AMRO Annual Consultation Report

Singapore - 2018

The ASEAN+3 Macroeconomic Research Office (AMRO)

April 2019

Acknowledgements

1. This Annual Consultation Report on Singapore has been prepared in accordance with the functions of AMRO to monitor, assess and report its members' macroeconomic status and financial soundness and to identify relevant risks and vulnerabilities, and assist them in the timely formulation of policy recommendation to mitigate such risks (Article 3 (a) and (b) of AMRO Agreement).

2. This Report is drafted on the basis of AMRO's Annual Consultation Visit to Singapore from 19 November to 7 December, 2018 (Article 5 (b) of AMRO Agreement). The AMRO Mission team was headed by Dr Chaipat Poonpatpibul, Group Head and Lead Economist. Team members also included Mr Justin Lim Ming Han (Researcher), Mr Yang-Hyeon Yang (Senior Economist), Dr. Simon Liu Xinyi (Economist), Dr Tanyasorn Ekapirak (Researcher) and Mr Edmond Choo Chiang Yong (Research Analyst). AMRO Director Dr Junhong Chang and Chief Economist Dr Hoe Ee Khor also participated in key policy meetings with the authorities. This AMRO Annual Consultation Report on Singapore for 2018 was peer reviewed by Dr Sumio Ishikawa (Group Head and Lead Economist) and Mr. Foo Suan Yong (Senior Expert); and approved by Dr Hoe Ee Khor.

3. The analysis in this Report is based on information available up to 25 February 2019.

4. By making any designation of or reference to a particular territory or geographical area, or by using the term "member" or "country" in this Report, AMRO does not intend to make any judgments as to the legal or other status of any territory or area.

5. On behalf of AMRO, the Mission team wishes to thank the Singaporean authorities for their comments on this Report, as well as their excellent meeting arrangements and hospitality during our visit.

Table of Contents

Executive Summary

1. **Following strong growth in 2017 and the first half of 2018, Singapore's economy is expected to expand at a slower pace in 2019.** Reflecting the waning momentum of the global tech upcycle and softer growth in its key final demand markets, Singapore's economy moderated to 2.4 and 1.9 percent in Q3 and Q4 2018 respectively from 4.4 percent in H1 2018. Growth moderated from 3.9 percent in 2017 to 3.2 percent in 2018 and is expected to moderate further to 2.5 percent in 2019, around its growth potential.

2. **The labor market has improved further with net employment gains increasing and broadening, contributing to higher underlying wage pressures.**

3. **Monetary Authority of Singapore (MAS) core inflation has continued to edge up to near 2 percent in 2018, while headline inflation has remained low.** For 2018, core inflation averaged 1.7 percent, rising from 1.5 percent in 2017, and is projected to increase to 2 percent in 2019, on account of a firmer labor market and continued wage growth. Average headline inflation has remained low at 0.4 percent in 2018 but is expected to increase as the drag from the weak residential rental market and the Certificate of Entitlement premiums for cars dissipate.

4. **Overall exports growth has started to turn negative.** Non-oil domestic exports (NODX) grew strongly at 6.1 percent in the first three quarters of 2018, but have weakened across a broad range of categories in Q4 2018. Electronics exports are expected to contract further because of the easing global electronics cycle and trade tensions.

5. **The FY2018 overall fiscal balance is revised from a slight deficit to a surplus of 0.4 percent of GDP due to better revenue growth and lower expenditure**. In FY2019, the fiscal impulse is expected to turn neutral.

6. **The China-U.S. trade conflict is the most important downside risk to Singapore's economy.** Singapore is among the economies most vulnerable to the trade conflict given its role as a regional hub, and strong trade and financial links with the U.S., China and the region. In addition, it has a high level of participation in global value chains (GVCs).The negative impact of the imposed tariffs is assessed at around 0.3 percent of GDP and it could go up to 1 percent of GDP if the ongoing negotiation between China and the U.S. were to fail, leading to a further escalation of the tariffs and worsening market confidence.

7. **Non-performing loans (NPLs) in Singapore's cross-border loans may increase should financial conditions tighten further.** While the Singapore banking system's NPL ratio is still low, tighter financial conditions can lead to higher default rates among corporates in the region, particularly firms with large unhedged foreign currency borrowings.

8. **Some segments in the corporate and household sectors are vulnerable to an economic slowdown and higher interest rates.** An economic slowdown, an escalating trade conflict and higher interest rates, may result in higher NPLs in the business sector and rising housing loan defaults among lower-income and highly leveraged households. The oil and gas sector may further be impacted by lower oil prices.

9. **Downward price pressures in the private residential market may occur over the longer term in view of the large impending increase in housing supply**. Following the sharp rise in private residential property prices from H2 2017 to H1 2018, higher Additional Buyer's Stamp Duty (ABSD) rates and the stricter Loan-to-Value (LTV) ratios have been imposed to mitigate the risk of excessive price increases, helping to mitigate the risk of a destabilising price correction and leading to a more stable property market. The measures

have slowed activity and price growth in the property market although in the medium term, there is still a risk that the large supply of private housing stock may not be well-absorbed due to slowing population growth or if economic conditions were to weaken significantly.

10. **Potential cybersecurity breaches could lead to disruptions in economic activities and a loss of confidence in banks.** The occurrence of significant cybersecurity incidents in banks could erode Singapore's reputation as a financial center.

11. **Rapidly aging demographics and disruptive digital technologies could pose major challenges over the longer term.** A rapidly aging population could lead to lower growth potential if policies to increase productivity gains are less effective than envisaged. New digital technologies may reduce the demand of workers in certain segments and marginalize workers incapable of upgrading their skills.

12. **If trade conflicts escalate further, authorities should deploy mitigating fiscal measures, supported by ongoing efforts to deepen existing bilateral and multilateral trade and investment ties.** Targeted and time-bound fiscal support should be employed to assist manufacturers or firms affected by the trade conflicts. Separately, efforts to deepen and enhance trade and FDI ties through existing bilateral and multilateral trade arrangements should be enhanced, so that Singapore can benefit from potential trade and investment diversion to the region.

13. **The normalization of monetary policy has been in line with the objective of containing price pressures in the medium-term in light of improving labor market conditions amidst above-potential growth**. However, should trade conflicts escalate and global financial conditions tighten further and affect Singapore significantly, MAS should consider easing monetary policy to complement the fiscal stimulus in supporting the economy.

14. **Macroprudential measures to dampen the upswing in property prices are welcome and periodic adjustments to these measures (including housing land supply) should be made to continue to mitigate the risk of a destabilizing correction in prices in the medium term.** Policy recalibrations should continue to be clearly communicated to home buyers and developers.

15. **While authorities are committed to ongoing structural transformation efforts, stronger social safety nets will help improve welfare and mitigate the impact of adverse shocks on the economy and vulnerable segments of the population.** All 23 sector-specific Industry Transformation Maps have been rolled out, building on prior productivity-raising and skills development initiatives. In addition, enhanced means-tested cash-transfers and in-kind benefits targeted at the elderly are encouraged.

16. **To ensure fiscal sustainability, authorities have announced additional fiscal revenue enhancement measures to meet the higher spending needs over the longer-term.** Expenditures in areas such as infrastructure and healthcare are projected to rise notably over the medium term. To maintain fiscal balance, it is noted that the authorities have planned for a GST hike sometime between 2021 and 2025. AMRO supports the greater use of debt to finance infrastructure spending since the associated costs can be distributed more evenly across multiple generations.

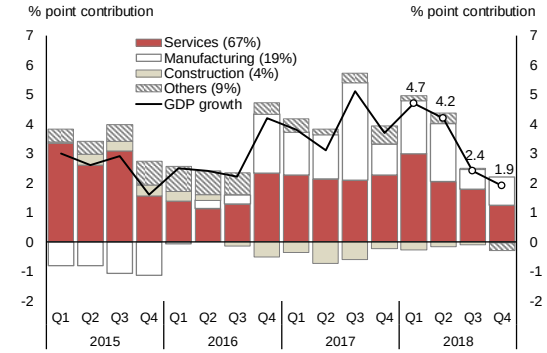
17. **Fintech continues to be actively promoted, and cyber risk mitigation efforts have been strengthened on various fronts.** The Fintech Regulatory Sandbox has been useful in providing room for fintech firms to develop and explore new business models and partnerships. Separately, cybersecurity standards for financial institutions and cyber threat information-sharing efforts in the region have been commendably enhanced.

A. Recent Developments and Outlook

A.1 Real Sector Developments and Outlook

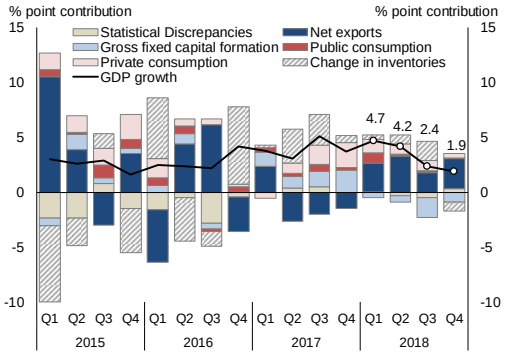
1. **Singapore's growth has remained firm, but moderated in H2 2018 as the cyclical uplift from the global tech rebound eased alongside weakening global growth.** Following a strong rebound of 3.9 percent yoy in 2017, and a further expansion of 4.4 percent in H1 2018, growth moderated to 2.4 and 1.9 percent in Q3 and Q4 2018 respectively (Figure 1). The manufacturing sector slowed as the impetus from the upswing in the global tech cycle waned, accentuated by softer growth in its key final demand markets. Growth in the services sector remained robust, driven mainly by financial and business services. On the demand side, slower domestic demand stemmed mainly from weaker gross fixed capital formation, while private consumption remained steady (Figure 2).

Figure 1. Contribution to Real GDP Growth: From Supply Side



Source: Singapore Department of Statistics

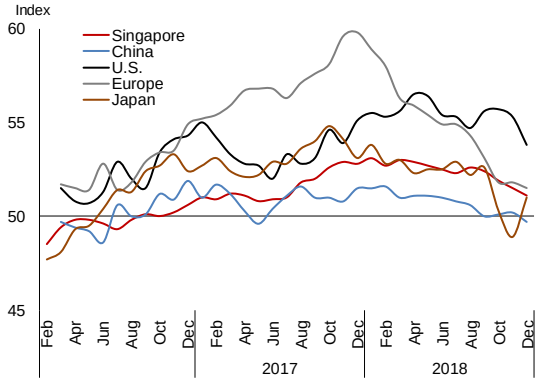
Figure 2. Contribution to Real GDP Growth: From Demand Side



Source: Singapore Department of Statistics

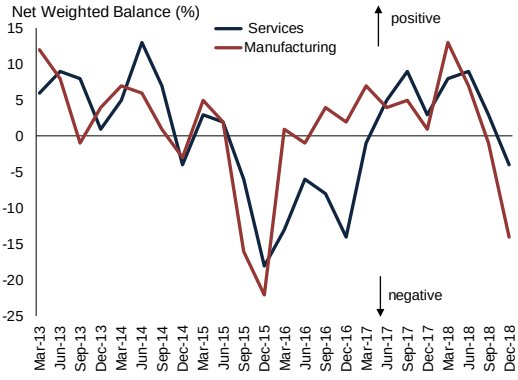
2. **Going forward, growth will expand at a slower pace.** Downside risks to growth have increased, stemming from the U.S.-China trade conflict and tighter global financial conditions. Growth moderated to 3.2 percent in 2018 and is expected to slow further to 2.5 percent in 2019, around the growth potential. As a regional hub, Singapore is among the regional economies that are most vulnerable to the escalating China-U.S. trade conflict, based on AMRO's analysis. Leading indicators such as the manufacturing PMIs of Singapore and its key final demand markets have moderated (Figure 3). In addition, the proportion of firms expecting more optimistic conditions over the next six months has declined markedly (Figure 4).

Figure 3. Manufacturing PMI of Singapore and its Key Final Demand Markets



Source: Singapore Institute of Purchasing and Materials Management; National Authorities

Figure 4. Six Months-Ahead Business Expectations by Sector

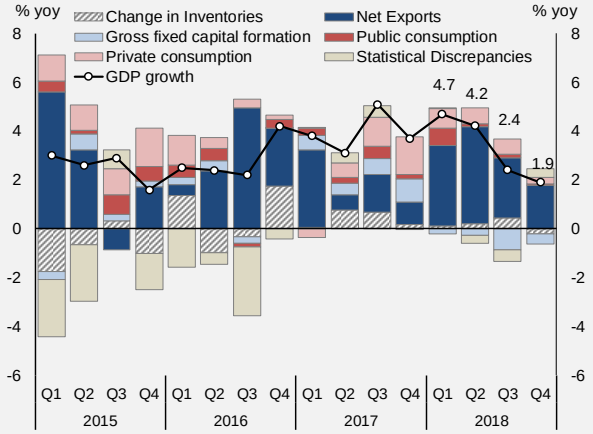


Source: Singapore Department of Statistics, Economic Development Board (EDB) Singapore

Box A. Alternative Approach to Estimating the Net Contribution of Key Demand Components to GDP Growth in Singapore[1]

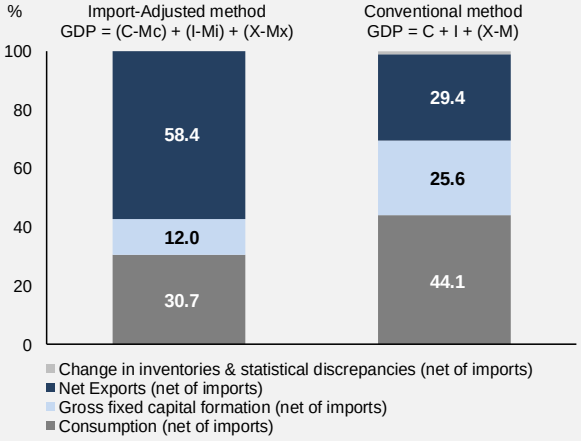
In assessing the drivers of Singapore's GDP growth, it may be useful to also consider an alternative national accounting approach – the 'Import-Adjusted' Method, which subtracts the import content of goods and services from each expenditure component. The conventional method decomposes growth according to contributions from private consumption, public consumption, gross fixed capital formation (investment) and net exports. However, imports that satisfy domestic demand are not netted out from each demand components, which overstate total domestic value-added and understate exports' value-added. By attributing the import content of goods and services to each demand component – 'Import-Adjusted' Method,[2] the contribution from domestic and external drivers of growth are thus more accurately assessed.

Figure A1. Import-adjusted GDP Growth: From Expenditure Side



Source: Singapore Department of Statistics; AMRO staff calculations

Figure A2. 'Import-Adjusted' vs Conventional Method of National Accounting (% Share of 2018 GDP, 2010 Market Prices)



Source: Singapore Department of Statistics; 2014 IO Table; AMRO staff calculations

External demand is a far more important driver to Singapore's growth under the 'Import-Adjusted' Method, compared to the Conventional Method. Applying the 'Import-Adjusted' Method to the various demand components, the contribution of exports (net of imports) to GDP growth is estimated to be much higher (Figure A1). As a share of GDP, the import-adjusted exports is estimated at 58.4 percent in 2018, which is twice as large compared to the conventional method (Figure A2). As such, Singapore's reliance on external demand is markedly higher under this alternative national accounting method. Against the backdrop of the easing tech cycle, slower global growth and trade conflict, demand for Singapore's exports is expected to moderate further going forward, with a knock-on effect on the rest of the economy.

3. **Improvements in the labor market have continued to gather pace, contributing to higher underlying wage pressures.** Despite the worsening external environment, net employment gains have increased and broadened in 2H 2018 (Figure 5). While the bulk of the gains was driven by services, there was an added boost from the manufacturing sector in Q3 2018. After contracting for ten consecutive quarters, the drag from the construction sector has also dissipated as construction-related activities picked up in 2018. The unemployment rate declined slightly to an average of 2.1 percent in 2018 from an average of 2.2 percent in 2017.

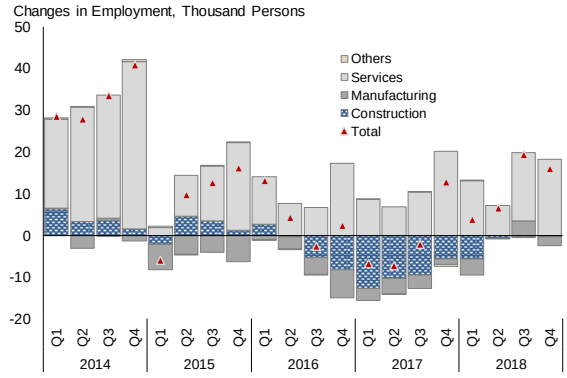
[1] Prepared by Justin Lim Ming Han (Researcher).

[2] Following the approach of Kranendonk and Verbruqqen (2008), the input-output cumulative production structure (CPS) technique is applied to using the 2014 Singapore Input-Output (IO) Table. The CPS technique estimates the import content of the goods and services associated with each component of final demand for the economy. The difference between a particular final demand component and its import content is then used to derive the net contribution of each demand component to overall GDP. For example, the net contribution of private consumption to GDP is private consumption less both final imports for consumption and intermediate imports used by domestic firms to produce goods and services that are consumed.

At the same time, average monthly nominal earnings growth per employee improved from 3.1 percent in 2017 to 3.5 percent in 2018, supported by higher productivity growth, which has rebounded strongly since 2017.

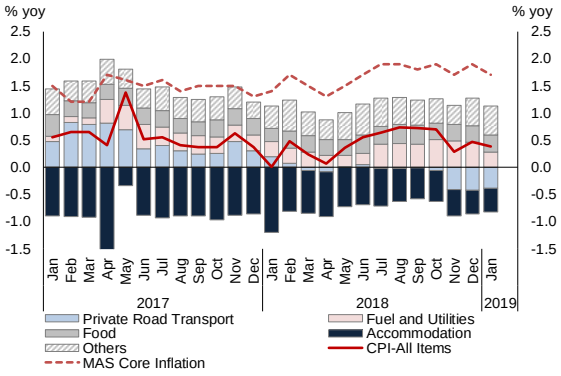
4. **MAS core inflation has continued to edge up to near 2 percent in 2018, while headline inflation has remained low (Figure 6).** MAS core inflation increased to an average of 1.7 percent in 2018 from an average of 1.5 percent in 2017, due to higher oil prices and electricity and gas tariffs. It is projected to average 2 percent in 2019, due to a firmer labour market and continued wage growth. Headline inflation remained low in 2018, but it is expected to increase as the drag from the weak residential rental market and COE premiums dissipates. Singapore Management University's (SMU's) quarterly survey suggests inflation expectations are firming at around 2.9 percent in December 2018, after falling to a multi-year low of 2.6 percent in 2016.

Figure 5. Net Change in Employment by Sector



Source: Ministry of Manpower

Figure 6. Headline and MAS Core Inflation



Source: Singapore Department of Statistics; MAS

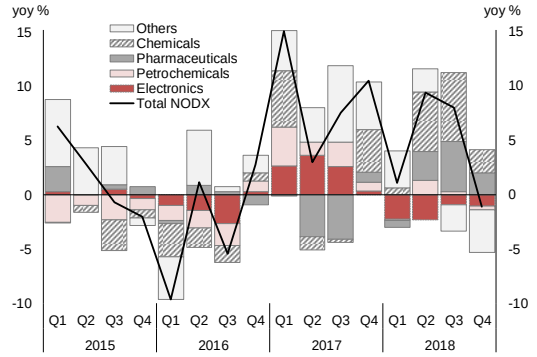
Authorities' Views

5. **AMRO's macroeconomic analyses and projections are broadly congruent with the authorities' assessment.** Growth in 2019 is expected to be around its potential, driven by ICT, financial and business services. Meanwhile, 2019 MAS Core inflation is expected to remain within 1.5-2.5 percent due to higher wages and a tighter labour market. Headline inflation is projected to rise from 0.4 percent in 2018 to 0.5-1.5 percent in 2019 as rentals recover and prices of Certificates of Entitlement (COEs) stabilize. The assessment of the impact of the trade conflict on Singapore should be interpreted within the context of a cyclical shock, which will dissipate in the long run.

A.2 External Sector and the Balance of Payments

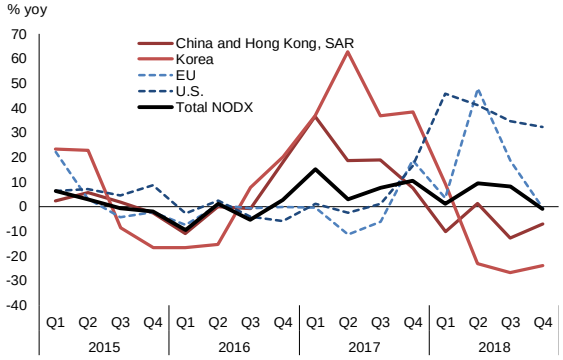
6. **Overall export growth has started to slow.** Non-oil domestic exports (NODX) grew strongly at 8.8 percent in 2017 and 6.1 percent in the first three quarters of 2018, reflecting the strong tech upcycle and demand for pharmaceutical goods. In Q4 2018, NODX contracted, due to fall in both electronics and non-electronics (Figure 7). Demand from the U.S. has been strong, while exports to Greater China and Korea have moderated from a high base (Figure 8). In forthcoming quarters, electronics exports are expected to contract further because of the easing global electronics cycle and the trade conflict.

Figure 7. NODX Growth by Product



Source: Enterprise Singapore

Figure 8. NODX Growth by Destination

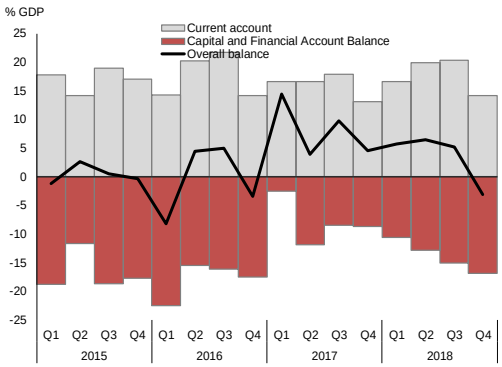


Source: Enterprise Singapore

7. **Singapore has continued to maintain a strong external position, with a large current account surplus and high reserves, while net capital and financial deficits reflected mainly the recycling of the current surplus in the form of portfolio investment and bank outflows. (Figure 9).** The current account surplus remained strong at 17.7 percent of GDP in 2018 due to the large trade surplus. At the same time, the deficit in the capital and financial account of 13.9 percent of GDP was driven by other investments and portfolio investments, while net FDI inflows remained strong.

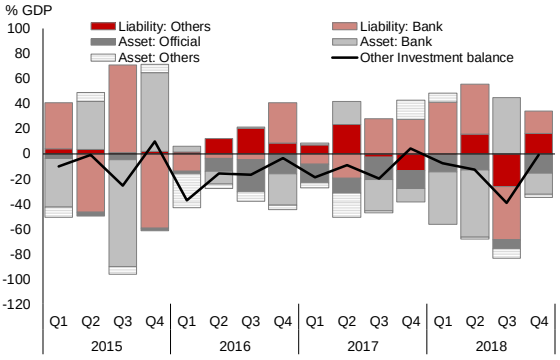
8. **Cross-border banking activities remain robust (Figure 10)**. Cross-border bank loans, as partly evidenced in the "other investment" account, is still large at 16.7 percent of GDP in 2018. Singapore-domiciled banks have net external assets positions, while net external liability positions also increased between Q3 2017 and Q2 2018, in line with the strong global economic rebound over this period. There was a net repayment of overseas lending while borrowings from overseas also declined in Q3 2018, but had subsequently reversed in Q4 2018.

Figure 9. Components of BOP



Source: Singapore Department of Statistics

Figure 10. Components of the Other Investment Account



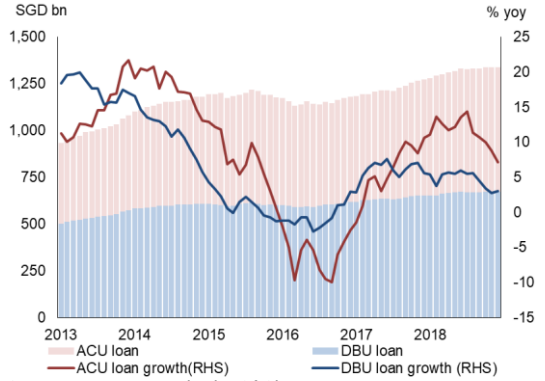
Source: Singapore Department of Statistics

A.3 Monetary Condition and Financial Sector

9. **Bank lending has started to moderate.** Lending to non-bank entities, particularly Asian Currency Units (ACU), remained steady in H1 2018, but has eased in recent months (Figure 11). Cross-border lending growth to emerging Asia, particularly trade credit, has started to moderate, mainly due to slower growth in China and the unresolved U.S.-China trade tension. Domestically, lending to building and construction sectors turned positive after several quarters of contraction. However, housing loan growth that recovered during 2017 and H1 2018, has slowed due to property cooling measures introduced in July 2018 (Figure 12). Going forward,

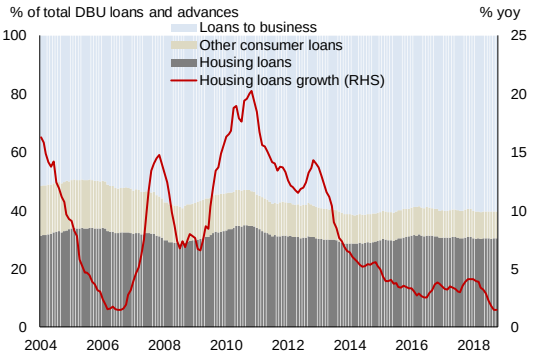
bank lending is expected to moderate due to the dampening effects from slower global growth, trade conflicts and property cooling measures.

Figure 11. Non-bank Loan Growth



Source: Monetary Authority Of Singapore

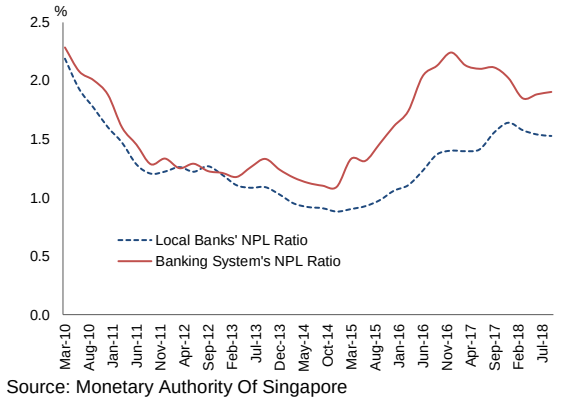
Figure 12. Housing Loan Growth



Source: Monetary Authority Of Singapore

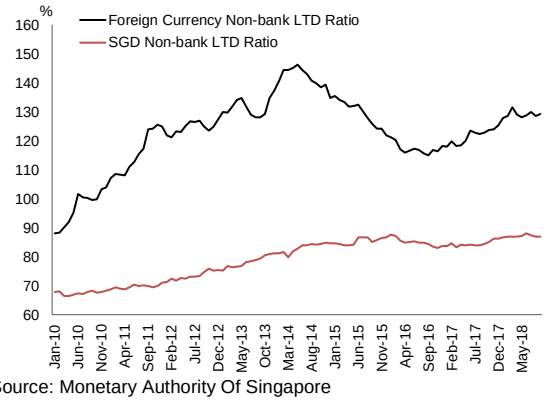
10. **The banking system's NPL ratio is still low, while the foreign currency loan-to-deposit ratio continued to increase.** Overall asset quality has improved, with the banking system's NPL ratio declining slightly from an average of 2.1 percent in 2017 to 1.9 percent in Q3 2018 (Figure 13). Reflecting the improving economic conditions in Singapore and across the region, the NPL of local banks have started to decline after rising sharply since 2015. Better asset quality is also seen across most sectors, particularly in the manufacturing, and marine and offshore engineering subsector, partially reflecting the recovery of the economy. Total provisioning for overall unsecured NPLs remains above 100 percent. Local banking groups are well capitalized and liquidity remains ample and above MAS' regulatory requirements. For the entire banking system, the foreign currency loan-to-deposit ratio has edged slightly higher due to stronger loan demand growth from regional economies (Figure 14).

Figure 13. Banking System's and Local Banks' NPL Ratios



Source: Monetary Authority Of Singapore

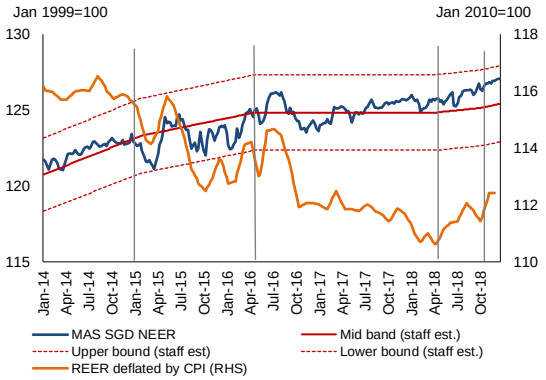
Figure 14. Banking System's Non-Bank Loan-to-Deposit (LTD) Ratios



Source: Monetary Authority Of Singapore

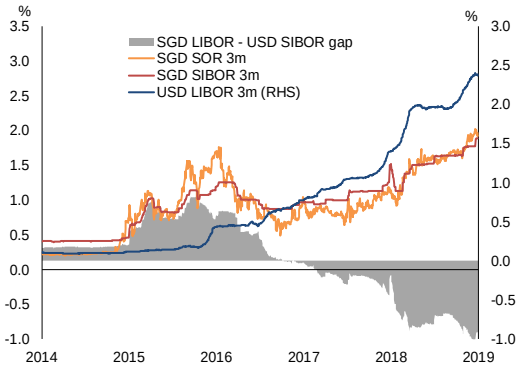
11. **The SGD NEER has been appreciating steadily and the SGD interbank rates have increased in tandem with the higher U.S. federal funds rate.** The SGD NEER has risen by about 0.9 percent since the normalization of monetary policy, which started in April 2018, and has remained in the upper half of the policy band (Figure 15). The 3-month SIBOR rate reached a high of 1.89 percent in December 2018, tracking the higher 3-month LIBOR rate of 2.8 percent during this period (Figure 16). SIBOR has remained lower than LIBOR since early 2017, as the market has been expecting SGD to strengthen against the U.S. dollar and liquidity has been abundant.

Figure 15.SGD NEER and the Estimated Exchange Rate Policy Band



Source: Monetary Authority Of Singapore; CEIC; AMRO staff calculations

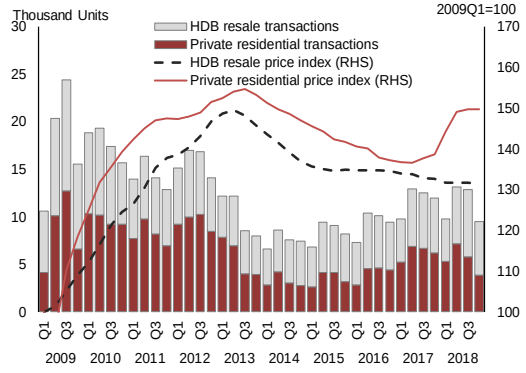
Figure 16. Interbank Rates and Swap Offer Rate



Sources: ABS Benchmarks Administration Co Pte Ltd; ICE Benchmark Administration Ltd

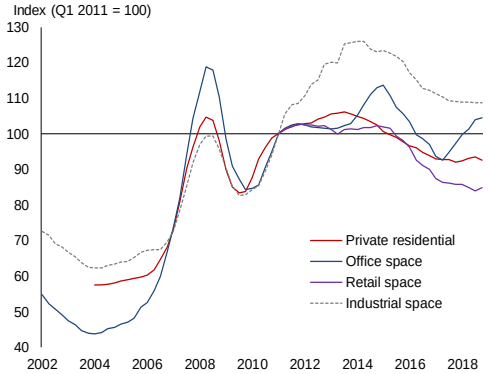
12. **Prices in the private residential market increased sharply, but have stabilised following the recalibration of macroprudential measures in July 2018.** The prices of private residential property increased by 9.6 percent from Q2 2017 to Q3 2018 alongside robust transaction volumes (Figure 17), underpinned by the strong economic recovery, improving market sentiment, and strong en-bloc redevelopment sales of private residential properties. However, the prices of private residential property dipped slightly in Q4 2018 after the recalibration of macroprudential measures in July 2018. At the same time, prices of resale public housing units have declined over the same period but are expected to remain stable going forward. The supply of new Build-to-Order flats in 2019 would be kept a steady level, with a slight reduction from 15,800 to 15,000, as announced by the Housing Development Board (HDB) in December 2018. Meanwhile, rents for private residential housing have stabilised, after declining steadily from their peak in 2013 (Figure 18). More broadly, rents of office spaces are recovering, while rents for retail and industrial spaces continue to decline. Going forward, prices of private residential properties are expected to remain stable due to both property cooling measures introduced in July 2018[3] and upcoming housing supply, which will likely be sufficient to meet the demand.

Figure 17. Property Prices and Transaction Volume



Source: Housing and Development Board, Urban Redevelopment Authority

Figure 18. Rental Index



Source: Urban Redevelopment Authority

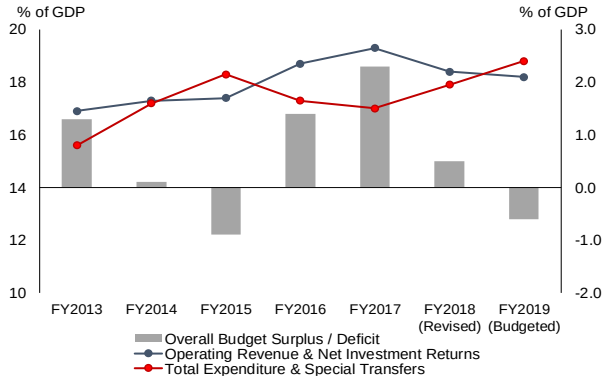
[3] In July 2018, Additional Buyer's Stamp Duty (ABSD) was raised and the Loan-to-value (LTV) limits were tightened. http://www.Monetary Authority of Singapore.gov.sg/News-and-Publications/Media-Releases/2018/Raising-Additional-Buyers-Stamp-Duty-Rates-and-Tightening-Loan-to-Value-Limits.aspx.

A.4 Fiscal Sector[4]

13. **The revised FY2018 Budget is expansionary, led by a large increase in expenditure, especially in infrastructure.** Between April and December 2018, operating revenue and registered y-o-y increase of 2.4 percent and between January and September 2018, total expenditure registered y-o-y increase of 3.5 percent. According to the 2019 budget statement, the FY2018 overall fiscal position is revised from a slight deficit of 0.1 percent of GDP to a surplus of 0.4 percent of GDP due to better operating revenue growth and a lower-than-expected total expenditure outlays (Figure 19). Despite a slight downward revision of approximately $1.0 billion from the initial plan, total expenditure is estimated to have increased by 7.4 percent, driven mainly by the large increase in infrastructure spending. On the other hand, the previous projected decline in the estimated operating revenue growth for FY2018 of -3.3 percent in the FY2018 Budget was revised to a smaller decline of -2.8 percent in the FY2019 Budget due to better-than-expected collections from MAS's Statutory Board Contributions, Corporate Income Tax and Stamp Duties.

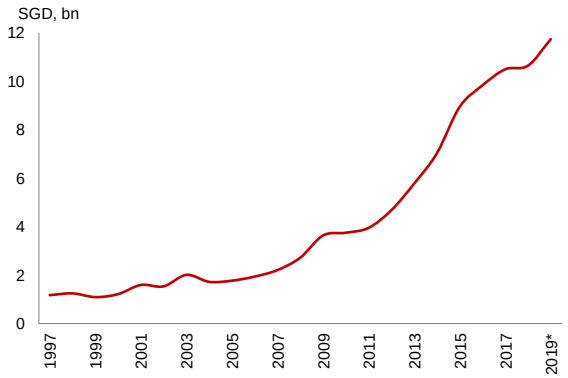
14. **In FY2019, the fiscal impulse is expected to be neutral.** The overall balance in FY2019 is expected to turn into a deficit of 0.7 percent of GDP compared to the revised surplus of 0.4 percent of GDP in FY2018. This is due to a large amount of additional transfers to healthcare- and infrastructure-related funds of approximately $13.2 billion which are allocated for the purposes of future expenditures. The FY2019 operating revenue and total expenditure are projected to increase slightly by 1.7 percent and 1.6 percent respectively. AMRO's estimated fiscal impulse which is proxied by the change in the primary balance which does not include one-off and recurring payments from the newly announced Merdeka Generation Fund and Long-Term Care Support Fund starting from 2019, is expected to be small in FY2019.

Figure 19. Fiscal Revenue and Expenditure



Source: Ministry of Finance (MOF)

Figure 20. Government Healthcare Spending



* 2019 refers to the Budgeted figures
Source: MOF

15. **Expenditures in areas such as infrastructure and healthcare are projected to rise notably over the medium term, financed by debt issuances and revenue from the planned GST hike.** The government is looking to finance some of the infrastructure investments with borrowings by Statutory Boards and Government-owned Companies (SBGCs). In addition, government healthcare spending which will have increased by more than fivefold from $2.2 billion in 2007 to a projected $11.7 billion in 2019 (Figure 20), is projected to increase

[4] Based on available data as of 19 February 2019.

significantly as Singapore's population ages more rapidly going forward. Revenue from the proposed 2 percentage-point increase in the GST rate during 2021-2025 is expected to support additional recurrent expenditures in areas such as healthcare, security and other social spending.

B. Risks, Vulnerabilities and Challenges

16. **The major risks facing Singapore are mostly external, of which the most consequential is the ongoing U.S-China trade conflict (Table 1).** Downside risk to growth in the near-term has increased mainly due to the ongoing U.S-China trade conflicts, tighter global financial conditions, and growing concerns over further cybersecurity breaches. Domestically, there are some pockets of vulnerabilities emanating from higher NPLs in the manufacturing and oil and gas sectors, and risk of rising housing loan defaults among the lower-income and more leveraged households.

Table 1. Heat Map of Risks

Risks		Likelihood				Potential Impact
		2016	2017	2018	2019	
Domestic	High household debt and delinquencies in some segments					Small
	Distress in some segments in the corporate sector					Small
	Destabilizing price correction in the property market					Medium
External	Tightening financial conditions					Medium
	U.S-China trade conflict					High
	Cybersecurity breaches					Medium

Low likelihood | Low to Medium | Medium | High likelihood

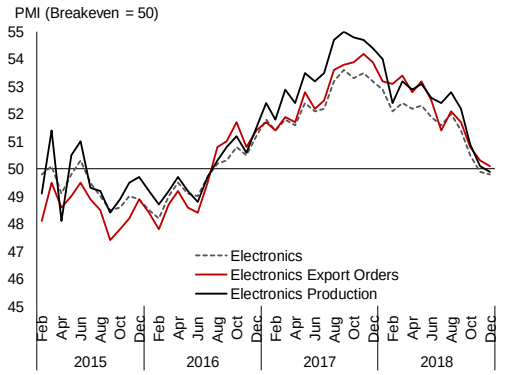
Source: AMRO

17. **Downside risk to growth in the short term has increased, mainly due to the ongoing China-U.S. trade conflicts.** Due to Singapore's role as a regional hub, strong trade and financial links with the U.S., China and the region, and high involvement in global value chains, the negative impact of tariffs is estimated at around 0.3 percent of GDP under the baseline scenario,[5] and by up to 1 percent of GDP under a worst-case scenario (Selected Issue 1). Although the direct impact of tariffs on Singapore's exports to the U.S. has been small, the indirect impact of the trade conflict is assessed to be significant. Owing to the high GVC participation level, Singapore's intermediate goods exports to China are likely to take a hit if China's exports to the U.S. were to slow markedly in the coming quarters. Subsequently,

[5] Under the baseline scenario, U.S. imposes 25 percent tariffs on $50 billion plus 10 percent tariffs on an additional $200 billion of imports from China, while China retaliates by imposing 25 percent tariffs on $50 billion plus 5-25 percent tariffs on additional $60 billion of imports from the U.S. Under the worst-case scenario, the U.S. and China impose 25 percent tariffs on all imports from each other. The scenarios do not include mitigating policy responses to shocks.

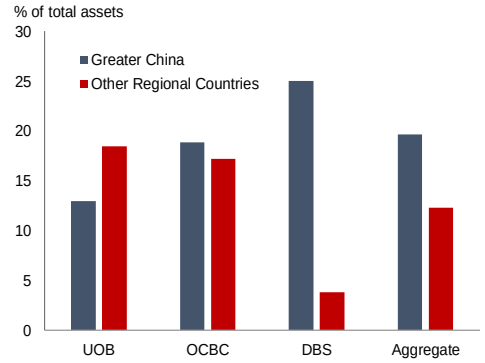
second-order effects through slower global growth can be significant given that Singapore's value-added (VA) generated by gross exports to China, the U.S. and ASEAN-5 accounted for as much as 9.5, 6.7 and 13.4 percent of Singapore's total value-added in 2017, respectively. A sharp deterioration in sentiments could further exacerbate the impact. On the other hand, Singapore may gain from trade and investment diversion from China due to its role as a regional center for FDI. However, there is significant uncertainty about this effect and it will likely take time for the relocation process to unfold. Recent indicators suggest that, on top of the global growth slowdown and maturing tech cycle, the adverse impact on the electronics sector may have started to show up, as the PMI for the electronics sector has recorded a slight contraction since November 2018, having expanded for 27 consecutive months previously. New export orders have also slowed albeit remaining slightly expansionary (Figure 21).

Figure 21. Singapore's Electronics Sector's PMI



Note: A PMI of more than 50 represents an expansion when compared with the previous month. A PMI reading under 50 represents a contraction, and a reading at 50 indicates no change.
Source: Singapore Institute of Purchasing and Materials Management (SIPMM)

Figure 22. Share of Local Banks' Assets in Greater China and Other Regional Countries



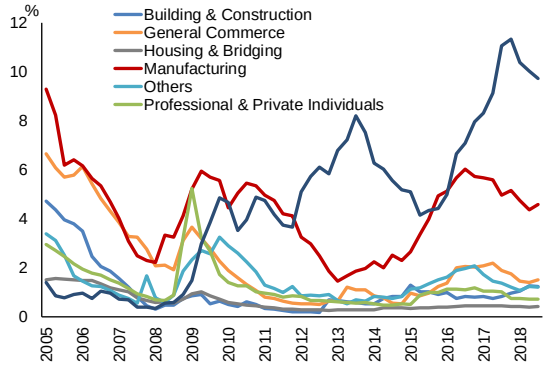
Note: Other Regional Countries mainly refers to Malaysia, Thailand Indonesia and other Asia-Pacific countries.
Source: 2017 UOB, OCBC and DBS annual reports

18. **NPLs in Singapore's cross-border loans may increase should financial conditions tighten further.** Global financial conditions may tighten further should expectations of a tighter U.S. monetary policy stance grow, or should inflationary pressures in the U.S. increase due to the tightening labor market. Although the Singapore banking system's NPL ratio remained low at 1.9 percent in 2018, tighter financial conditions can lead to higher borrowing costs and increased distress among corporates in the region, particularly firms with large unhedged foreign currency borrowings. This in turn can result in higher NPLs among Singaporean banks, as well as contribute to a weaker overall cross-border loan growth. The exposure of the three major local banks' to Greater China and to other regional countries in 2017 was 19.7 percent and 12.3 percent of total assets, respectively (Figure 22). The spillovers to Singapore's banking sector will be amplified should the risk of tighter financial conditions interact with slower global growth and escalating trade conflicts.

19. **Some segments in the corporate and household sectors are vulnerable to an economic slowdown and further interest rate increases.** MAS stress test results show that households, corporates and banks are able to withstand much higher interest rates. Although banks have been actively managing their risks arising from the manufacturing and oil and gas sectors after increasing provisions in the second half of 2017, NPLs for these sectors are still high. An economic slowdown, escalating trade conflict, and higher interest rates may result in

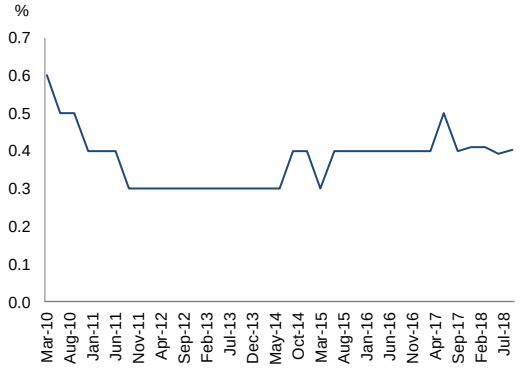
higher NPLs in these sectors, especially SMEs (Figure 23). Although sentiment has improved since the oil price crash in 2014/15, the oil and gas sector may also be affected by lower oil and gas prices. In addition, while the ratios of non-performing housing loans have been low at less than 0.5 percent over the past eight years (Figure 24), housing loan defaults may increase among the lower-income and more leveraged households should households' balance sheets deteriorate markedly. This could be due to a combination of higher interest repayments, possible weaker labor market conditions, or a potential sharp correction in property prices. Weaker rental income also contributes to a higher likelihood of default, particularly private residential properties that are held for investment purposes.

Figure 23. Banking System NPLs by Sector



Source: Monetary Authority Of Singapore

Figure 24. Non-Performing Housing Loan Ratio

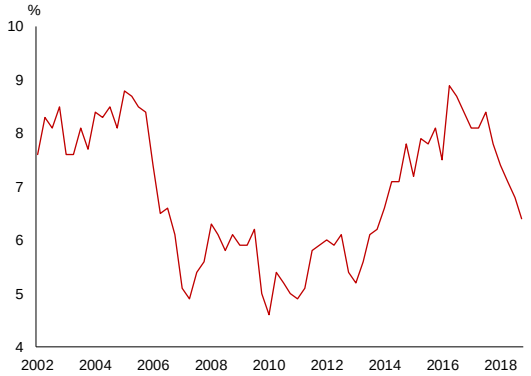


Source: Monetary Authority Of Singapore

20. **Although the risk of excessive price increases in the residential property markets has been addressed by recent cooling measures,** there is also a risk that the large supply of new housing in the medium term may not be well-absorbed due to weaker economic conditions amid slowing population growth. Vacancy rates of private residential housing continued to decline from a peak of 8.9 percent in 2016 to 6.4 percent in Q4 2018 (Figure 25). However, it may increase over the medium term should the completion of new housing supply outpace population growth. Between Q3 2017 and December 2018, the total number of private residential units in the pipeline rose sharply by 47 percent from 35,022 to 51,498[6] units. The bulk of them are due to be completed sometime in the period between 2021 and 2022 (Figure 26). While private residential housing demand from both property developers and homebuyers has started to moderate following cooling measures announced in July 2018, the risk of a destabilizing price correction could still persist over the medium term, especially if economic conditions were to weaken sharply or subsequent adjustments in the housing supply turns out to be inadequate.

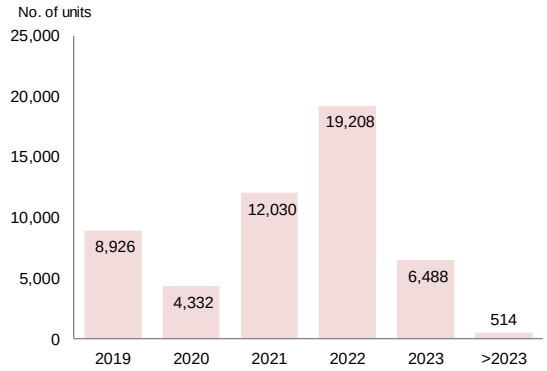
[6] In addition to this pipeline supply, the H1 2019 Government Land Sales programme can yield up to 6,475 private residential units.

Figure 25. Vacancy Rate of Private Residential Properties



Source: Urban Redevelopment Authority

Figure 26. Pipeline Supply of Private Residential Units by Expected Year of Completion, end-2018



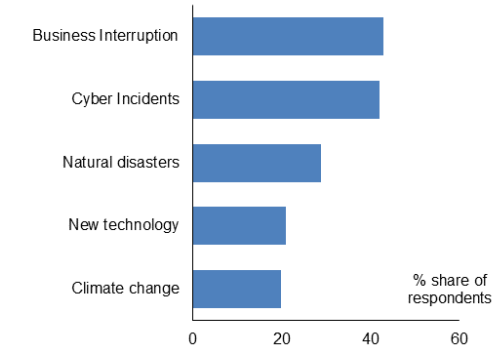
Source: Urban Redevelopment Authority

21. **Due to the fast-growing adoption of information technology and digitization, cybersecurity incidents can affect business and economic activities.** Along with the country's rapid digitization environment, the increasing use of digital payments coupled with a shift towards e-commerce activities, have led to cyberattacks becoming a key business risk. More than 40 percent of respondents in a 2019 Allianz Risk Barometer survey expressed concern about cyber-related crimes and data breaches (Figure 27), which is cited as among the top risks facing the economy. In this regard, a successful transition towards a more digitized economy needs to be underpinned by the ability of businesses and the public sector to prevent, mitigate and improve their resilience against cyberattacks. If cyber risks are not sufficiently addressed, not only will economic activities be affected but there will also be greater aversion towards new digital technologies, adversely impacting the potential increase in productivity and growth.

22. **Cyberattacks on financial institutions can lead to disruptions in key financial services, with attendant risk to financial stability and spillover to the broader economy.** Cyber incidents can potentially lead to contagion risk in the following ways: i) disruptions to systemically important financial service providers; ii) damages resulting in corrupted data and systems; or iii) reputational loss in banks. First, although a study by MAS suggests that the implications of cyber incidents on financial stability would be mostly limited if they were theft- or disruption-related, which make up the bulk of reported cyber incidents globally (Figure 28), AMRO's views are that notwithstanding this, contagion risk can arise if systemically important or highly connected institutions are targeted. This is because disruptions in financial services provided by these entities can spread rapidly throughout the financial system, and affect the broader economy. For example, cyberattacks may cripple banks' ability to meet payment obligations with interconnected financial institutions, which in turn will affect the general liquidity and credit needs of businesses and individuals. Second, despite the low likelihood of its occurrence, cyber incidents that result in damages to data and internal systems can also be consequential. This is on account of the potentially longer timeframe required to rectify the damage, leading to prolonged outages in key financial activities. Third, systemic risks from disruption and damage-related cyber incidents will be further compounded should if there is any subsequent loss of confidence in Singapore's banks, despite having ample liquidity buffers and being well-capitalized. This can occur if disruption to banking services cannot be rectified within

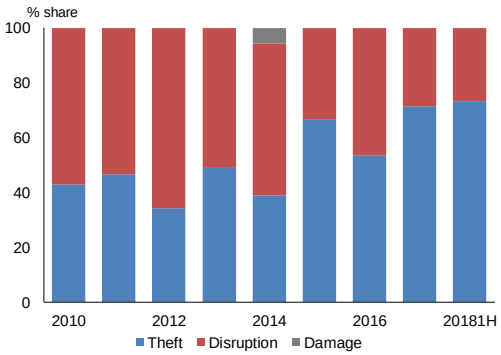
a short period or damages to financial institutions' and critical third-party service providers' databases are severe or irreversible. Singapore's reputation as a financial center may be eroded if there are successive cyber breaches.

Figure 27. Top Five Risks in Singapore in 2019, % of Respondents



Source: Allianz Risk Barometer 2019 in Singapore

Figure 28. Distribution of Global Reported Cyber Incidents Affecting the Financial Sector



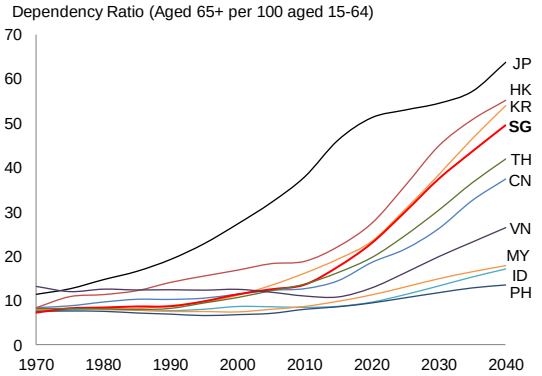
Source: Monetary Authority Of Singapore

23. **Domestically, the challenges over the longer term are characterized by rapidly aging demographics, which has significant implications for growth and fiscal policy.** Over the longer term, Singapore's rapidly aging demographics amid tight immigration policies could lead to a lower growth potential if policies to increase productivity gains were to be less effective than envisaged. Singapore's old age dependency ratio is expected to increase from the current number of around 20 persons aged 65 years and older per 100 persons between the ages of 15 and 64 years, to around 50 by 2040 (Figure 29), indicating that the pace of aging would accelerate going forward. Aging will also put increasing pressure on fiscal spending. Based on authorities' projections, government healthcare spending will increase to about 3 percent of GDP by 2030 from 2.2 percent of GDP in 2018.

24. **In addition, unforeseen digital disruptions can have unintended implications on Singapore's labor market, particularly on low-skilled workers' wages and employment prospects.** Workers of all segments will be affected by the emergence of new digital technologies, which may reduce demand for workers in certain segments and exacerbate skill mismatches in the labor market. Recent studies show that widespread adoption of technologies, such as artificial intelligence (AI) and robotics could result in greater net job creation for high skilled workers, while displacing low- to medium-skilled workers.[7] Left alone, these displaced workers may remain unemployed for a long time despite favorable macroeconomic conditions. Moreover, an AMRO study found that the benefits of these technologies will likely be skewed towards skilled-workers, leading to a widening income gap.[8] Broadly, the analyses show that an additional 1 percent increase in investment in information and communication technology (ICT) goods led to a 0.074 percent increase in monthly wages, particularly among the higher-skilled workers, and sustained by real productivity growth per worker. However, the wage benefits for low-skilled workers are negligible (Selected Issue 2).

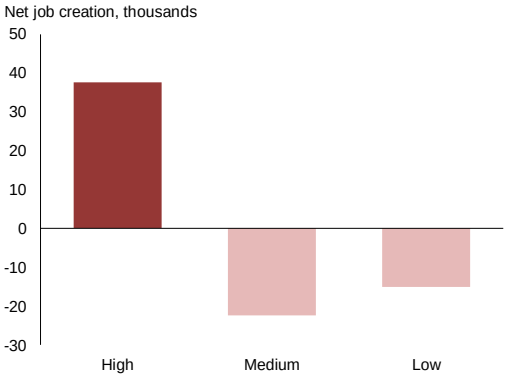
[7] Cisco. (2018). Technology and the future of ASEAN jobs – The impact of AI on workers in ASEAN's six largest economies. Retrieved from https://www.cisco.com/c/dam/global/en_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf.
[8] Han, Justin Lim Ming. 2018. "Impact of Technology on Wages and Productivity in Singapore." AMRO Working Paper 18-04, ASEAN+3 Macroeconomic Research Office, Singapore.

Figure 29. Old Age Dependency Ratios



Source: World Population Prospects: The 2017 Revision, United Nations, June 2017

Figure 30. The Impact of Technology on Singapore's Net Job Creation by 2028



Note: High-skilled refers to Managers, Professionals, Technicians and Associate Professionals; Medium-skilled refers to Clerical Support, Services and Sales, and Low-skilled Agriculture; and Low-skilled refers to elementary occupations
Source: Technology and the future of ASEAN jobs – The impact of AI on workers in ASEAN's six largest economies, by Oxford Economics & Cisco, September 2018

Authorities' Views

25. **The authorities are broadly in agreement with AMRO's assessment of the risks facing Singapore**. On the external front, the authorities are closely monitoring the ongoing trade conflict and are fully aware of its potential impact on Singapore's economy. The direct impact of the trade war on Singapore's exports to the U.S. has been limited thus far, while Singapore's exports to China that are indirectly affected by the tariffs were already declining prior to the announcement of tariffs. The indirect trade and confidence channels of the trade conflict may be more evident in the coming months, as the U.S.-China trade conflict remains unresolved. Domestically, a timely recalibration of macro-prudential measures was undertaken to dampen the sharp upswing in private property prices and prevent excessive exuberance in the housing market, particularly in light of a rising interest rate environment and the upcoming bulge in housing supply in the next few years. The country's ongoing structural transformation efforts to promote greater innovation and productivity are envisaged to address the long-term challenges to the economy, including an ageing population and rapid technological change.

C. Policy Discussion and Recommendations

C.1 Continued Commitment in Pursuing Structural Transformation

26. **Authorities are committed to transforming the economy into a high productivity and innovation-based economy.** The government has initiated multi-year efforts to restructure the economy, recognizing the ongoing shifts in the external environment, population aging, rapid shifts in technology and growing skills mismatches. It is noted that all 23 sector-specific Industry Transformation Maps (ITMs) have been rolled out, building on prior productivity increasing and skill development initiatives. We are encouraged that the Budget for FY2018 has included more targeted schemes to encourage greater adoption of digital technologies and enhance up-skilling efforts.

Authorities' Views

27. **The structural transformation strategies are aimed at identifying new opportunities and mitigating longer-term structural challenges arising from shifts in the global economy, rapid technological progress and aging demographics.** Guided by the recommendations of the Committee on the Future Economy, seven broad transformation strategies were developed to help Singapore achieve a sustainable growth rate of 2 to 3 percent over the longer term. The comprehensive and yet targeted approaches under the 23 Sector-specific Industry Transformation Maps (ITMs) are aimed at raising productivity, deepening human capital capabilities, spurring greater technological adoption and innovation, and strengthening international ties for companies in each sector. In the areas of skills development, concerted efforts are undertaken through the various initiatives under the SkillsFuture movement and the Adapt & Grow initiative to prepare the workforce to upgrade and/or transit to new jobs as the economy restructures and the nature of jobs evolves. Older but active workers would also stand to benefit from a variety of government funded work-related training programs, which enhances their employment and reemployment prospects, complemented by targeted cash transfers and subsidies.

C.2 Proactive Fiscal Policy in Meeting Near-term Challenges while Ensuring Longer-term Sustainability

28. **Authorities should monitor developments in the China-U.S. trade conflict closely and be ready to employ mitigating fiscal measures if necessary.** AMRO staff recommend further fiscal stimulus if trade conflicts were to escalate. In the first instance, manufacturers with significant direct and indirect exposures to China may be supported via targeted assistance. This may include financing, complemented by advisory services about potential trade issues. If trade conflicts were to escalate and lead to a sharp global slowdown, authorities should adopt broad-based measures to support the economy, for instance, extending the Corporate Income Tax rebate, bringing forward infrastructure projects in the pipeline, promoting employment and accelerate re-skilling efforts, and ensuring that firms still have access to credit.

29. **At the same time, efforts to promote greater regional economic integration will mitigate the negative impact of trade protectionism in the medium term.** AMRO staff support the authorities' proactive engagement and cooperation with neighboring countries and other external parties. These efforts will position Singapore to benefit from potential trade and investment diversion, particularly in the areas of trade-related services and regional hub activities, and mitigate the negative impact of trade protectionism, which is likely to be prolonged. The deepening and enhancing of trade and FDI ties through bilateral and multilateral trade arrangements is encouraged. In addition, the establishment of Infrastructure Asia, an institution that is involved in infrastructure capacity building, advisory and matching, will further leverage on Singapore's expertise in urban development, infrastructure project financing, risk management, and legal services to facilitate greater infrastructure development in partnership with other countries in the region.

30. **Stronger social safety nets will help improve welfare and mitigate the impact of adverse shocks to the economy and vulnerable segments of the population**.

Commitments to improve social safety nets have been strengthened, together with more targeted spending on healthcare, housing and educational needs, which will promote better socioeconomic outcomes. In this regard, the enhanced means-tested cash-transfers and in-kind benefits targeted at the elderly and older workers are welcomed and continued efforts are encouraged. These measures can help Singapore cope with shocks stemming from potential technological disruptions and unfavorable changes in the external environment, more effectively.

31. **To ensure fiscal sustainability, the authorities have announced additional financing options and fiscal revenue enhancement measures to meet higher projected spending needs over the longer term.** The government is looking at borrowings by Statutory Boards and government-owned companies to support infrastructure building and is also considering the provision of guarantees for some of the long-term borrowings for critical national infrastructure. AMRO staff support this method of financing as the financing costs would be distributed more equitably across generations. We note the authorities intend to increase GST from 7 percent to 9 percent sometime between 2021-2025, in view of higher recurrent spending in areas such as healthcare, security, education and other social spending.

Authorities' Views

32. **Fiscal policy continues to underpin the multi-year transformation process, while ensuring fiscal sustainability over the longer term.** The FY2018 budget continues to be expansionary to support the authorities' ongoing structural transformation agenda, including the boosting of expenditure outlays for infrastructure spending and skill development. Meanwhile, the proposed 2 percentage-point increase in GST rates during 2021-2025 is necessary to meet recurrent spending needs over the longer term. It will also ensure a more diversified revenue base that is resilient to unanticipated external shocks. A comprehensive set of means-tested cash transfers and subsidies for the current elderly are suggested, which will be periodically reviewed to ensure their relevance and ability to meet the required objectives. For example, the Silver Support Scheme automatically supplements the retirement income of the bottom 20 percent of elderly Singaporeans, aged 65 and above, who had low incomes through life and have little or no family support, through quarterly cash payments. Coverage may extend to include up to the next 10 percent of elderly. Silver Support benefitted over 153,000 recipients in 2018. Elderly Singaporeans who are unable to work and have no family support will also receive monthly cash payments via the Comcare Long-Term Assistance scheme.

C.3 Gradual Normalization of Monetary Policy Amidst an Improving Economy

33. **The normalization of monetary policy is in line with the objective of containing price pressures in the medium term.** The slope of the SGD NEER policy band was increased slightly twice last year from zero percent prior to April 2018, in response to the steady improvements in the labor market and above-potential growth, alongside rising inflation. We share the authorities' view that the current monetary policy stance remains slightly accommodative, and supportive of economic activities. Should trade tensions escalate and global financial conditions tighten further and affect Singapore significantly, MAS should consider easing monetary policy to complement the fiscal stimulus.

Authorities' Views

34. **The decisions to normalize monetary policy were carefully deliberated, and are consistent with the objective of maintaining price stability over the medium term.** The sequential slight increases of the SGD NEER band is in line with the mandate of ensuring price stability over the medium term, in light of the improving labor market conditions amidst above-potential growth, which could lead to higher core inflation. Nevertheless, the authorities are closely monitoring the U.S.-China trade conflicts, and are aware of the downside risks to growth and inflation should the trade conflicts escalate and lead to a broader global economic downturn.

C.4 Recalibrating Macroprudential Policy to Preserve Financial Stability

35. **Macroprudential measures to dampen the upswing in property prices were timely and periodic adjustments to housing land supply should be made to help mitigate the risk of a destabilizing correction in prices in the medium term.** In view of the recent resurgence in private residential prices and large increases in new housing loans, recent cooling measures have helped to mitigate the risk of a destabilizing correction in prices in the future, especially given the large pending supply of housing and higher interest rates. To ensure the effectiveness of the measures, it is important that policy recalibrations continue to be clearly communicated to home buyers and developers. Moreover, authorities should continue to adjust housing land supply, taking into account the pace of population growth to prevent a large gap between demand and supply and ensure stability in the property market over the longer-term.

Authorities' Views

36. **The recalibration of macroprudential policies was needed to curb the property price upswing and to ensure stability and sustainability of the property market.** Timely intervention has prevented further sharp price increases in the private residential property market, which could lead to destabilizing price adjustments over the longer-term, in light of the strong supply in the pipeline and rising interest rate environment. New housing loans, which also rose sharply, are also starting to moderate. Incoming public and private housing supply has also been reduced slightly for 2019 to reduce the risk of a sharp decline in prices.

C.5 Active and Sound Development of Fintech while Strengthening Cybersecurity

37. **AMRO welcomes the initiatives by MAS to promote the development and adoption of fintech, which will enhance efficiency, reduce cost and increase accessibility of financial services.** Authorities have been actively promoting the development of fintech while developing and calibrating regulations to mitigate risks**.** For example, MAS has been encouraging the development of Application Programming Interfaces (APIs) to enable efficient data sharing among financial institutions and fintech players. Authorities have adopted a regulatory sandbox approach that focuses on identifying the most important risks and mitigating them through targeted regulations and guidelines. The Fintech Regulatory Sandbox is useful in providing room for fintech firms to explore new business models. Also, the authorities have been active in the development of digital public services, such as the Know-Your-Customer (KYCs) utility, for usage by financial institutions. Building on the momentum of previous years, the 2018

Singapore Fintech festival has attracted investment intentions of up to USD12 billion in ASEAN firms in the next few years. As such, active engagement by MAS in these areas is welcomed, as it will help allow fintech firms and financial institutions to innovate within the perimeters of regulation.

38. **Cyber risk mitigation efforts which have been strengthened on various fronts are commendable.** Authorities have been proactive in addressing increasing cyber security concerns. The Cybersecurity Act,[9] passed in Parliament in February 2018, establishes a legal framework for the oversight and maintenance of national cybersecurity in Singapore across all 11 Critical Information Infrastructures (CIIs).[10] With increasing digitization and greater adoption of financial technologies, the authorities' efforts to further enhance supervision and cyber risk management practices in the financial sector are welcomed. In particular, cyber security standards and framework for financial institutions have been enhanced. In addition to existing requirements for FIs to recover their critical systems from cyber incidents in a timely manner and to protect customer information from unauthorized access or disclosure, MAS is establishing a set of cyber hygiene requirements for FIs to safeguard against cyberattacks. Furthermore, MAS has established a framework and conducted a study to assess the implications of cyber risk on financial stability. The results of the study were published in the 2018 Financial Stability Review. In addition, MAS has also collaborated with various international cybersecurity organizations, such as the Financial Services Information Sharing and Analysis Centre, to facilitate the sharing of cyber threat information amongst financial institutions in Singapore. Cooperation with other financial regulators and central banks have also been established through bilateral and multilateral cyber information sharing arrangements. These efforts to promote information sharing both at the domestic and international levels, across different stakeholders and talent development and broader adoption of general cyber hygiene standards are highly commendable.

39. **As the ASEAN chair for 2018, Singapore has played a significant role in promoting financial integration, cyber resilience and the adoption of financial technologies in the region.** By cooperating with other countries and leveraging on its expertise and role as regional financial center, initiatives in these areas will lead to a safer, more innovative and more inclusive regional financial ecosystem.

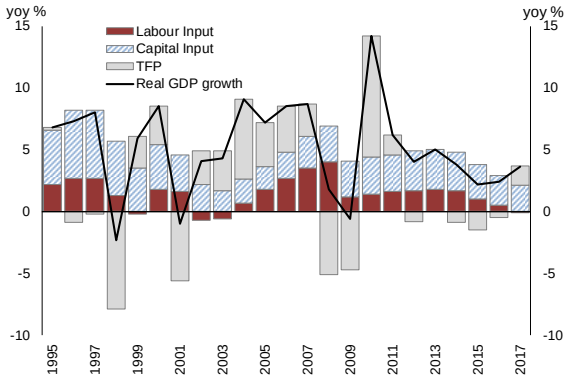
[9]Cyber Security Agency, Singapore. 2018. "Cybersecurity Act." https://www.csa.gov.sg/legislation/cybersecurity-act(last updated January 17, 2019).
[10] Critical Information Infrastructure sectors are government, information and communication, energy, aviation, maritime, land transport, healthcare, banking and finance, water, security and emergency, and media.

Appendices

Appendix 1. Selected Figures for Major Economic Indicators

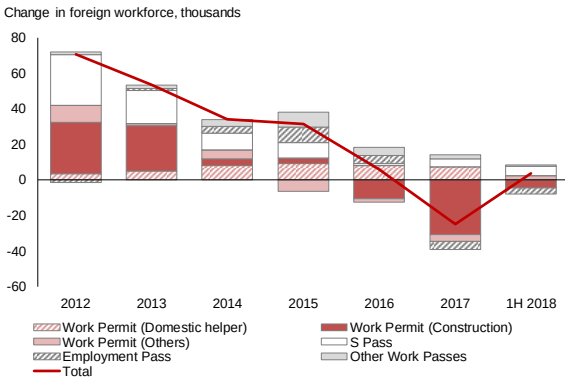
Figure 1.1. Real Sector

Capital and productivity improvements were the drivers of growth in recent years…



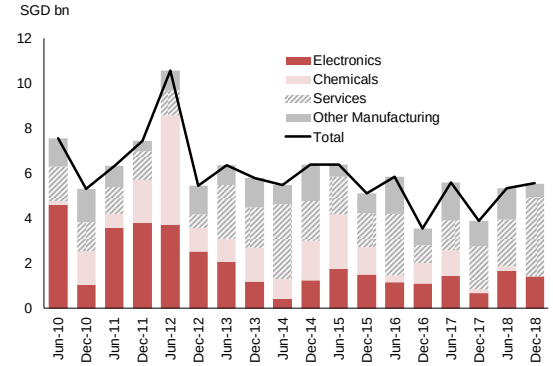
Source: CEIC; Singapore Department Of Statistics

… as foreign worker employment change turned positive in 2018.



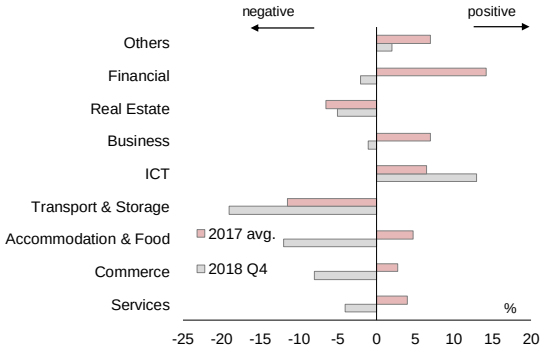
Source: Ministry of Manpower

Although investment commitments in manufacturing and services are still robust, ...



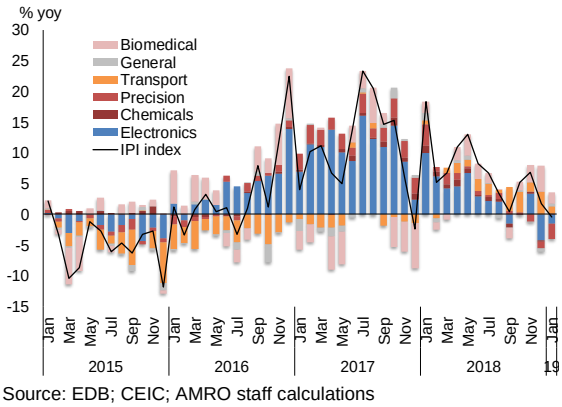
Source: EDB; CEIC; AMRO staff calculations

…business sentiment in most services subsectors has slowed markedly in Q4 2018.



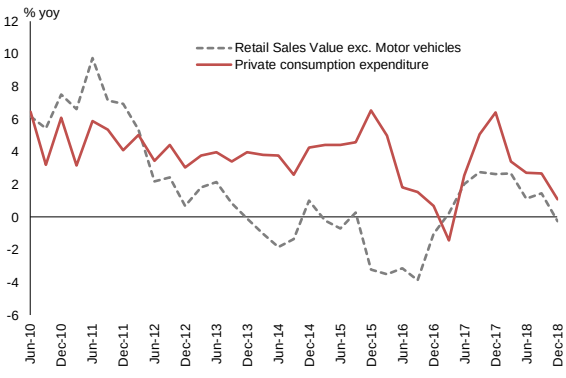
Source: Singapore Department Of Statistic, AMRO staff calculations

Industrial production also slowed markedly in 2018.



Source: EDB; CEIC; AMRO staff calculations

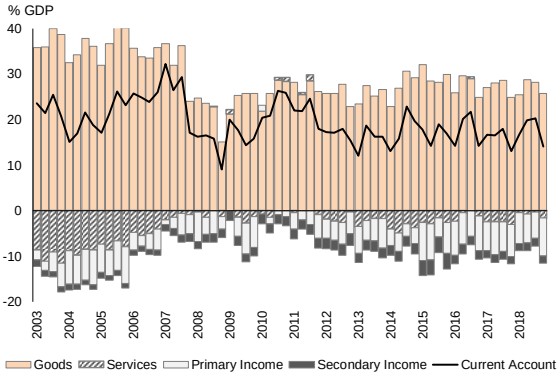
Consumer spending remained soft, as retail sales are still weak.



Source: CEIC; Singapore Department Of Statistics

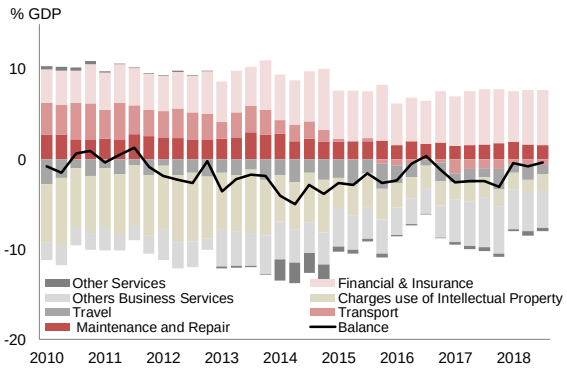
Figure 1.2. External Sector

The current account balance surpluses have remained high.



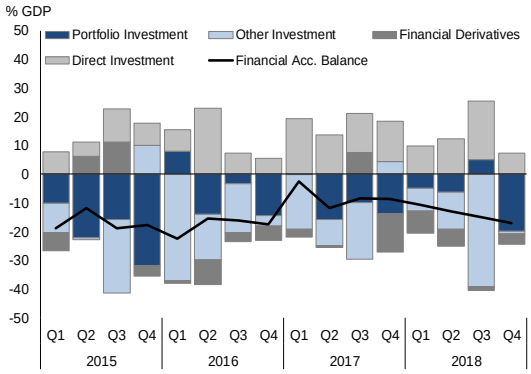
Source: Singapore Department Of Statistics; CEIC

The services trade balance deficit is small.



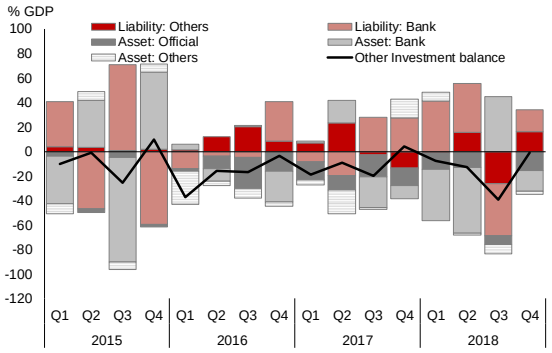
Source: Singapore Department Of Statistics; CEIC

The deficit in the financial account is mostly attributed to other investments...



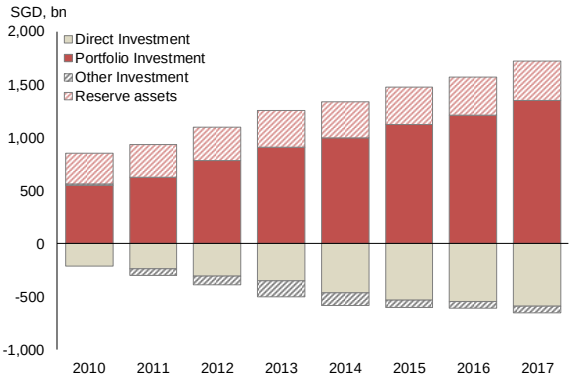
Source: Singapore Department Of Statistics; CEIC

… as banks' net lending to overseas entities have been higher than net borrowings from abroad.



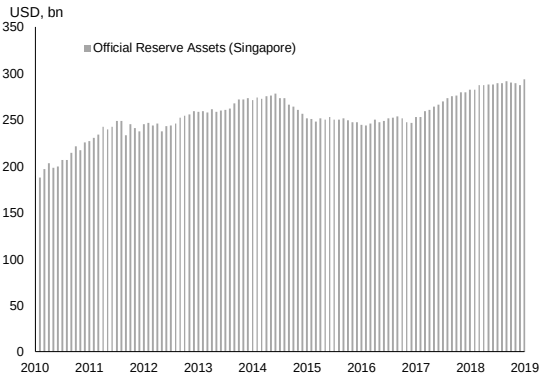
Source: Singapore Department Of Statistics; CEIC

The net investment position continued to increase, driven mainly by portfolio investment.



Source: Singapore Department Of Statistics; CEIC

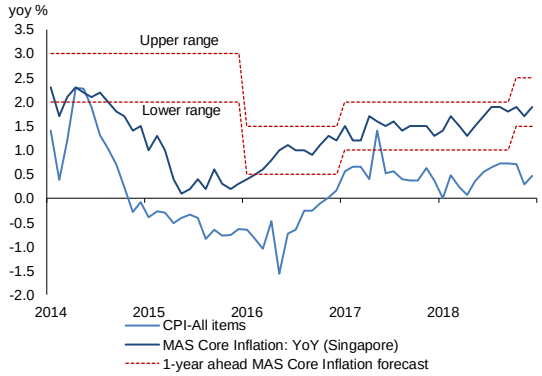
Gross official reserves remain high.



Source: Monetary Authority of Singapore

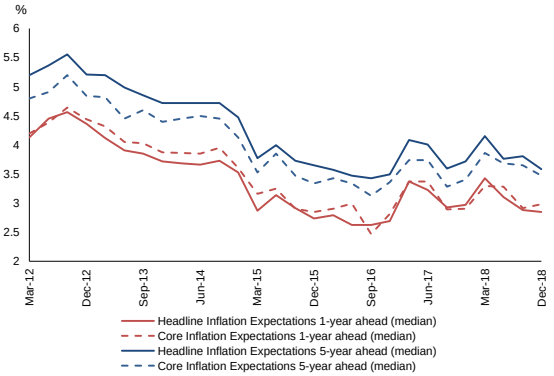
Figure 1.3. Monetary and Financial Sector

Headline inflation rose but was still low while MAS core inflation continued to edge up, to near 2 percent…



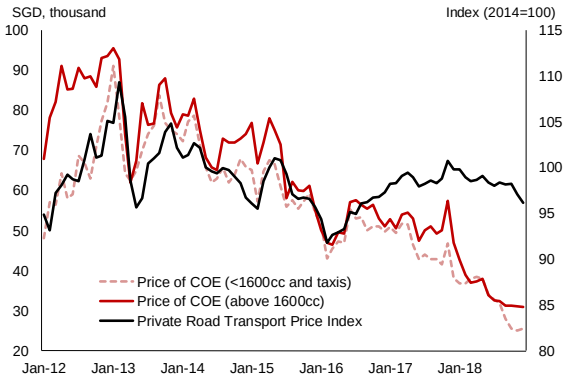
Source: Monetary Authority Of Singapore; Singapore Department Of Statistics; AMRO staff calculations

… and inflation expectations stabilized and rose since 2017, but have edged down in recent quarters.



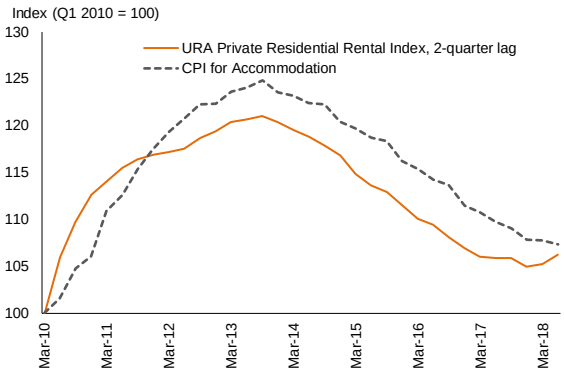
Source: Singapore Index of Inflation Expectations (SInDEx)

Although headline inflation was weighed down by declining prices of car ownership certificates in 2018,



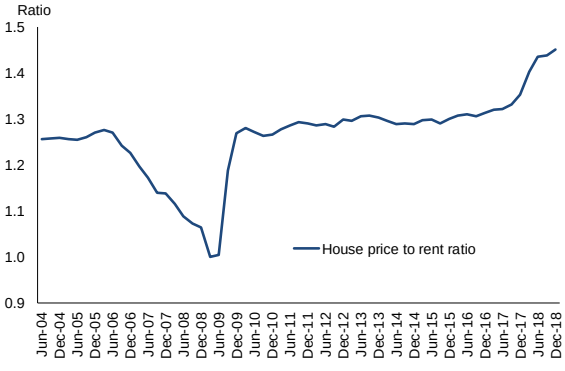
Source: Singapore Department Of Statistics; AMRO staff calculations

… rentals are starting to show signs of recovery, …



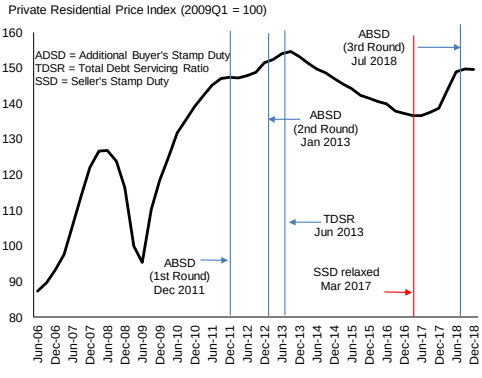
Source: Singapore Department Of Statistics; AMRO staff calculations

… driven in part by a sharp recovery in the private residential property market, which led to a large increase in the house price-to-rent ratio.



Source: Urban Redevelopment Authority; CEIC; AMRO staff calculations

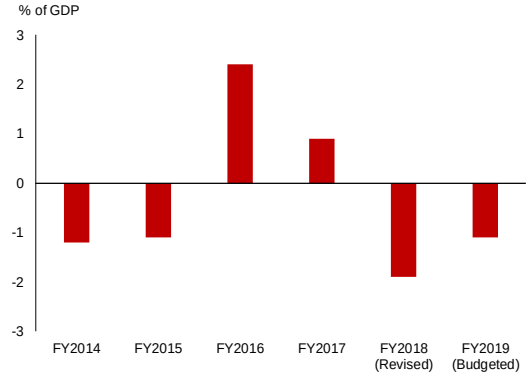
Nevertheless, macroprudential measures introduced since 2009 have been effective in curbing excessive price increases.



Source: CEIC; AMRO staff calculations

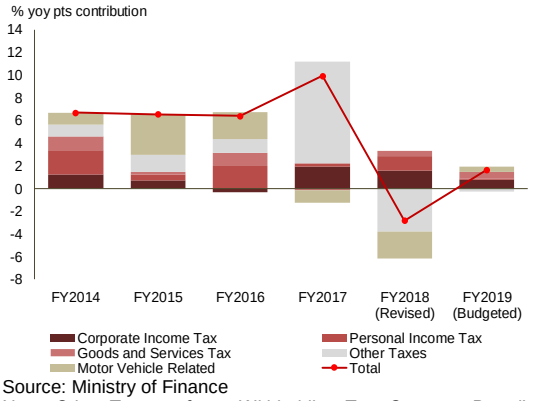
Figure 1.4. Fiscal Sector[11]

The change in the overall fiscal balance in FY2019 is expected to be large.



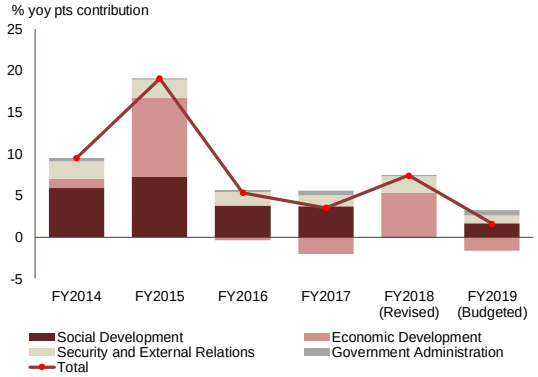
Source: Ministry of Finance

Operating revenue is projected to increase slightly…



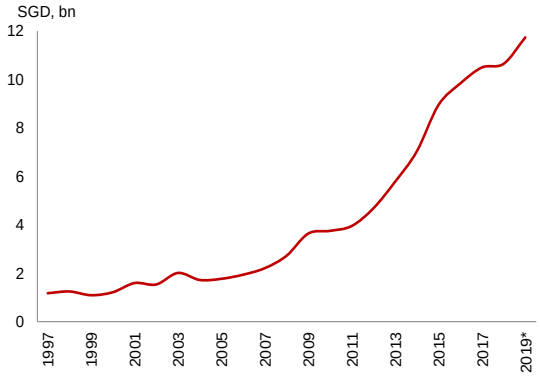
Source: Ministry of Finance
Note: Other Taxes refer to Withholding Tax, Statutory Board's Contributions, Asset Taxes, Customs and Excise Taxes, Betting Taxes, Stamp Duty, Other Taxes and Other Fees and Charges and Others.

and expenditure is expected to increase, particularly in the area of social development…



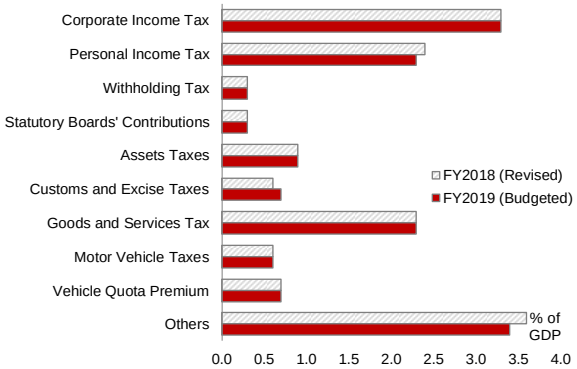
Source: Ministry of Finance

…as MOF's budgeted health-related expenditures will continue to increase as the population ages.



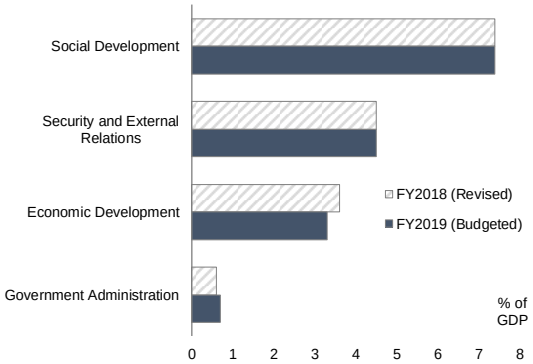
Source: Ministry of Finance

The bulk of operating revenue is derived from corporate, personal income and GST taxes …



Source: Ministry of Finance; AMRO staff calculations
Note: Others refer to Betting Taxes, Stamp Duty, Oher Taxes, and Other Fees and Charges and Others.

… while expenditure outlays are primarily in social and economic development, and security.



Source: Ministry of Finance; AMRO staff calculations

[11] Based on available data as of 19 February 2019.

Appendix 2.Selected Economic Indicators for Singapore

	2014	2015	2016	2017	2018	Projection	
						2019	2020
Real Sector and Prices	(in annual percentage change, unless otherwise indicated)						
Real GDP	4.1	2.5	2.8	3.9	3.2	2.5	2.6
Real private consumption	3.6	5.0	2.2	3.2	2.4	3.4	3.5
Real public consumption	0.1	7.8	4.3	4.2	3.6	5.0	5.1
Gross fixed capital formation	6.5	1.5	0.9	5.3	-3.4	0.5	1.0
Exports of goods & services	3.1	5.0	0.8	5.4	5.2	2.4	2.6
Imports of goods & services	3.0	3.6	0.6	7.0	4.5	2.4	2.7
MAS core inflation	1.9	0.5	0.9	1.5	1.7	2.0	2.0
Consumer price inflation	1.0	-0.5	-0.5	0.6	0.4	1.1	1.5
Unemployment rate, Annual Average	2.0	1.9	2.1	2.2	2.1	2.1	2.0
External Sector	(in percent of GDP, unless otherwise indicated)						
Current account	17.9	17.0	17.5	16.0	17.7	18.0	18.5
Capital and Financial Account [1]	-15.7	-16.8	-17.9	-7.9	-13.9	-9.0	-11.0
Direct investment (net)	5.2	8.0	10.7	15.2	12.4	13.0	13.0
Portfolio investment (net)	-14.9	-20.1	-6.1	-10.0	-6.6	-11.0	-12.0
Other investment (net)	-6.9	-6.5	-18.1	-10.7	-15.1	-14.0	-14.5
Derivatives (net)	0.9	1.8	-4.4	-2.4	-4.6	3.0	2.5
Overall Balance of Payments	2.2	0.4	-0.6	8.1	3.5	9.0	7.5
International Reserves (USD bn, end period)	256.9	247.7	246.6	279.9	287.7	-	-
Fiscal Sector	FY2014	FY2015	FY2016	FY2017	FY2018*	FY2019*	FY2020*
Operating Revenue (% GDP)	15.1	15.3	15.4	16.2	15.3	15.1	14.9
Total Expenditure (% GDP)	14.1	15.9	15.9	15.7	16.1	16.0	15.8
Primary Surplus / Deficit (% GDP)	1.0	-0.6	-0.5	0.5	-0.8	-0.9	-1.0
Overall Budget Surplus / Deficit (% GDP)	0.1	-1.0	1.4	2.3	0.7	-0.5	-0.7
Monetary	(in annual percentage change, unless otherwise specified)						
3-month SGD Sibor (% end period)	0.5	1.2	1.0	1.5	1.9	-	-
Domestic Liquidity Indicator (end period)	0.0	0.2	-0.2	0.1	0.0	-	-
Narrow Money M1	8.6	6.7	5.5	5.4	-1.2	-	-
Broad Money M2	7.6	4.0	8.4	4.1	5.1	-	-
Memorandum items							
Straits Times Index (end period)	3365	2883	2881	3403	3069	-	-
Private Residential Property Index (2009Q1=100)	147.0	141.6	137.2	138.7	149.6	-	-
Spot exchange rate (SGD/USD, period avg.)	1.27	1.37	1.38	1.38	1.35	-	-
NPL Ratio of Local Banks (%, end period)	0.9	1.1	1.4	1.6	1.5	-	-

* Fiscal Sector's figures for FY2018, FY2019, and FY2020 reflect AMRO staff calculations.
Note: 1) There has been a change in sign convention for the financial account, based on BPM6. A positive sign now indicates an increase in assets or liabilities, and net outflows in net balances. However, this figure still uses the previous sign conventions.
Source: Singapore authorities; CEIC; AMRO staff calculations

Appendix 3. Balance of Payments and International Investment Position

in percent of GDP, unless otherwise indicated	2013	2014	2015	2016	2017	2018
Current Account	15.8	17.9	17.0	17.5	16.0	17.7
Goods: Balance	25.7	27.5	29.6	27.3	27.1	27.0
Exports	147.4	140.8	125.9	115.1	118.8	124.8
Imports	121.7	113.3	96.2	87.8	91.7	97.8
Services: Balance	-2.3	-3.9	-2.4	-0.9	-2.6	-0.8
Exports	47.0	49.7	50.9	49.6	51.3	51.0
Imports	49.3	53.6	53.3	50.5	53.9	51.8
Primary Income Balance	-5.4	-3.4	-6.8	-6.9	-6.8	-6.8
Secondary Income Balance	-2.1	-2.2	-3.4	-1.9	-1.6	-1.7
Capital and Financial Account	9.8	15.7	16.8	17.9	7.9	13.9
Direct Investment	-6.3	-5.2	-8.0	-10.7	-15.2	-12.4
Assets	14.8	16.8	14.8	12.6	13.0	10.3
Liabilities	21.1	21.9	22.8	23.2	28.2	22.7
Portfolio Investment	21.0	14.9	20.1	6.1	10.0	6.6
Assets	20.4	15.7	18.1	7.4	14.2	5.7
Liabilities	-0.6	0.9	-2.0	1.3	4.3	-0.9
Other Investments	-0.6	6.9	6.5	18.1	10.7	15.1
Assets	31.4	23.6	8.6	31.6	20.9	30.3
Liabilities	32.0	17.1	2.1	13.6	10.2	15.2
Financial Derivatives	-4.3	-0.9	-1.8	4.4	2.4	4.6
Overall Balance	**6.0**	**2.2**	**0.4**	**-0.6**	**8.1**	**3.5**
Net International Investment Position* (SGD bn, end period)	766.2	772.8	880.1	964.2	1,075.0	1,143.1
External Assets	3,704.3	4,031.6	4,313.6	4,566.4	4,838.8	5,096.2
External Liabilities	2,938.1	3,258.8	3,433.5	3,592.2	3,763.8	3,953.1

* Latest available estimates for 2018 are as at Q3 2018
Source: Singapore authorities, CEIC, AMRO staff calculations

Appendix 4. Government Accounts

Unit: SGD Billion	FY2014	F`Y2015	FY2016	FY2017	FY2018 (Revised)	FY2019 (Budgeted)
Operating Revenue	**60.8**	**64.8**	**69.0**	**75.8**	**73.7**	**74.9**
% of GDP	15.1	15.3	15.4	16.2	15.0	14.8
% yoy	6.7	6.6	6.4	9.9	-2.8	1.7
Tax Revenue	**54.1**	**55.6**	**58.7**	**66.4**	**66.8**	**67.7**
Income Tax	23.9	24.9	26.4	31.3	28.3	30.1
Corporate Income Tax	13.4	13.8	13.6	14.9	16.1	16.7
Personal Income Tax	8.9	9.2	10.5	10.7	11.7	11.8
Withholding Tax	1.1	1.4	1.5	1.5	1.5	1.3
Statutory Boards' Contributions	0.5	0.4	0.8	4.9	1.5	1.3
Assets Taxes	4.3	4.5	4.4	4.4	4.6	4.7
Customs and Excise Taxes	2.5	2.8	2.7	3.1	3.1	3.5
Goods and Services Tax	10.2	10.3	11.1	11.0	11.3	11.7
Motor Vehicle Taxes	1.6	1.8	2.1	2.1	2.9	3.1
Betting Taxes	2.6	2.7	2.7	2.7	2.7	2.7
Stamp Duty	2.8	2.8	3.3	4.9	4.6	4.0
Other Taxes	6.1	5.9	6.0	6.0	6.8	6.7
Fees and Charges	**6.4**	**8.7**	**9.8**	**9.1**	**6.5**	
Vehicle Quota Premiums	3.4	5.4	6.6	5.8	3.3	3.4
Other Fees and Charges	3.0	3.2	3.2	3.3	3.2	3.4
Other Receipts	0.3	0.5	0.5	0.4	0.4	0.4
Total Expenditure *	**56.6**	**67.4**	**71.0**	**73.6**	**79.0**	**80.3**
% GDP	14.1	15.9	15.9	15.7	16.1	15.8
% yoy	9.5	19.1	5.3	3.5	7.4	1.6
Operating Expenditure	**42.7**	**48.1**	**52.1**	**55.6**	**58.6**	**60.8**
Education	10.7	11.2	11.8	12.1	12.6	12.5
Health	5.9	7.5	8.2	8.7	9.1	10.0
Social and Family Development	1.7	2.1	2.4	2.5	2.7	2.9
Development Expenditure	**14.0**	**19.4**	**18.9**	**18.0**	**20.4**	**19.5**
Transport	5.5	10.3	9.3	7.6	9.8	8.6
Trade and Industry	2.1	2.4	2.9	2.7	3.7	3.4
Primary Surplus/Deficit	**4.2**	**-2.6**	**-2.1**	**2.3**	**-5.3**	**-5.4**
% of GDP	1.0	-0.6	-0.5	0.5	-1.1	-1.1
Less: Special Transfers Excluding Top-ups to Endowment and Trust Funds ***	**3.9**	**4.4**	**2.8**	**2.1**	**1.7**	**1.7**
Basic Surplus / Deficit	**0.3**	**-7.0**	**-4.9**	**-0.1**	**-7.0**	**-7.1**
Less: Top-ups to Endowment and Trust Funds **	**8.5**	**6.0**	**3.6**	**4.0**	**7.3**	**13.6**
Add: Net Investment Returns Contribution ****	**8.7**	**8.9**	**14.6**	**14.7**	**16.4**	**17.2**
Overall Budget Surplus / Deficit	**0.6**	**-4.1**	**6.1**	**10.9**	**2.1**	**-3.5**
% GDP	0.1	-1.0	1.4	2.3	0.4	-0.7

* Total Expenditure consists of operating expenditure and development expenditure.
** The government endowment fund is a fund established with an injection of government monies as principal, for which only the income earned will be used to finance specific programs on an ongoing basis. Examples include the Community Care Endowment Fund and Edusave Endowment Fund. The government trust fund is a fund established with an injection of government monies as principal, for which both the principal and income earned on the principal could be drawn down to finance specific programs on an ongoing basis. Examples include the National Research Fund and the GST Voucher Fund.
*** Refers to discretionary transfers made by the Government and these include one-off direct transfers to businesses and households.
**** Contributions from investment returns on Singapore's reserves, where Net Investment Returns is the sum of: (1) up to 50 percent of the expected long-term real returns on the relevant assets specified in the Constitution; and (2) up to 50 percent of the Net Investment Income on the remaining assets. Through the NIR contributions that supplement the annual Budget, Singaporeans benefit from the investments of GIC and Temasek.
Source: Ministry of Finance

Appendix 5. Data Adequacy for Surveillance Purposes: a Preliminary Assessment

Criteria/ Key Indicators for Surveillance	Availability[(i)]	Reporting Frequency/ Timeliness[(ii)]	Data Quality[(iii)]	Consistency [(iv)]	Others, if Any[(v)]
National Account	Available	Quarterly, within two months of the end of the reference quarter (for preliminary data)	-	-	-
Balance of Payments (BOP)	Available	Quarterly, within two months after the end of the reference quarter (for preliminary estimates)	-	-	-
International Investment Position (IIP)	Available	Quarterly, within three months after the end of the reference quarter (for preliminary estimates)	-	-	-
External Debt	Available	Quarterly, within three months after the end of the reference quarter (for preliminary estimates)	-	-	-
State Budget and Government	Available	Central government revenue (monthly, within two months of the end of the reference period). Central government expenditure (quarterly, within two months of the end of the reference period).	-	-	-
Money Supply and Credit Growth	Available	Monthly, within one month of the end of the reference period	-	-	-
Financial Sector Soundness Indicators	Available	Quarterly, within six months	-	-	-
State-owned-enterprises Statistics (vi)	Available if publicly listed on the stock exchange, otherwise limited	Quarterly data available for listed companies within two months of the reference quarter, but not available for non-listed companies.	-	-	-
Housing Market Indicators	Available	Quarterly, within two months of the end of the reference quarter (for preliminary data)	-	-	-

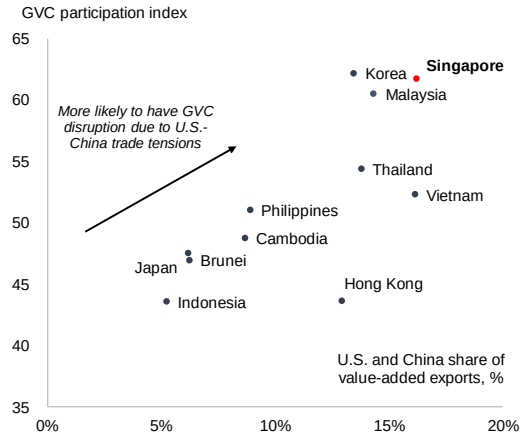
Notes: (i) Data availability refers to whether the official data are available for public access by any means.
(ii) Reporting frequency refers to the periodicity that the available data are published. Timeliness refers to how up-to-date the published data are relatively with the publication date.
(iii) Data quality refers to the accuracy and reliability of the available data given the data methodologies are taken into account.
(iv) Consistency refers to both internal consistency within the data series itself and its horizontal consistency with other data series of either same or different categories.
(v) Other criteria might also apply, if relevant. Examples include but are not limited to potential areas of improvement for data adequacy.
(vi) This refers to the government-linked companies, not SOEs.
Source: AMRO staff compilations. This preliminary assessment will form the “Supplementary Data Adequacy Assessment" in the EPRD Matrix.

Annexes: Selected Issues

Annex 1. The Impact of U.S.-China Trade Conflict on Singapore[12]

1. **The adverse impact of the U.S.-China trade conflict on Singapore is expected to be significant, mainly through indirect channels including GVCs and economic slowdown in China, the U.S. and other regional economies.** Despite the 90-day truce between U.S. and China, trade relations between the two countries remain uncertain[13]. At this juncture, the unresolved trade conflict is still a key downside risk to the region and Singapore. Although the direct impact of tariffs on Singapore's exports to the U.S. is small, the indirect channels of the trade conflict are assessed to be significant. First, Singapore's intermediate goods exports to China can be hit hard if China's exports to the U.S. were to slow markedly in the coming quarters due to its high GVC participation level (Figure A1.1). Second, second-order effects through slower global growth can be substantial if there is a sharp deterioration in sentiments considering the importance of China, the U.S. and other regional economies to Singapore's external demand (Singapore's value-added (VA) generated by gross exports to China, the U.S. and ASEAN-5 accounted for 9.5, 6.7 and 13.4 percent of Singapore's total value-added in 2017, respectively[14]). Potential trade and FDI diversion from China to the ASEAN region can provide some cushion to the impact, but the magnitude is difficult to gauge and the diversion may take longer to materialize due to uncertainties over the trade situation. As such, this selected issue seeks to examine the various transmission channels through which Singapore's economy is affected by the trade conflict, complemented by model simulations and available survey findings.

Figure A1.1 GVC Participation Index and Share of VA exports to U.S. and China



Note: GVC participation index is the sum of backward and forward linkages. The higher the number, the more integrated an economy is in GVCs.
Source: National Authorities; OECD TiVA database

Figure A1.2 Estimated Impact on Real GDP Growth

Economy	Change in Real GDP Growth (% Pts)	
	Base Scenario	Adverse Trade Scenario
China	-0.18	-0.60
U.S.	-0.16	-0.52
Hong Kong	-0.29	-1.00
Korea	-0.19	-0.63
Japan	-0.07	-0.26
Singapore	-0.30	-0.99
Malaysia	-0.12	-0.41
Indonesia	-0.09	-0.31
Thailand	-0.06	-0.24
Philippines	-0.09	-0.36
Vietnam	-0.07	-0.24

Source: Oxford Economics; AMRO staff estimates

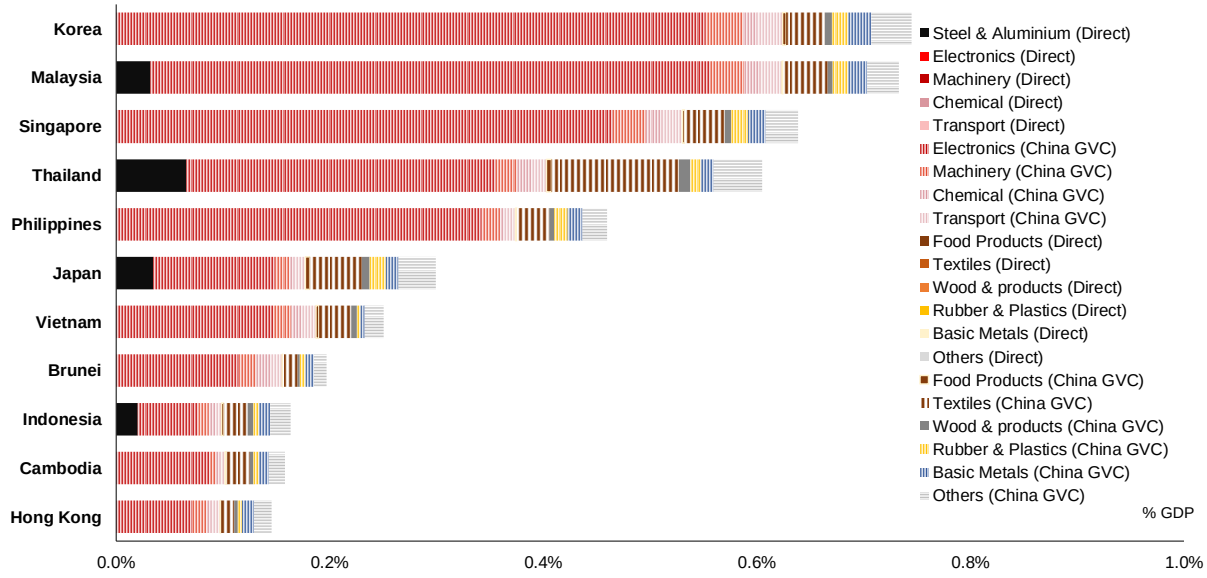
2. **Based on Oxford Economics' Global Economic Model, AMRO estimates that Singapore would be affected by up to 0.3ppts of GDP growth in 2019 and 2020, potentially increasing to 1ppt if trade tensions were to escalate under the worst-case scenario (Figure**

[12] Prepared by Mr Edmond Choo Chiang Yong (Research Analyst) and Mr Justin Lim Ming Han (Researcher).
[13] U.S.-China trade tensions reached critical levels in June 2018 following the imposition of 25 percent U.S. tariffs on $50 billion of its imports from China, and reciprocal retaliation by China. Additional U.S. tariffs on $200 billion were also implemented effective September, which may increase further from 10 percent to 25 percent by January 2019. However, the latter measure has been postponed to early March 2019 after both countries agreed to a 90-day truce during December's G20 meeting.
[14] Based on the MTI Q3 2018 quarterly economic survey.

A1.2). Two scenarios are used to simulate the impact of tariffs on GDP growth and its second-order effects on the broader economy, with the worst-case scenario potentially materializing by March 2019 if the U.S. proceeds with its threat to impose 25 percent tariffs on all Chinese imports[15]. The impact of U.S.-China trade conflicts on Singapore will be amongst the most severe.[16] The sizable impact is due to its high dependency on trade, in addition to subsequent second-order impact on Singapore's economy stemming from a slowdown in either the U.S. or China, since Singapore's trade exposures to China and the U.S. are also among the highest in the region (Figure A1.1). More importantly, the downside risk to growth would be greater if there is a sharp deterioration in sentiments, which can result in heightened risk aversion and volatility in financial markets, thereby further exacerbating and prolonging the global economic downturn.

3. **Although the direct impact is small, the total indirect exposure of Singapore's goods exports to U.S. tariffs on imports from China through GVCs is estimated at around 0.6 of GDP (Figure A1.3).** The direct impact from the blanket trade actions by U.S. on washing machines, solar panels, steel and aluminium would be limited as these products only account for a modest 0.1 percent of Singapore's domestic exports. However, by decomposing the origin of China's value-added exports to the U.S. using the 2015 OECD Trade in Value-Added (TiVA) database, the total indirect exposure of Singapore's goods exports to U.S. tariffs on imports from China is estimated at around 0.6 of GDP, which is among the highest in the region.

Figure A1.3 Value-Added Exports that are Exposed to U.S. Trade Actions through GVCs* (% GDP)

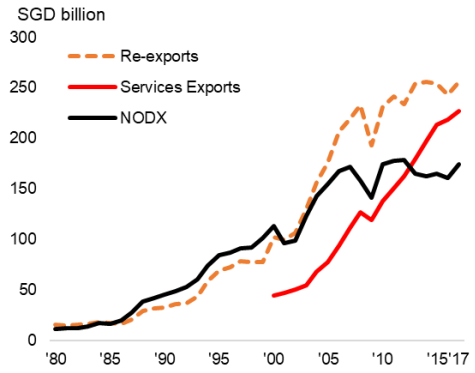


* Value-added exports are based on the latest available data (2015).
Note: China's value-added exports exposure to U.S. trade actions is estimated at 3.3 percent of GDP in 2015. In order to assess the net impact of tariffs, the foreign value-added of targeted exports is deducted from China's total exports. For example, the direct impact of U.S. Section 301 investigations on China's exports (solid red bars) excludes foreign VA of Chinese electronics, machinery, chemicals and some transport equipment exports. This foreign VA, where they are sourced from the economies in the region, are added to the impact on exports of those economies as spillovers through GVCs.
Source: OECD Trade-in Value Added 2018 Database (TiVA); AMRO staff estimates

[15] Under the baseline scenario, U.S. imposes 25 percent tariffs on $50 billion plus 10 percent tariffs on an additional $200 billion of imports from China, while China retaliates by imposing 25 percent tariffs on $50 billion plus 5-25 percent tariffs on an additional $60 billion of imports from the U.S. Under the worst-case scenario, the U.S. and China impose 25 percent tariffs on all imports from each other. The scenarios do not include mitigating policy responses to shocks.
[16] The impact on Korea and other ASEAN-5 countries is estimated at between -0.2 to -0.6ppts.

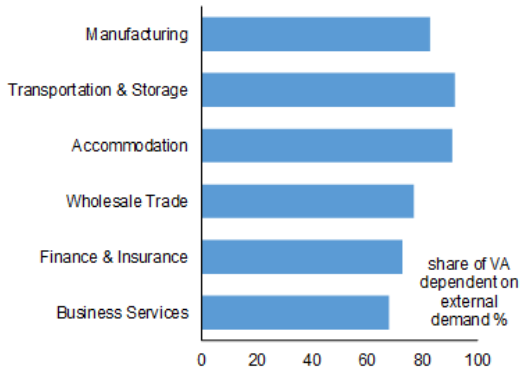
4. **In the coming quarters, second-order effects of the trade conflict via slower growth in Singapore's key trading partners can be significant, dampening Singapore's trade-oriented service exports.** Because of the prolonged trade conflict, there could be a pullback in growth in Singapore's key final demand markets such as China, U.S. and the ASEAN-5. As a financial and trade hub for the region, Singapore's dependence on the services sector is underpinned by its rising services exports that have surpassed NODX in recent years (Figure A1.4). A moderating external environment would not only result in slower demand for Singapore's goods exports, but also weaken the performance of Singapore's trade-oriented services sectors. The value-added derived from external demand for some trade-oriented services sectors such as transportation and storage, accommodation, wholesale trade, finance and insurance and business services, are high and comparable to the manufacturing sector (Figure A1.5). In this regard, a pullback in global demand due to the trade conflict would thus also affect Singapore's broader economy, particularly its services sector that has been a primary growth driver.

Figure A1.4 Services, NODX and Re-exports



Source: Enterprise Singapore; Singapore Department of Statistics

Figure A1.5 External Demand's Share of Total VA in Selected Trade-Dependent Sectors, 2015



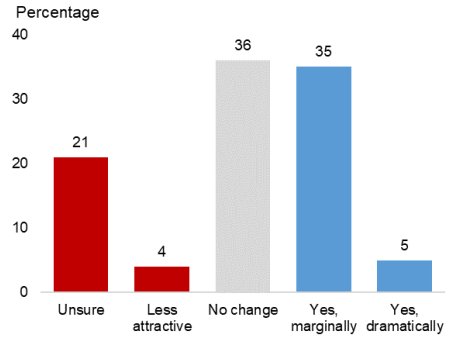
Source: MTI-ECD estimates

5. **While the impact of the trade conflicts is negative in the short-run, there could be some positive impact over the longer term as MNCs and corporates relocate from China to ASEAN economies, thereby providing some benefits to Singapore, particularly in the electronics and services sectors.** An increasing number of manufacturers in China have been relocating their production to ASEAN economies because of their relatively lower wages. Hence, the ongoing U.S.-China trade conflict may accelerate corporates' relocation to the region, particularly Malaysia, Thailand and Vietnam, benefitting Singapore in the process given its role as a trade and financial hub. A recent survey[17] by the American Chamber of Commerce in Singapore (AmCham) showed that four in 10 corporates headquartered in Singapore view ASEAN as an attractive business location (Figure A1.6). These findings corroborate AMRO's estimates of the long-run potential benefits using the Global Trade

[17] The survey was conducted by market research consultancy Blackbox Research in November 2018 for AmCham Singapore. The survey period was from 27 September to 6 October 2018. Of the 179 Singapore-based member companies polled, 63 percent are American companies. 21 percent of the respondents have global coverage; 55 percent Asia-Pacific and 15 percent have ASEAN presence. Companies from the services sector take up 42 percent; manufacturing sector 26 percent with the rest in other sectors. More details and survey results can be found here: https://www.amcham.org.sg/weekly-updates/amcham-launches-survey-results-us-china-trade-war/

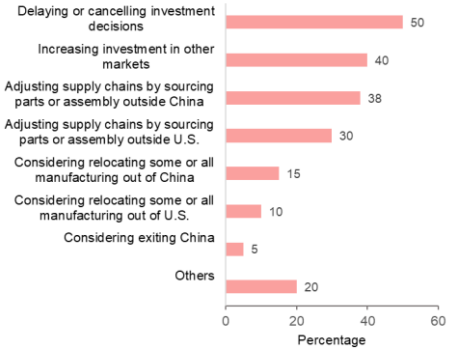
Analysis Project (GTAP) model. As shown in Table A1.1, the simulations suggest that the production of electronics and machinery will increase in Malaysia, Thailand and Singapore due to tariffs. Moreover, Singapore's trade-dependent service sectors should also stand to gain due to its regional hub role, despite being less forthcoming in the GTAP model estimates.

Figure A1.6 Responses on ASEAN Emerging as a More Attractive Place for Business



Source: AmCham Singapore

Figure A1.7 Investment Decisions of Singapore Firms



Source: AmCham Singapore

Table A1.1 Estimated Long-term Impact on Industrial Production by Sector

Country	Sector								
	Total	Electronics & Machinery	Automotive	Agriculture	Apparel	Chemicals	Metal	Services	Others
China									
U.S.									
Hong Kong									
Korea									
Japan									
Singapore									
Malaysia									
Indonesia									
Thailand									
Philippines									
Vietnam									
Cambodia									
Brunei									
Laos									
Rest of World									

Note: Darker shades of red in the heatmap denote more significant negative impact (-0.1 to -0.6 percent of GDP), yellow shades denote neutral or little impact (-0.1 to 0.1 percent of GDP), while greener shades denote positive impact from the trade scenarios (0.1 to 0.6 percent of GDP).
Source: AMRO staff estimates using GTAP Model Version 9

6. **However, the potential benefits may take longer to materialize as there is considerable uncertainty in the adjustment process.** Despite the benefits, many businesses are still adopting a wait-and-see approach, holding back on planned capital expenditure given the overarching uncertainty in the business climate and the associated high relocation costs. Although Figure A1.7 shows that 15 percent of the respondents – many of which are regional headquarters – are considering relocating their manufacturing facilities outside of China, or exiting China completely, at least half are delaying or canceling their investment plans in the region. As such, the potential gains to the region and Singapore are likely to be limited in the short term, and a significant part will take longer to materialize due to the prolonged uncertainty over trade relations between the U.S. and China.

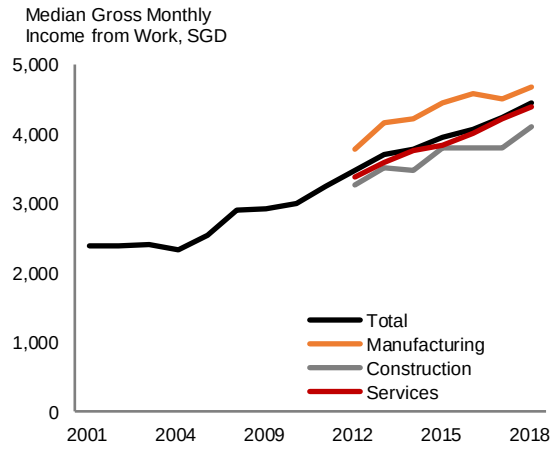
7. **If the US-China trade conflicts were to escalate, the authorities should stand ready to employ mitigating fiscal measures, supported by ongoing efforts to deepen**

existing trade and investment ties. Fiscal policy can play a leading role in mitigating the impact of an escalating trade conflict. For example, manufacturers with significant direct and indirect exposures to China may be supported via targeted and time-bound assistances. This may include financing assistance, complemented by advisory services about potential trade issues. At the same time, efforts to promote greater regional economic cooperation are encouraged. This is because the authorities' proactive engagement and cooperation with neighbouring countries and other external parties, will enable Singapore to benefit from potential trade and investment diversion, particularly in the areas of trade-related services and regional hub activities. In particular, given Singapore's strategic location in Southeast Asia, companies looking to relocate could leverage on Singapore's connectivity and local knowledge to expand in the region. In this regard, the ongoing deepening and enhancement of trade and FDI ties through existing bilateral and multilateral trade arrangements is commendable.

Annex 2. The Impact of Technology on Wages and Productivity in Singapore[18] [19]

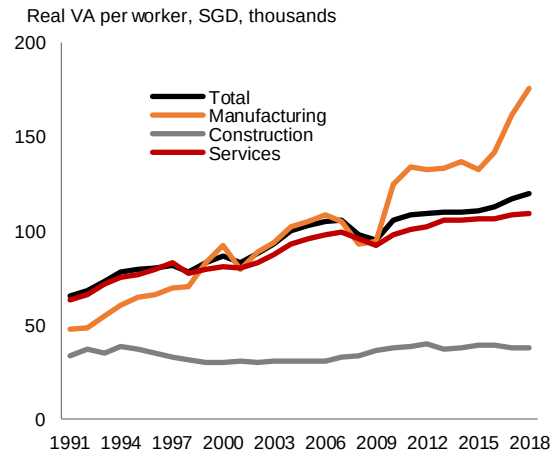
8. **This selected issue examines the impact of technology on monthly wages and productivity in Singapore.** Although technological advances have been key in raising sustainable income levels over the longer-term, their adverse distributional effects in relation to wage growth and employment prospects can be a cause for concern. Studies[20] show that the impact of these new technologies on the labor market are uneven and can persist over prolonged periods. As much as technology increases job prospects, productivity and wages of skilled workers, they can also displace labor in tasks made redundant by these changes. In the case of Singapore, the upskilling of the workforce and growing high-skilled premium have occurred alongside greater utilization of ICT by workers over time. However, the impact of ICT on wages of low- to medium-skilled workers and labor-intensive sectors such as construction, wholesale and retail and transport may be less significant. This section examines whether wages and productivity have indeed increased because of greater technological adoption, and secondly, analyzes the distributional effects of technology on wages**.**

Figure A2.1 Median Gross Monthly Income by Sector



Source: Ministry of Manpower

Figure A2.2 Real VA per Worker by Sector



Source: Ministry of Manpower

9. **Singapore's robust wage growth has been witnessed in both manufacturing and services sectors since the 1990s, supported in part by real productivity growth.** Figure A2.1 shows that the median gross income (including employer CPF) increased from SGD2,387 in 2001 to SGD4,437 by 2018 (Figure A2.1). Income growth was higher for workers in the manufacturing sector, while productivity improvements in manufacturing have outpaced services since the GFC (Figure A2.2). On the other hand, the relatively slower productivity growth in services has not resulted in slower growth in service sector income.

10. **From an occupational standpoint, however, wage and employment gains are uneven and tend to be towards high-skilled workers.** Over the past decade, wage growth of high-skilled workers has generally outpaced other skill segments, accelerating since the

[18] Based on Han, Justin Lim Ming. 2018. "Impact of Technology on Wages and Productivity in Singapore." AMRO Working Paper 18-04, ASEAN+3 Macroeconomic Research Office, Singapore.
[19] Prepared by Mr Justin Lim Ming Han (Researcher).
[20] Research shows that this shift is also notable in advanced countries (Autor and Dorn, 2013) and other ASEAN countries, with empirical evidences supporting technology-induced skill premia in Indonesia (Lee and Wie, 2013) and Malaysia (Justin et al, 2017).

GFC (Figure A2.3). The number of highly-skilled resident workers also increased significantly from 0.3 million in 1990 to more than 1.2 million by 2017 (Figure A2.4). In comparison, wage growth for low-skilled workers was slower than that of high skilled workers between 2002 and 2012, but has picked up in the 2010s because of the various government support schemes targeted at enhancing productivity and wage growth of workers in the related segments (AMRO, 2017). For example, the Workfare Income Supplement Scheme introduced in 2007 to top up wages of low-income workers, the Wage Credit Scheme in which the government co-funds qualifying wage increases for Singaporeans, and the Progressive Wage Model in 2012 – mandatory wage increases for local residents in selected sectors.

Figure A2.3 Real Annualised Change in Median Gross Monthly Income by Occupation

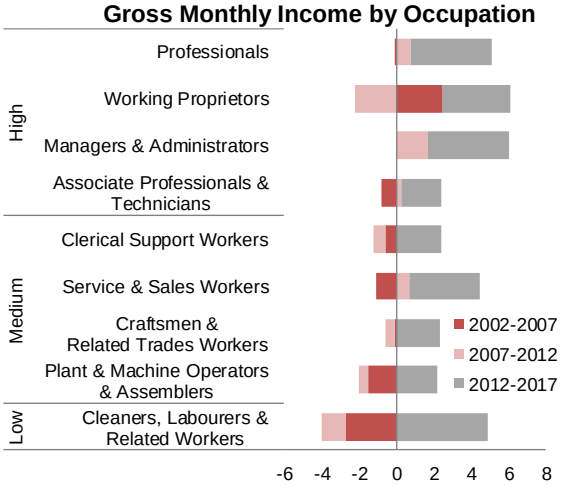
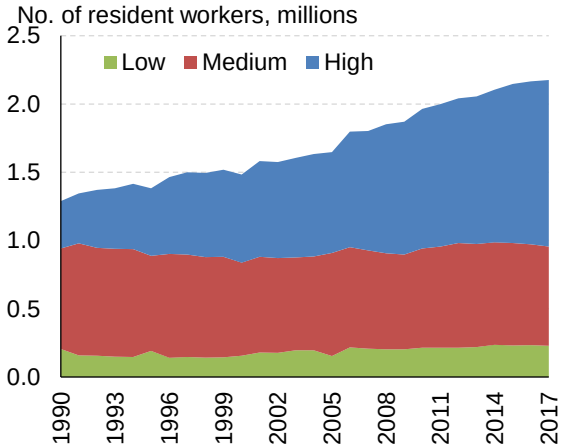


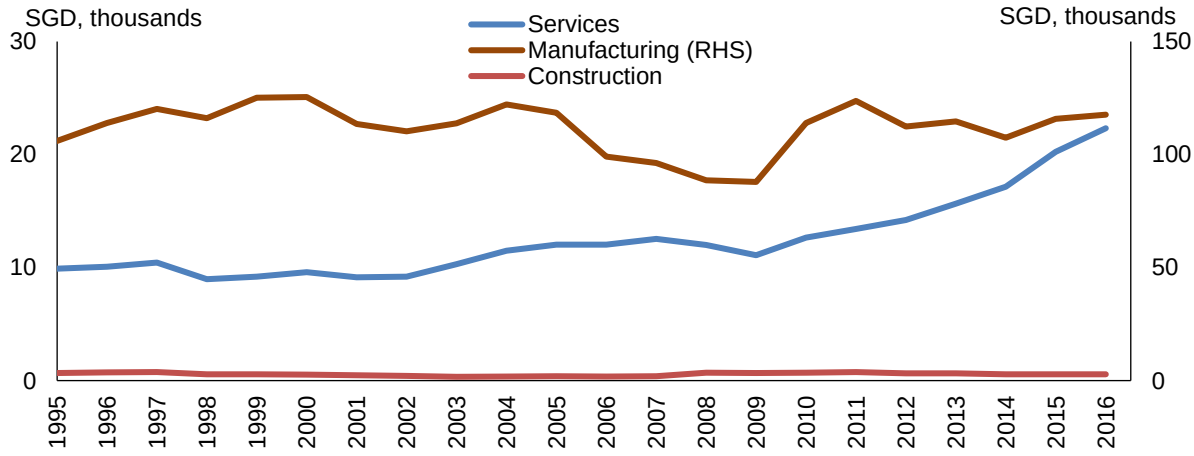
Figure A2.4 Resident Workers by Skill Level



Note: High-Skilled refers to Mangers, Professionals, Technicians and Associate Professionals; Medium-Skilled refers to Clerical Support, Services and Sales, and Low-Skilled Agriculture; and Low-skilled refers to elementary occupations.
Source: Ministry of Manpower; Department of Statistics Singapore; AMRO staff estimates

11. **In the services sector, the use of ICT has accelerated since the early 2010s.** Figure A2.5 shows that ICT utilized per worker in services has been increasing steadily since the 1990s and in recent years. Moreover, increasing ICT utilization in services occurred in tandem with the increase in services employment, reflecting greater ICT utilization. On the other hand, ICT utilized in manufacturing is relatively unchanged, and exhibits greater fluctuations over time, potentially due to greater sensitivity to fluctuations in the business cycle.

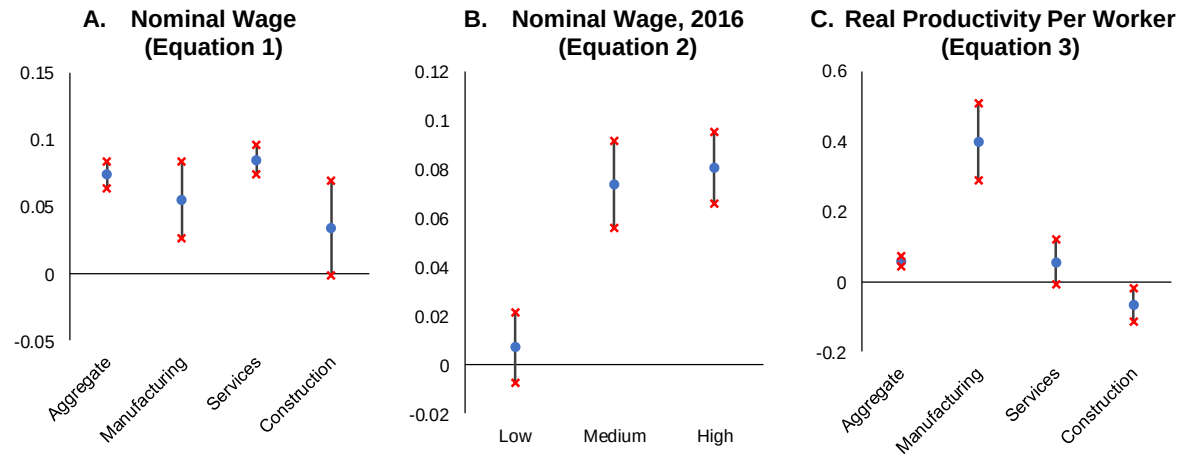
Figure A2.5 Value of ICT goods utilized per worker by sector



Source: Ministry of Manpower, OECD Input-Output database; AMRO staff estimates

12. **The impact of technology on wages and productivity is examined empirically via a human capital model framework.** The role of technology in affecting wages is determined via the life-cycle earnings human capital model popularized by Mincer (1974), while the effects of technology on productivity is based on the methodology outlined by Belorgey et al (2006). The sample ranges from 1995 to 2016. The key variables used are Singapore's wages, employment, years of schooling, and share of highly-skilled workers, while the value ICT used per worker is obtained from the OECD Input-Output Table database.

Figure A2.6 The Estimated Impact of Technology on Wages and Real Productivity Growth per Worker[21]



Source: AMRO staff estimates

13. **The results show that greater ICT adoption has contributed to positive wage and productivity per worker growth, especially in services.** The empirical estimates show that a 1 percent increase in the value of ICT utilized per worker led to a 0.074 percent increase in monthly wages (Figure A2.6, panel A). The technological impact is most evident for services workers, which saw a 0.085 percent increase, followed by manufacturing, but is insignificant in the construction sector. Moreover, a 1 percent increase in the growth rate of ICT utilized per worker increased the real productivity growth rate by 0.058 percent on average (Figure A2.6, panel C). It was as high as 0.4 percent in the manufacturing sector, followed by 0.056 percent in services, but insignificant in the construction sector. These results support the notion that wage gains have derived from productivity improvements attributed to greater ICT utilization in the workplace. While an increasing ICT utilization led to the most significant

[21]In Panel A, the impact of technology on nominal wages across different sectors is estimated with the following regression: $Ln\,W_{it} = \alpha Z_{it} + \beta lnI_{it}.\boldsymbol{\rho_i} + \gamma S_t + \delta T_t + \nu F_t + \eta k_t + \boldsymbol{\rho_i} + \varepsilon_{it}$. It is estimated under the Feasible Generalized Least Squared (GLS) estimator to account for within-panel autocorrelation that follows an autoregressive process of order 1, and in levels as proposed by Cohen and Soto (2007). Panel B is based on a cross-sectional analysis using the 2016 Occupational Wage Survey which takes the following form: $Ln\,W_i = \beta\, lnI_i + \gamma\, Z_i + \boldsymbol{\rho_i} + \varepsilon_i$, and the empirical approach entails three separate wage regressions to examine and contrast the impact of ICT at the 50th wage quantile for each skill level (Low, Medium, and High). In Panel C, the impact of technology on real productivity growth is estimated in the following form: $\Delta Ln\,Y_{it} = \alpha \Delta Ln\,Y_{it-1} + \mu \Delta Z_{it} + \beta \Delta lnI_{it}.\boldsymbol{\rho_i} + \gamma \Delta H_{it} + \delta \Delta T_t + \nu \Delta F_t + \eta k_t + \boldsymbol{\rho_i} + \varepsilon_t$. For Equations (1) and (3), $Ln\,W_{it}$ and $Ln\,Y_i$ denote the logged average monthly wages and real productivity per worker in sector i at year t, Z_{it} is the share of high-skilled workers in sector i, H_{it} is the number of hours worked in sector i at year t, lnI_{it} is the logged value of ICT utilized per worker interacted with $\boldsymbol{\rho_i}$, which is a vector of sector dummies, S_t is the average years of schooling for adults ages 25 years and above, T_t and F_t are measures of trade and financial openness, and k_t denotes the capital-to-GDP ratio at year t. Meanwhile, the notations used in Equation (2) are LnW_{ij}, which is the logged average monthly wages (SGD) of workers in sector i and occupation class j, while I_i, and Z_i are the logged ICT utilized per worker (SGD) and share of high-skilled workers of sector i respectively. The standard errors in all equations are robust to cross-sectional correlation and heteroscedasticity. The charts show the mean coefficient estimates represented by the blue dot, while the range represents the plus and minus one-standard deviation.

productivity gain in the manufacturing sector, the positive effect on wage gain was significantly higher in the service sector.

14. **Estimates from the cross-sectional analyses show that wages of higher-skilled workers rose because of greater ICT adoption, while the impact is negligible for low-skilled workers.** The results in Figure A2.6 (panel B) show the impact of ICT utilization on wages of low-skilled workers is small and inconclusive. However, the impact of ICT on wages is greater for medium- and high-skilled workers, whereby a 1 percent increase in ICT utilization led to a 0.074 percent and 0.083 percent increase in wages, respectively. The findings – that the wages of higher-skilled workers were higher due to greater ICT adoption, while the impact of ICT is negligible for low-skilled workers – are consistent with earlier empirical studies for other countries.

15. **Going forward, the emergence of new digital technologies will likely enhance the prospects of highskilled workers in Singapore, particularly in the services sector.** The advent of new digital technologies such as big data analytics, the Internet of Things, artificial intelligence (AI) and cloud computing bode well for productivity and wage growth prospects of highly-skilled workers, particularly in services sectors such as finance and insurance, and professional and business services. Meanwhile, the impact of ICT is less evident in others, for instance, in the construction sector. In general, this sector is labor-intensive and potentially has less scope for automation, and thus greater ICT utilization may not be feasible from a cost-benefit standpoint. Hence, industry-specific approaches to promote greater ICT adoption may be more appropriate, as opposed to broad-based policy measures.

16. **Continued investments in skills training and upgrading are essential to ensure that the benefits of these technologies can be fully reaped, while ensuring that social safety nets for technologically marginalized workers are adequate.** The results here show the extent of ICT adoption is greater in sectors that have higher shares of skilled workers. Recognising the importance of lifelong learning in the digital economy, efforts to transform Singapore's economy via the 23 sector-specific Industry Transformation Maps (ITMs) which emphasise, amongst others, greater investment in and adoption of new digital technologies, complemented by a wide range of active labour market policies aimed at training skilled workers for this purpose. These measures provide funding support to support local jobseekers in finding jobs (Adapt and Grow), acquire new skills (SkillsFuture) and facilitate skills transfer from global talent (Capability Transfer Program). In this regard, employers should actively encourage and incentivize workers to participate in these programs while investing in new digital technologies in the workplace, thereby boosting productivity and wages. At the same time, social safety nets should be enhanced to take care of those marginalized workers who are unable to upgrade their ICT skills in a meaningful manner.

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