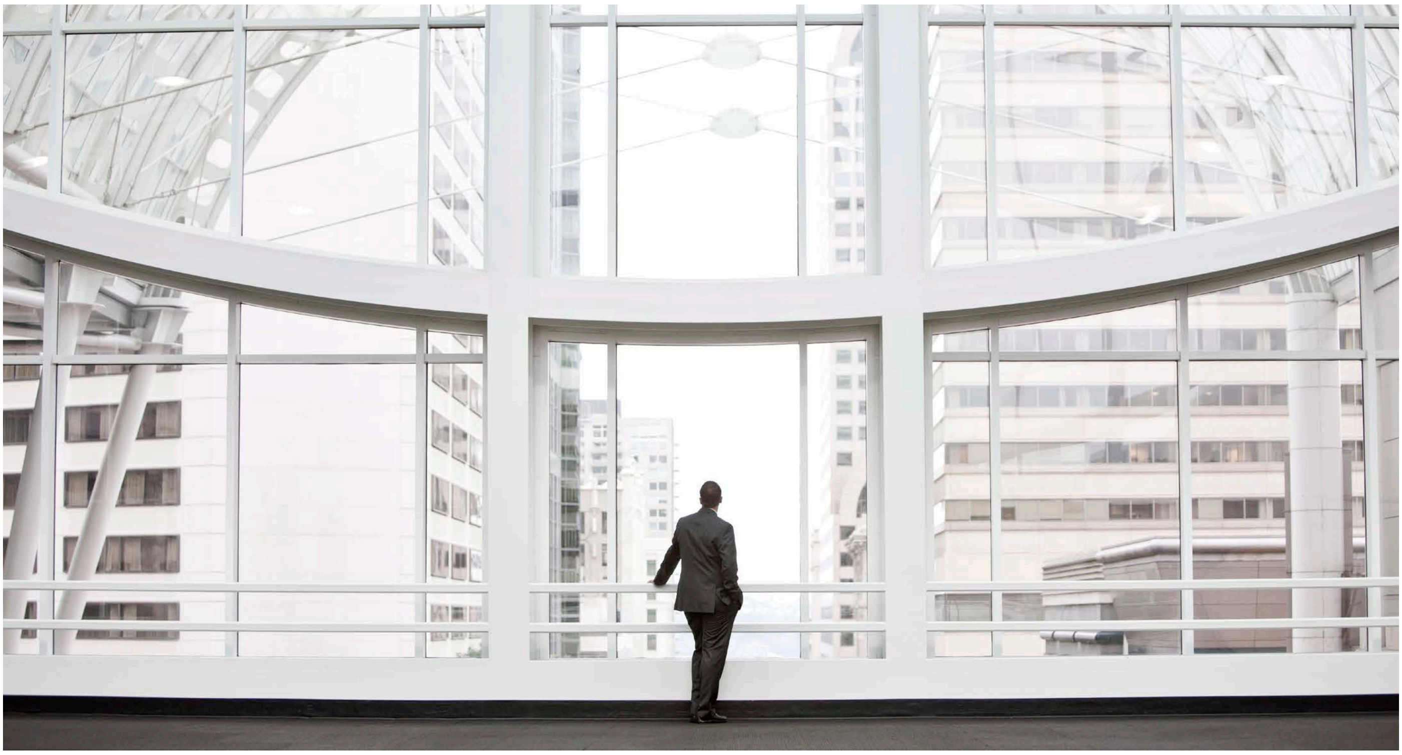
Total expenses per employee

The majority of bank expenses are employee related.

As a rough measure of productivity, total expenses (excluding remediation and impairment costs) per employee shows Singapore banks have the lowest total expenses per employee. The push for productivity has seen a greater shift in UK through measures including offshoring to bring expenses down.

Figure 7: Annualised cost (excluding remediation and impairment costs) per employee (S$'000)





Performance analysis: Balance sheet

Lending assets

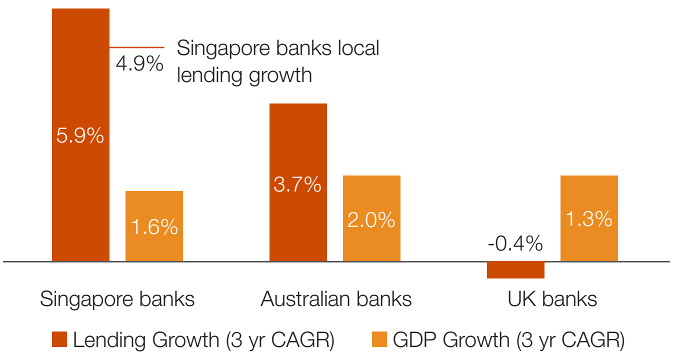
Lending asset growth for Singapore banks exceeded that of UK and Australian banks through their overseas lending, particularly in Hong Kong and China. We see Singapore banks as increasingly 'business lenders' and Australian and UK banks as 'retail lenders'.

	Singapore	Australia	UK
Lending assets 3 yr CAGR	+5.9% ▲	+3.7% ▲	-0.4% ▼

Australian banks credit growth has been almost entirely domestic and exceeded GDP growth significantly, but now face constraints on the ability of the Australian consumer to further increase leverage. The Australian banks credit growth did lag domestic system growth over the last year, reflecting higher market penetration of non-majors and non-bank lenders.

UK banks credit growth has been below GDP growth, reflecting a withdrawal from overseas operations (see Figure 8).

Figure 8: Lending growth vs GDP growth

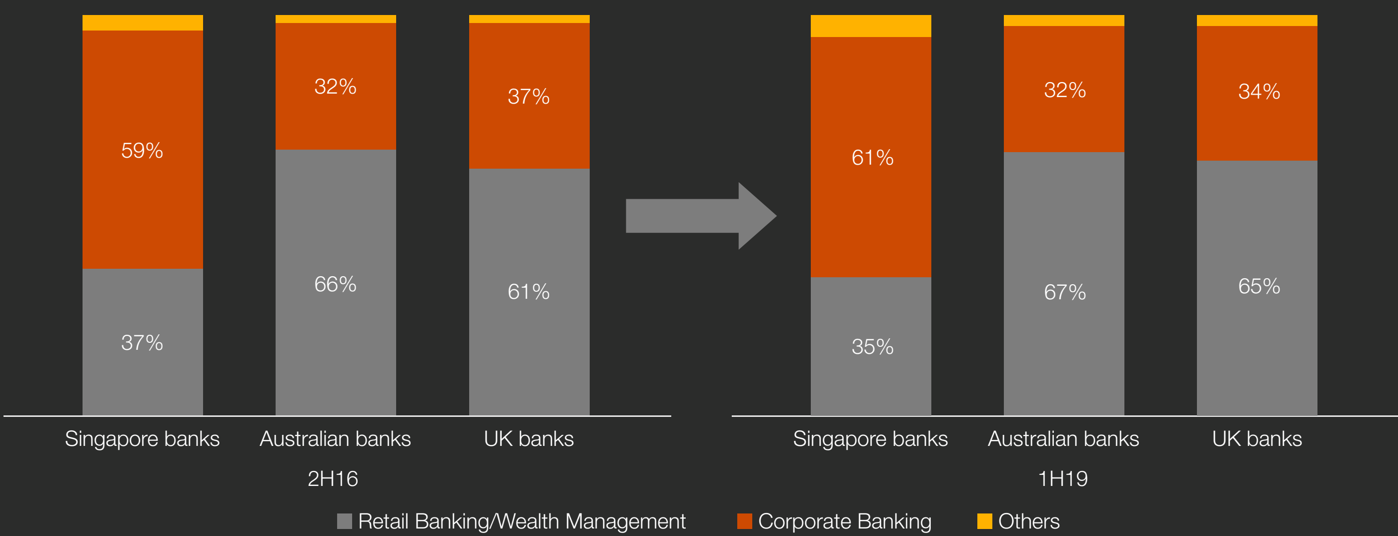


Lending exposures by business unit

Business lending of Singapore banks has continued to increase, now representing almost two thirds of each dollar lent, as they (and their corporate clients) capitalise on growth across Asia. From a balance sheet perspective, retail banking growth has been 'capped' to an extent with tighter lending regulations in Singapore.

In contrast, loans to businesses contributed just 34% of UK lending, and 32% of Australian lending. The 'swing to retail' in the UK and Australia reflects three factors: inflationary pressures on household leverage, a lower propensity for businesses to borrow given economic uncertainty, and lower appetite from banks given higher capital requirements (see Figure 9).

Figure 9: Lending exposures by business unit



Singapore banks lending exposure by industry

The largest lending sectors for Singapore banks are residential housing loans (24%) and building and construction (23%).

Lower interest rates have had a noticeable impact on the increase in the overall exposure of Singapore banks to the building and construction industry. In contrast, housing loans have remained stable reflecting high existing borrowing capacity and local regulatory property cooling measures.

We see a significant difference in NPL ratio by segment, with a NPL ratio of 9.1% for transportation, storage and communication lending, as compared to building and construction of 0.6%. This is a function of the credit cycles for the two industries; and it is possible for these ratios to reverse in the future (see Figures 10 and 11).

Figure 10: Singapore banks loan portfolio by industry

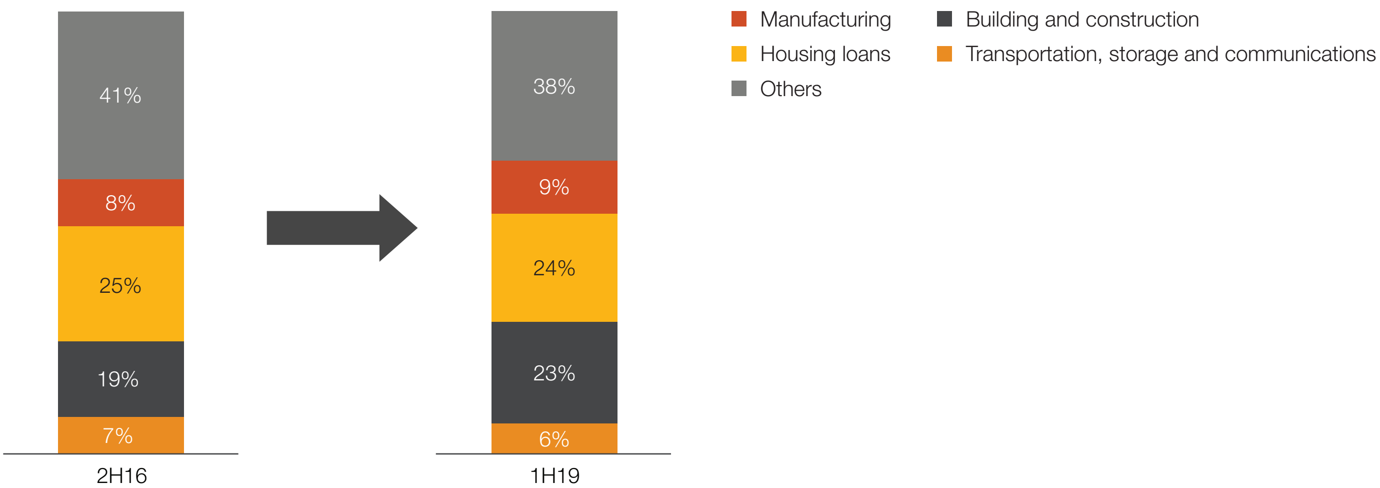
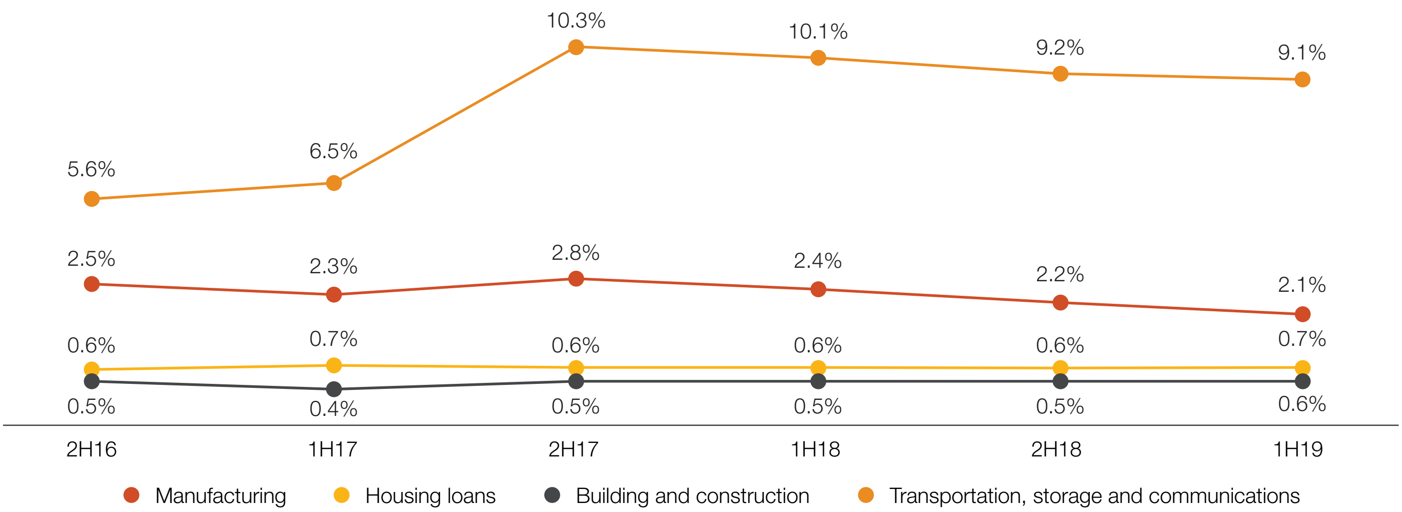


Figure 11: Singapore banks NPL ratio by industry



Singapore banks lending exposure by region

As at 1H19, 47% of customer loans originate from Singapore, 24% of loans originate from Hong Kong and China and 9% are from major South and South East Asian nations.

South and South East Asia contributed the highest rate of default at 3.2%. Despite the uncertainty of the trade conflict between United States and China, the rate of default has remained stable at 0.6% for loans to Hong Kong and China (see Figures 12, 13 and 14).

Figure 12: Singapore banks lending exposure by region

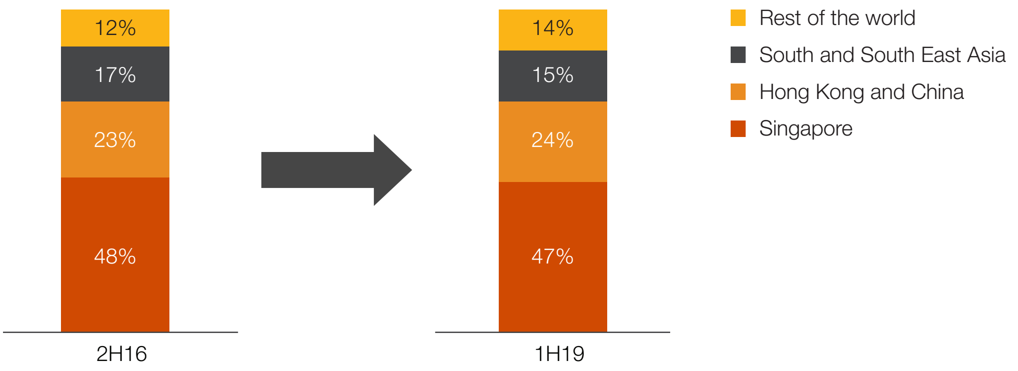


Figure 13: Singapore banks lending growth by region (3 yr CAGR)

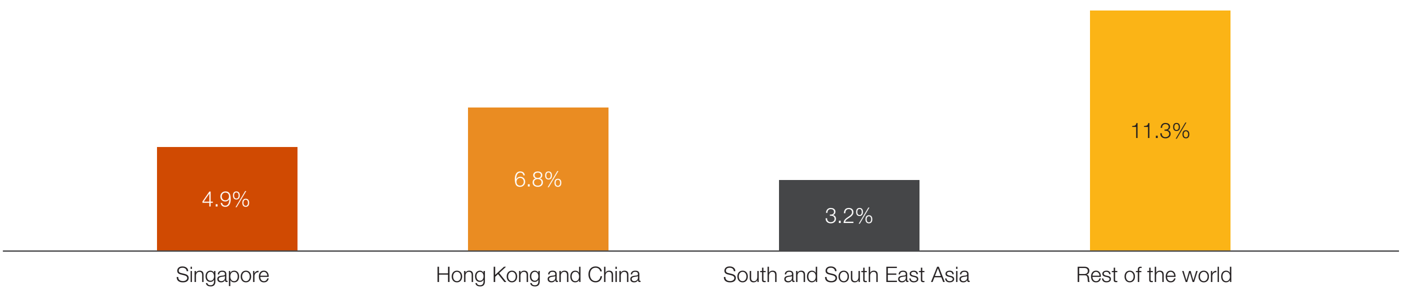
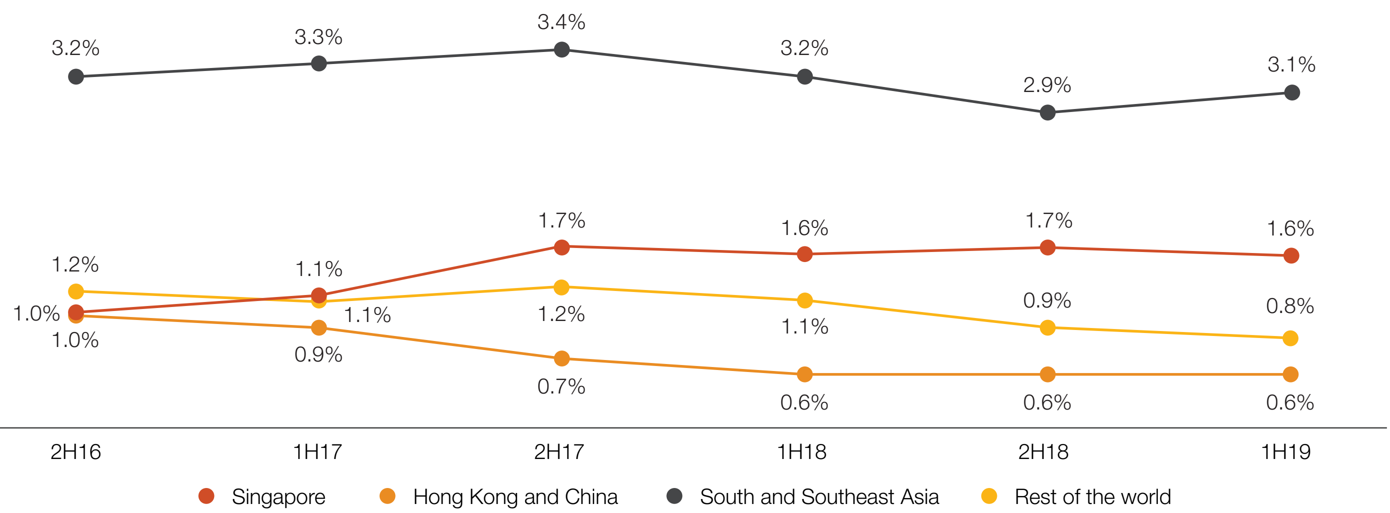


Figure 14: Singapore banks NPL ratio by region



Asset quality

Provision coverage ratios across the three markets have been steady to declining despite worsening global economic outlook and uncertainty. Is this reflective of the world being overly pessimistic, or have we just not seen the downturn (yet)?

What is 'Provision Coverage'?

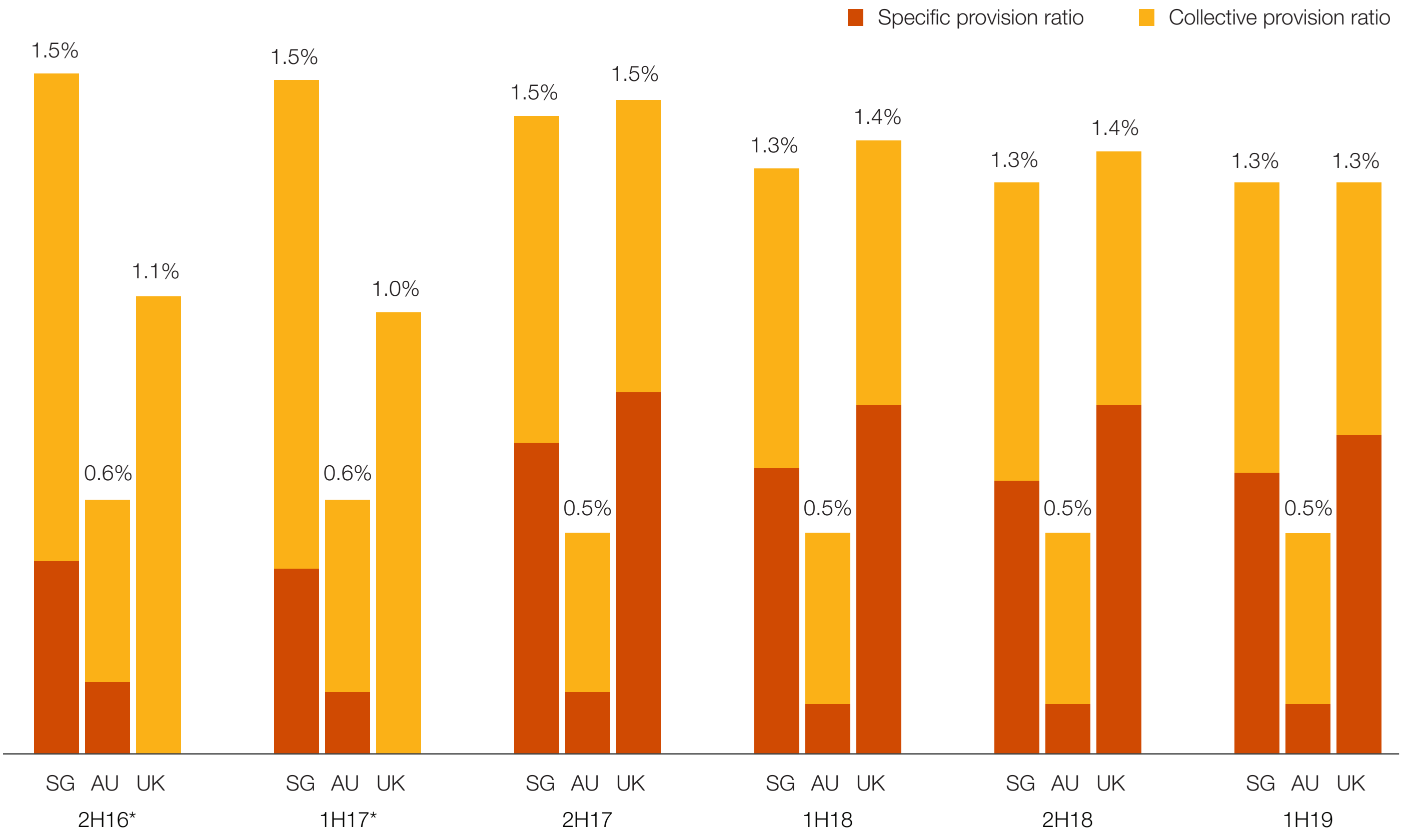
Provision coverage reflects the amount of provision set aside by banks, per dollar of lending asset, for specific bad loans and collectively for good loans.

	Singapore	Australia	UK
Provision coverage	1.3%	0.6%	1.3%

Australian banks provisions increased following the transition to IFRS 9, as well as through the underlying deterioration in housing credit (increase in loans 90 days past due). As Australian banks have a primary exposure to housing loans secured by underlying property, the overall provision coverage levels nonetheless remain low.

UK banks provisions have declined, reflecting the benign environment relative to three years ago. Provisions for credit cards dominate the current provision make up (see Figure 15).

Figure 15: Provision coverage

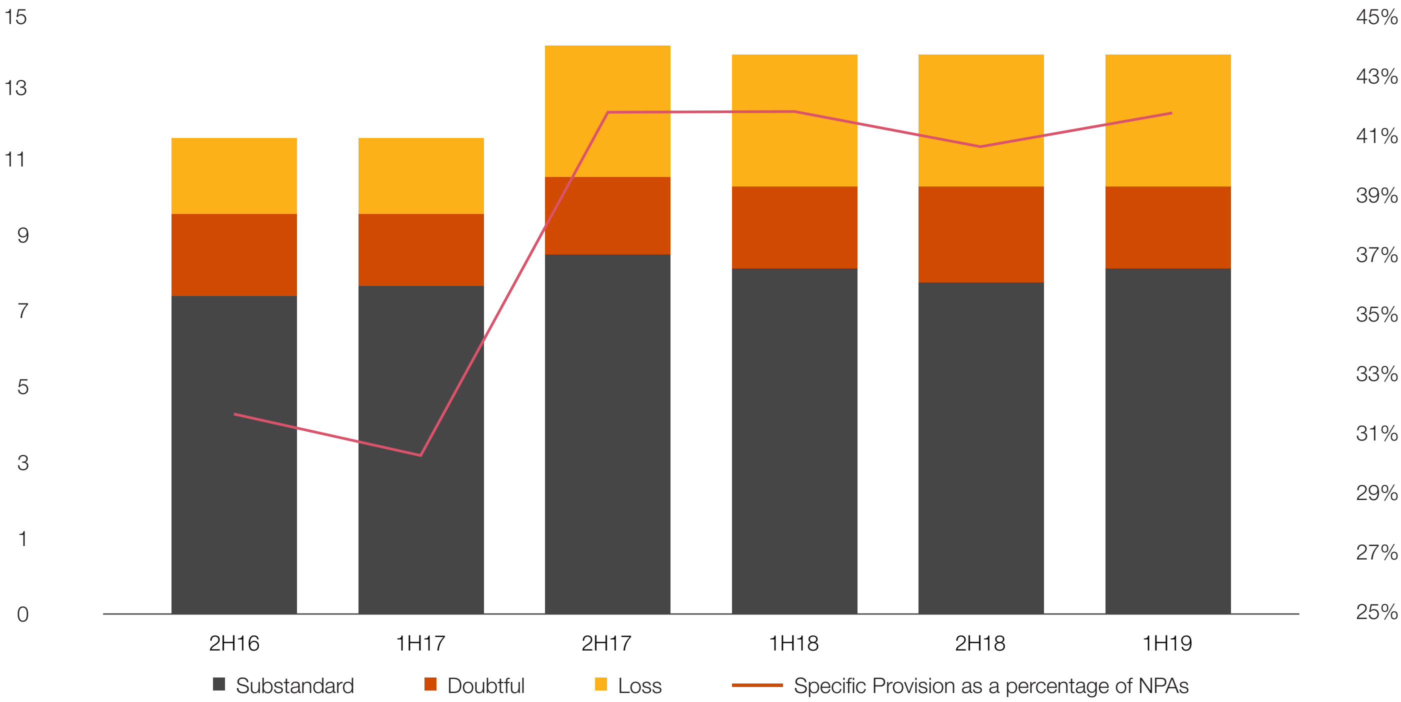


*We have shown total provision for 2H16 and 1H17 rather than a split of collective and specific provisions for UK banks given data limitations.

Singapore banks non-performing assets (NPAs)

Singapore banks NPAs have been steady since 2H17 despite a growing lending book. Specific provisions now reflect about 40% coverage of NPAs.

Figure 16: Singapore banks NPAs vs Specific Provisions (S$b)



Funding

Singapore banks and UK banks have more than enough deposit funding to support continued lending growth. In comparison, we see limited domestic deposit availability and a lack of an overseas franchise as key 'handbrakes' for further Australian banks asset growth.

What is the Loan to Deposit (L/D) ratio?

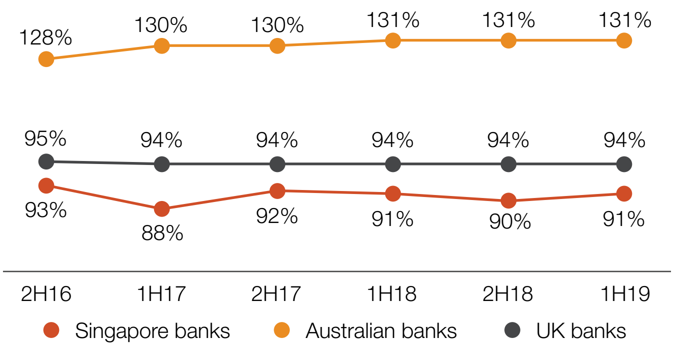
The L/D ratio captures how much deposit funding is available for each dollar lent. A high ratio (over 100%) indicates lending requires other forms of more expensive and potentially less stable funding.

	Singapore	Australia	UK
Loan to Deposit ratio 3 yr Δ	91% -2bps ▼	131% +3bps ▲	94% -1bps ▼

Australian banks have had a lower domestic deposit base relative to lending, reflecting high household borrowing leverage in Australia. The Australian L/D ratio has worsened slightly.

The current ratios reflect more pressure on new lending growth as this will likely need to be funded from wholesale lending.

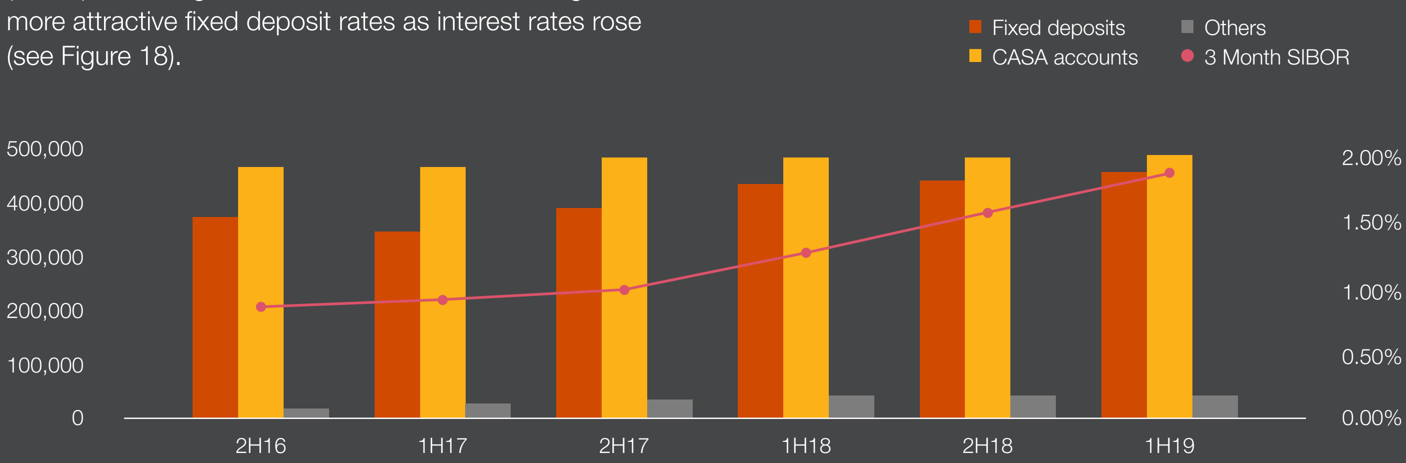
Figure 17: L/D ratio



Singapore banks deposit breakdown

Fixed deposits formed 45% of all deposits in 2019 and grew faster than Current Account Savings Account (CASA), reflecting customer behaviour in switching to more attractive fixed deposit rates as interest rates rose (see Figure 18).

Figure 18: Singapore banks deposits breakdown by product (S$m)



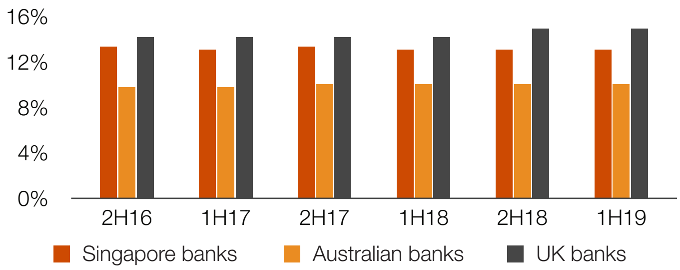
Capital

	Singapore	Australia	UK
Capital (Tier 1) ratio	14%	11%	15%
Dividend pay-out ratio	45%	93%	52%

Capital ratio

Singapore banks maintain comparatively strong capital ratios (14%) compared to Australian banks (11%) and are within range of the UK banks (15%), though local regulatory differences in capital requirements do mean that this is not a clean 'apples to apples' comparison. Overall, capital ratios remained stable (see Figure 19).

Figure 19: Capital (CET 1) ratio by country

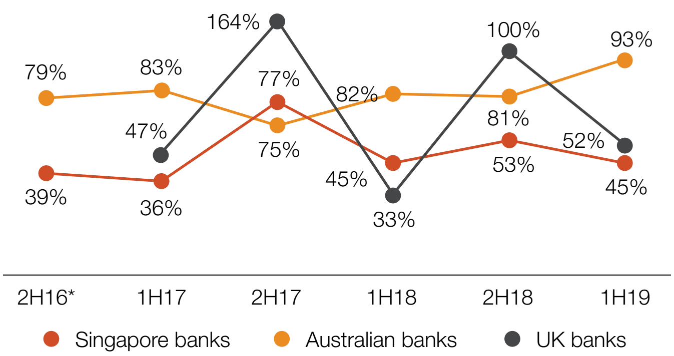


Dividend pay-out ratio

Whilst capital ratios are steady, dividend payout ratios were broadly reflective of earnings volatility in each region - UK banks being most volatile and Australian banks being the least.

Australian banks payout ratios are trending up, reflecting limited potential for growth and possible changes to future dividend pay-out rates. In contrast, Singapore banks pay-out ratios are low, suggesting strong confidence in lending growth, and possible increased dividend potential going forward (see Figure 20).

Figure 20: Dividend pay-out ratio by country

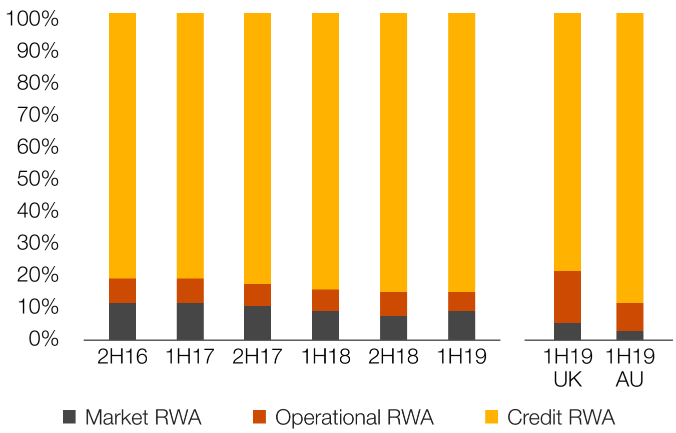


*2H16 dividend pay-out ratio of UK banks was negative

Risk Weighted Assets (RWA) composition

A closer look at RWA suggested some evidence of de-risking in Singapore banks in light of the increased uncertain economic outlook in recent years. We see a general reduction in market RWA for Singapore banks, suggesting a reduced appetite for market trading activities relative to lending (see Figure 21).

Figure 21: Singapore RWA composition and UK & Australian RWA composition (1H19)



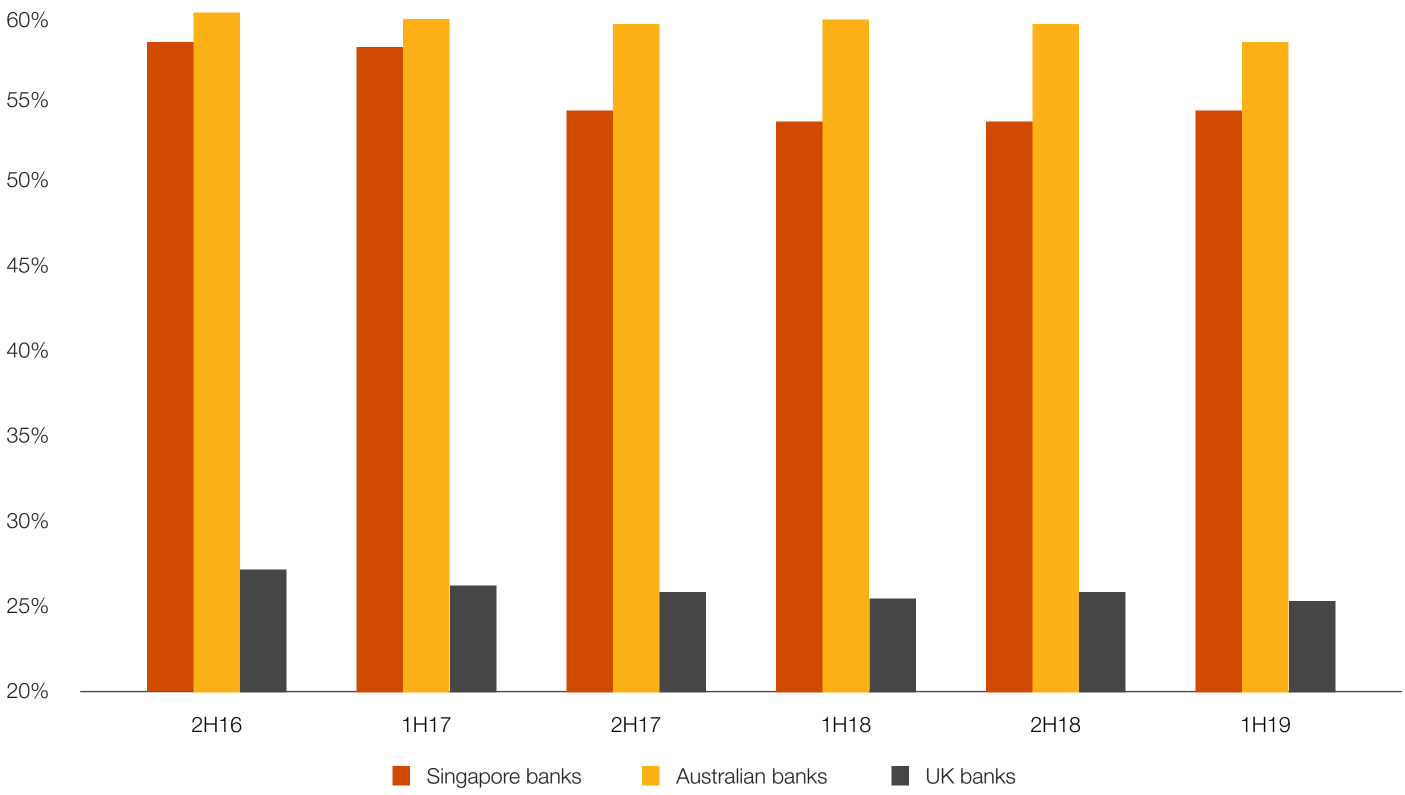
Capital density

We also observed that in all three markets, Total RWA to Total Assets (capital density) declined, indicating lower overall risk exposures.

As a whole, the markedly lower capital risk weight of UK banks reflect the use of more advanced internal capital risk models, particularly for market risk.

We expect these capital risk measures to converge more closely across jurisdictions with the implementation of standardised output floors with the upcoming Basel IV changes (see Figure 22).

Figure 22: Total RWA to total assets by country (capital density)



The road ahead: Risk scenarios

Risk scenarios

We have set out simplified assumptions underpinning four 'What if?' scenarios to illustrate the relative downside risks across the major banks.

Scenario 1: Interest rates drop to zero

Singapore banks and Australian banks performance is more susceptible to zero rates, whilst the UK banks are less so as UK base interest rates are already very low.

In broad terms, a drop in interest rates reduces banking profitability and NIM because banks benefit less from cheaper funding on current accounts (close to zero % interest payable to deposit-holders), and from shareholder capital. This impact is offset to an extent with higher lending volumes as borrowing rates are more attractive to customers.

Our analysis suggests:

- Singapore banks NIM has been more sensitive to changes in base interest rates than Australia and UK
- Australia has the highest reliance on interest income (interest income reflects 72% of total income versus 52% of UK banks)
- UK benchmark interest rates are already at 0.8% - 'closer to zero' than Australia and Singapore at approximately 2% (as of 30 June 2019).

From a lending perspective, we believe growth from lower interest rates will be more muted in Australia due to the constraints on deposit funding and market saturation. We see this similarly for UK where the full benefit of lending growth is restricted by UK ring-fencing regulations.

Assumptions

	Singapore	Australia	UK
NIM change	1.83% → 1.53%	2% → 1.8%	2.6% → 2.5%
Lending asset growth	6%	2%	3%

Illustrative outcome based on assumptions

	Singapore	Australia	UK
Income	-7%	-6%	-1%
ROE and profit	-13%	-13%	-2%

Scenario 2: Prolonged trade tariffs lead to a Greater China building and construction industry cycle downturn

Singapore banks higher exposure to business lending means they are comparatively more vulnerable to sector specific credit downturns than UK and Australian banks.

The impact of a prolonged trade war with a negative impact on China will have a significant impact on business lending, in particular with exposures to Hong Kong and China.

We assumed the NPL ratios of Singapore banks increases to 3%[6] of building and construction exposures given lending exposures in China, Hong Kong and South East Asia. We assumed Australia had a flow-on impact with NPLs also at 3%. We assumed no change to UK building NPL ratios.

For simplicity, we did not model the flow on impact to reduced lending business volume.

Assumptions

	Singapore	Australia	UK
NPL change for building and construction	0.6% → 3%	0.9% → 3%	N/A

Illustrative outcome based on assumptions

	Singapore	Australia	UK
Income	No impact	No impact	N/A
ROE and profit	-37%	-10%	N/A

[6]Note the NPL ratio for Singapore banks to the transportation and storage industry is currently 9% see page 16. We do not have a breakdown of Singapore banks' building and construction exposures by region. We assumed that a 6%-9% NPL of exposures in the Greater China region translates to 3% of total building and construction exposures.

Scenario 3: Singapore banks lose customer trust

Unsurprisingly, this scenario would have a significant bottom line impact for Singapore banks.

There is an argument that Singapore banks are less exposed to this issue due to smaller scale of retail lending and trading activities. However, corporate banking includes a large number of Small to Medium Enterprises across Asia that may lack financial sophistication. Singapore banks also have wealth management offerings which have been a conduct hotspot.

We assume under this scenario customer trust rebuild costs of 10% of total income, reflecting the UK annual experience over the past three years.

Assumptions

	Singapore
Customer remediation costs	0 → S$1.7b

Illustrative outcome based on assumptions

	Singapore
ROE and profit	-18%

Scenario 4: New digital entrants capture 20% of retail market share

As Singapore banks are less reliant on retail operations, the impact of new digital entrants would be significantly lower than the UK and Australia.

In all three domestic markets, we see the major domestic banks holding a substantial percentage of market share for retail lending.

We assumed across all three markets:

- a 20% drop in retail lending and deposit volumes;
- a 20 bps reduction in NIM due to higher funding costs and competition;
- 20% decline in fees and commissions income; and
- expenses reduced by 80% of the change in total income, to reflect that some fixed costs remain.

Assumptions

	Singapore	Australia	UK
NIM change	1.83% → 1.63%	2% → 1.8%	2.6% → 2.4%
Retail asset base change	-20%	-20%	-20%
Fee and commission income	-20%	-20%	-20%
Expenses change	-14%	-19%	-15%

Illustrative outcome based on assumptions

	Singapore	Australia	UK
Income	-14%	-19%	-15%
ROE and profit	-14%	-23%	-19%

Source data, assumptions and adjustments

Source data

This analysis is based primarily on published half year financial results, full year annual reports, and Pillar 3 risk reports for Singapore, Australian and UK banks from 2H16 to 1H19.

In analysing performance, we compared aggregate performance in each location for key balance sheet and income (return) metrics as outlined in this report for the past 3 years. We used the CAGR where applicable to show annualised returns.

GDP data has been obtained from the following sources:

- Singapore: www.singstat.gov
- Australia: www.rba.gov.au
- UK: www.ons.gov.uk

Benchmark interest rate data has been obtained from the following sources:

- Singapore (3 Month SIBOR): ABS Benchmarks Administration Co Pte Ltd
- Australia: Bloomberg
- UK: Bloomberg

Dividend pay-out ratio for UK and Australian banks were extracted from Bloomberg.

Assumptions and adjustments

Due to constraints in extracting certain publicly available information and lack of consistency of presentation of data across the banks and jurisdictions, we have made the following assumptions and adjustments to data in projecting/determining comparable information for our analysis:

Profit and ROE:

- Statutory profit instead of cash profits are used for Australian Banks for comparability.
- ‘Underlying basis’ financial results have been used for Lloyds as this is the only information available for half year results.
- Individual banks ROE were weighted on their equity base to calculate country banks ROE.

Non-interest income:

- For Singapore banks, OCBC Insurance Income has been excluded from the calculations and non-interest income split.
- For Australian and UK banks, any insurance income has been excluded in calculating the total non-interest income.

Expenses:

- Period end employee headcount data was used for calculation of the total expenses per employee.
- Total expenses per employee were calculated based on exchange rates as of 30 June 2019.

Capital:

- Individual banks dividend pay-out ratios were weighted on their net profit after tax to calculate country banks dividend pay-out ratio.

Overall analysis – Risk scenario analysis

We estimated Australian banks NPL ratios by industry type for 1H19 based on data obtained from 2018 Annual Reports.

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