

The cover features a central circular graphic with a large blue ring. Inside this ring, the title 'ECONOMIC SURVEY OF SINGAPORE' is written in orange and blue. Below the title, 'First Quarter 2022' is written in orange. Surrounding the central ring are various icons: a port crane, a computer monitor with a DNA helix, a magnifying glass over a bar chart, a cloud with an upward arrow, a robotic arm, a satellite dish, a microscope, a flask, and several interlocking gears in red, green, and blue. The background is a light orange color.

# ECONOMIC SURVEY OF SINGAPORE

First Quarter 2022

May 2022

**Ministry of Trade and Industry**  
**Republic of Singapore**

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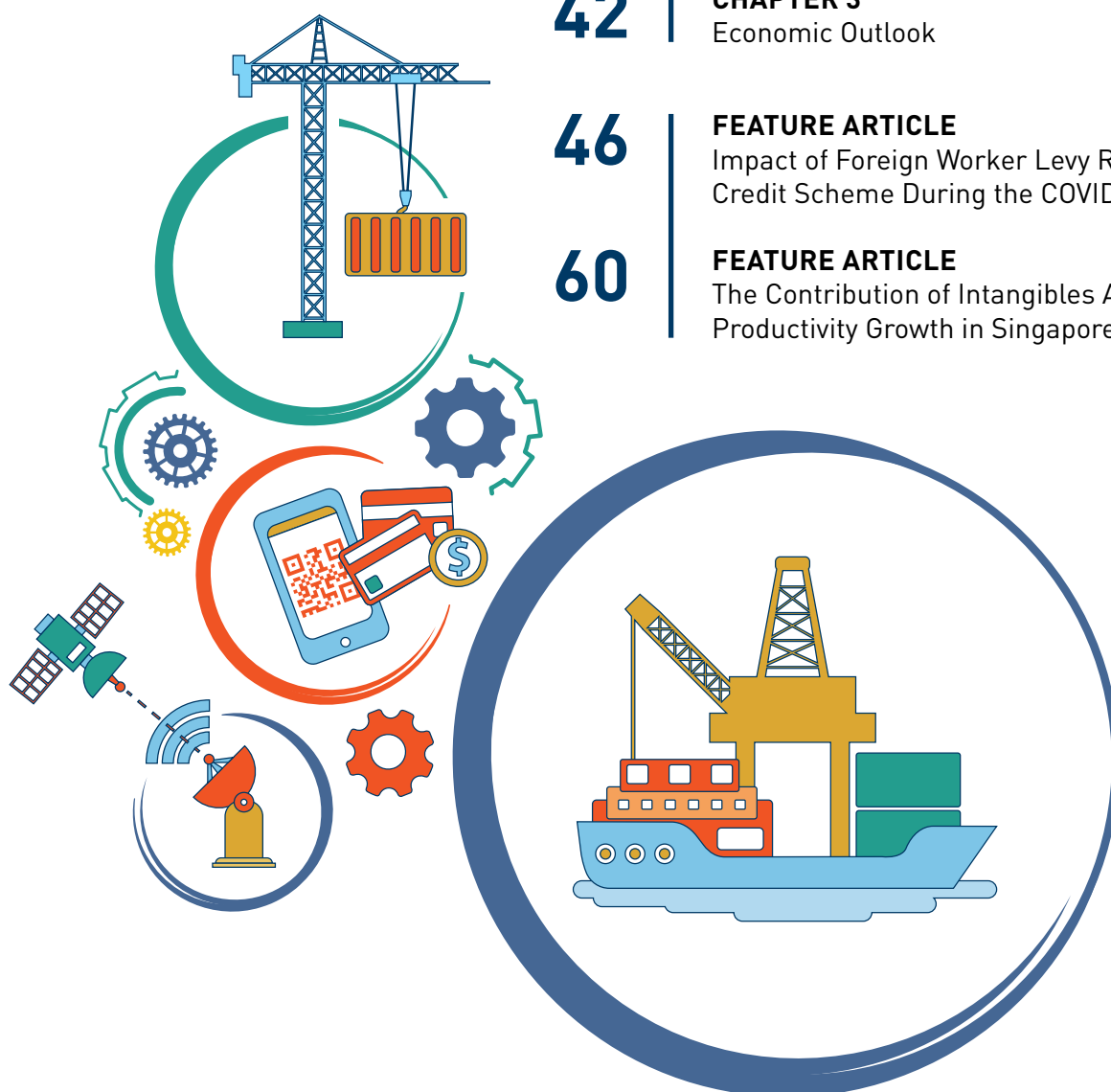
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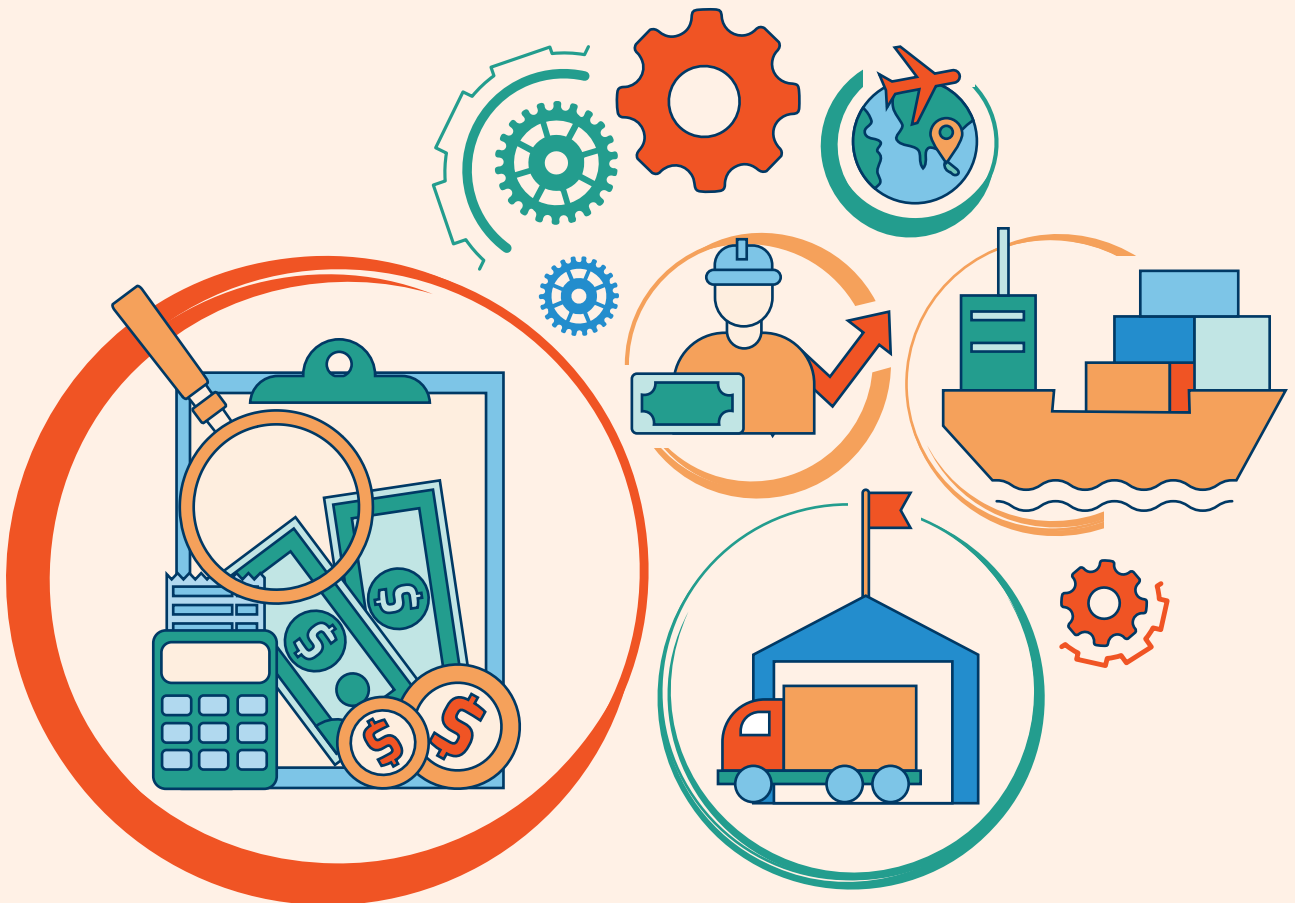
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# MAIN INDICATORS OF THE SINGAPORE ECONOMY

## OVERALL ECONOMY

Real Gross Domestic Product  
(Year-on-Year-Growth)



4Q21 **+6.1%** 1Q22 **+3.7%**

Gross Domestic Product  
at Current Market Prices



4Q21 **\$138.5 billion** 1Q22 **\$141.9 billion**

## PRICES

Consumer Price Index — All Items  
(Year-on-Year Growth)



4Q21 **+3.7%** 1Q22 **+4.6%**

Domestic Supply Price Index  
(Year-on-Year Growth)



4Q21 **+24.5%** 1Q22 **+24.4%**

## LABOUR MARKET

Change in Employment  
(Quarter-on-Quarter)



4Q21 **+54.6 thousand** 1Q22 **+46.5 thousand**

Overall Unemployment Rate



4Q21 **2.4%** 1Q22 **2.2%**

Value-Added per Actual Hour Worked  
(Year-on-Year Growth)



4Q21 **+5.5%** 1Q22 **+2.2%**

## COSTS

Unit Labour Cost of Overall Economy  
(Year-on-Year Growth)



4Q21 **+6.7%** 1Q22 **+6.8%**

Unit Business Cost of Manufacturing  
(Year-on-Year Growth)



4Q21 **-5.2%** 1Q22 **+1.2%**

Unit Labour Cost of Manufacturing  
(Year-on-Year Growth)



4Q21 **-1.9%** 1Q22 **+3.8%**

## MERCHANDISE TRADE

Merchandise Exports



4Q21 **\$169,573 million** 1Q22 **\$169,997 million**  
**+26.9%** Year-on-Year Growth **+18.8%** Year-on-Year Growth

Merchandise Imports



4Q21 **\$152,969 million** 1Q22 **\$153,079 million**  
**+31.0%** Year-on-Year Growth **+23.1%** Year-on-Year Growth

## SERVICES TRADE

Services Exports



4Q21 **\$80,500 million** 1Q22 **\$80,521 million**  
**+9.2%** Year-on-Year Growth **+7.1%** Year-on-Year Growth

Services Imports



4Q21 **\$80,207 million** 1Q22 **\$77,671 million**  
**+12.1%** Year-on-Year Growth **+6.6%** Year-on-Year Growth





CHAPTER

**01**

# THE SINGAPORE ECONOMY

# THE SINGAPORE ECONOMY

## ECONOMIC PERFORMANCE

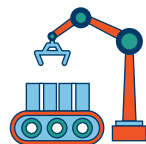
Real GDP grew by

**3.7%** in 1Q22



### Main Drivers of Growth in 1Q22

Manufacturing



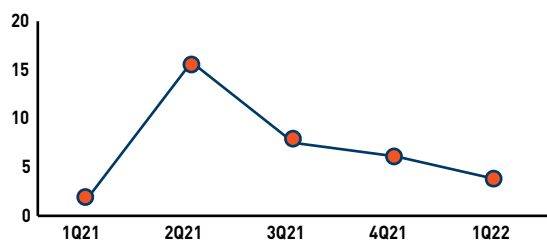
**1.5%-point**  
contribution

Finance & Insurance



**0.5%-point**  
contribution

### Quarterly Growth (Year-on-Year)



## LABOUR MARKET

Resident  
Unemployment Rate



**3.0%**  
in 1Q22

Employment  
(Q-O-Q Change)



**+46,500**  
employed

## PRODUCTIVITY

Value-Added per Actual Hour  
Worked increased by

**2.2%** in 1Q22



### Sectors with the Highest Employment Growth in 1Q22

**+21,600**  
employed



Construction

**+10,900**  
employed



Other Services  
Industries

**+7,200**  
employed



Manufacturing

### Sectors with the Highest Growth in Value-Added per Actual Hour Worked in 1Q22

**12.6%**



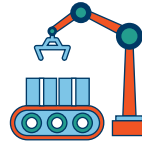
Real Estate

**6.4%**



Retail Trade

**6.1%**



Manufacturing

## COSTS

Overall Unit Labour  
Cost increased by  
**6.8%** in 1Q22



Within the Manufacturing Sector

**1.2%**



Unit Business  
Cost

**3.8%**



Unit Labour  
Cost

## PRICES

The Consumer Price  
Index (CPI) rose by  
**4.6%** in 1Q22



Categories with Price Increases

**15.4%**



Transport

**4.2%**



Housing &  
Utilities

**2.7%**



Food

## INTERNATIONAL TRADE

Total Merchandise  
Exports increased by  
**18.8%** in 1Q22



Total Services  
Exports grew by  
**7.1%** in 1Q22



**45.4%**



Oil  
Domestic  
Exports

**17.2%**



Re-Exports

**11.4%**



Non-Oil  
Domestic  
Exports

Services Exports Increase was led by...

**3.9%-pt**



Other Business  
Services

**1.0%-pt**



Travel

**0.8%-pt**



Charges for the  
use of Intellectual  
Property

## OVERVIEW

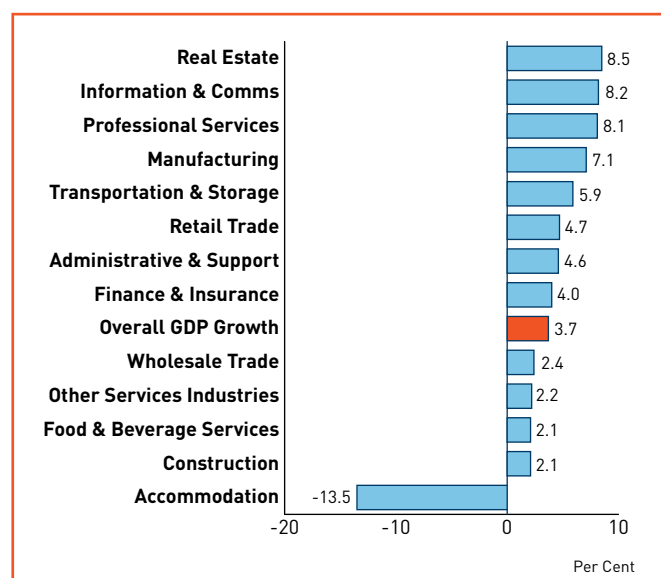
In the first quarter of 2022,

- ▶ The Singapore economy expanded by 3.7 per cent on a year-on-year basis. The sectors that contributed the most to GDP growth were manufacturing, finance & insurance and professional services.
- ▶ The seasonally-adjusted unemployment rates fell at the overall level, as well as for residents and citizens. The number of retrenchments also declined over the quarter.
- ▶ Total employment rose by 46,500 on a quarter-on-quarter basis, extending the gains in the preceding quarter. Excluding Migrant Domestic Workers (MDWs), total employment increased by 41,100 on the back of employment gains for both residents and non-residents, with non-residents accounting for the bulk of the increase as border restrictions eased.
- ▶ The Consumer Price Index-All Items (CPI-All Items) rose by 4.6 per cent on a year-on-year basis, faster than the 3.7 per cent increase in the previous quarter.

## OVERALL PERFORMANCE

The Singapore economy expanded by 3.7 per cent on a year-on-year basis in the first quarter of 2022, moderating from the 6.1 per cent expansion in the previous quarter (Exhibit 1.1). On a quarter-on-quarter seasonally-adjusted basis, the economy grew by 0.7 per cent, slower than the 2.3 per cent growth in the fourth quarter of 2021.

**Exhibit 1.1: GDP and Sectoral Growth Rates in 1Q 2022**



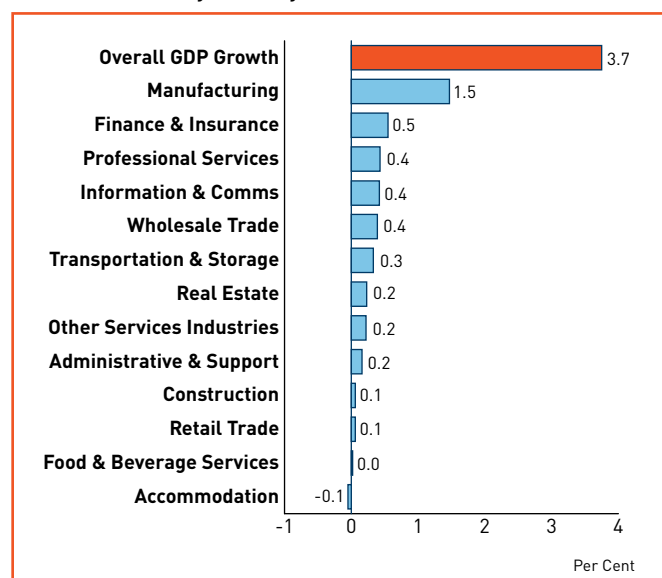
The manufacturing sector expanded by 7.1 per cent year-on-year in the first quarter, extending the 15.5 per cent growth in the previous quarter. Growth was supported by output expansions in the electronics, transport engineering, general manufacturing and precision engineering clusters, which more than offset output declines in the biomedical manufacturing and chemicals clusters.

The services producing industries grew by 4.2 per cent year-on-year in the first quarter, following the 4.4 per cent growth recorded in the previous quarter. Growth was supported by expansions in all services sectors except for the accommodation sector, which shrank by 13.5 per cent. Among the services sectors that grew, the real estate (8.5 per cent), information & communications (8.2 per cent) and professional services (8.1 per cent) sectors posted the fastest expansions.

The construction sector expanded by 2.1 per cent year-on-year in the first quarter, moderating from the 2.9 per cent growth registered in the previous quarter. Growth was supported by increases in both public and private sector construction output.

The top three positive contributors to GDP growth in the first quarter were the manufacturing, finance & insurance and professional services sectors (Exhibit 1.2).

**Exhibit 1.2: Percentage-Point Contribution to Growth in Real GDP in 1Q 2022 (By Industry)**



**Exhibit 1.3: Changes in Total Demand\***

	2021				2022
	I	II	III	IV	1
<b>Total Demand</b>	-0.8	16.5	8.2	7.0	<b>3.3</b>
<b>External Demand</b>	-0.8	14.2	6.9	7.9	<b>3.4</b>
<b>Total Domestic Demand</b>	-0.8	23.4	11.8	4.6	<b>3.0</b>
<b>Consumption Expenditure</b>	-2.5	16.4	3.9	2.8	<b>3.7</b>
<b>Public</b>	9.5	0.7	3.3	3.6	<b>-2.8</b>
<b>Private</b>	-6.9	23.0	4.1	2.6	<b>6.5</b>
<b>Gross Fixed Capital Formation</b>	3.2	42.9	32.8	8.3	<b>2.1</b>
<b>Changes in Inventories</b>	-0.1	-0.4	-0.3	0.0	<b>0.0</b>

\* For inventories, this refers to the contribution to GDP growth.

## SOURCES OF GROWTH

Total demand increased by 3.3 per cent year-on-year in the first quarter of 2022, slower than the 7.0 per cent expansion in the previous quarter (Exhibit 1.3). Growth came on the back of higher external and domestic demand. External demand rose by 3.4 per cent year-on-year, moderating from the 7.9 per cent growth in the previous quarter. Similarly, domestic demand increased by 3.0 per cent year-on-year, weaker than the 4.6 per cent growth in the previous quarter.

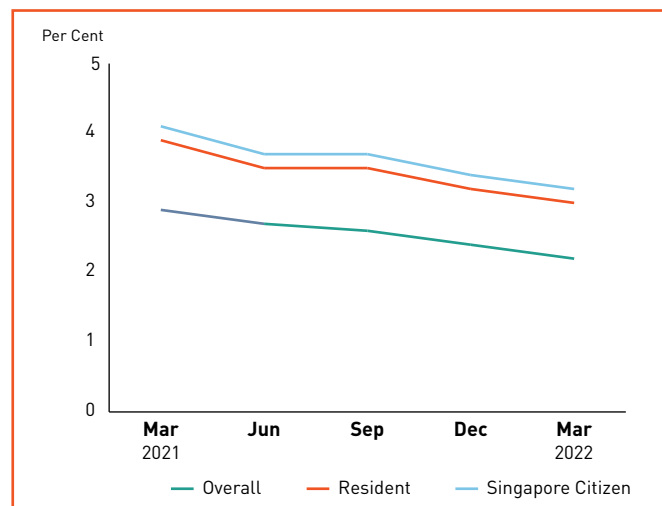
Within domestic demand, consumption expenditure expanded by 3.7 per cent year-on-year, an improvement from the 2.8 per cent growth in the preceding quarter. The increase in consumption expenditure was supported by higher private consumption expenditure (6.5 per cent), even as public consumption expenditure dipped (-2.8 per cent). Meanwhile, gross fixed capital formation (GFCF) rose by 2.1 per cent year-on-year, slowing from the 8.3 per cent expansion in the previous quarter. The increase in GFCF was mainly due to higher private sector GFCF (2.5 per cent) as public sector GFCF remained almost unchanged (0.1 per cent) during the quarter. Private sector GFCF picked up on account of higher investments in private machinery & equipment and intellectual property products, which outweighed lower investments in private construction & works and transport equipment. In terms of public sector GFCF, expansions in investments in public machinery & equipment and intellectual property products were broadly offset by contractions in investments in public construction & works and transport equipment.

## LABOUR MARKET

### Unemployment and Retrenchment<sup>1</sup>

Compared to December 2021, the seasonally-adjusted unemployment rates in March 2022 fell at the overall level (from 2.4 per cent to 2.2 per cent) as well as for residents (from 3.2 per cent to 3.0 per cent) and citizens (from 3.4 per cent to 3.2 per cent) (Exhibit 1.4), with all returning to their respective pre-pandemic levels.<sup>2</sup>

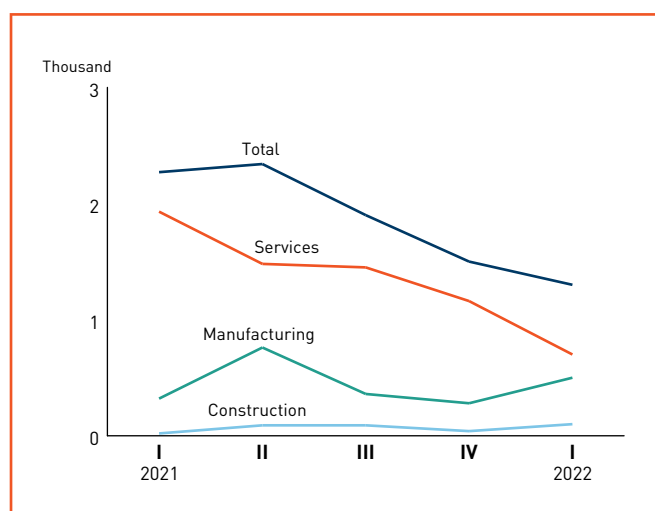
**Exhibit 1.4: Unemployment Rate (Seasonally-Adjusted)**



In March 2022, an estimated 73,900 residents, including 66,700 Singapore citizens, were unemployed. These were lower than the number of unemployed residents (76,300) and citizens (69,700) in December 2021.<sup>3</sup>

Total retrenchments declined to a record low of 1,300<sup>4</sup> in the first quarter, from 1,500 in the preceding quarter (Exhibit 1.5). Over the quarter, retrenchments fell in the services sector (from 1,160 to 700), but rose in the manufacturing (from 280 to 500) and construction (from 40 to 100) sectors.

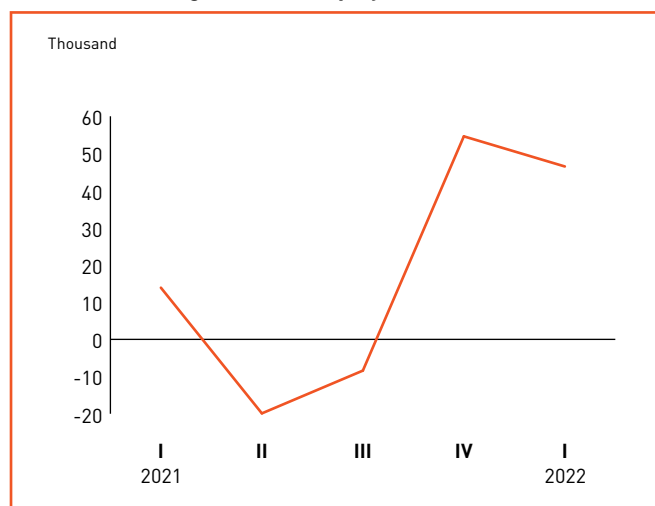
**Exhibit 1.5: Retrenchments**



### Employment<sup>5</sup>

Total employment increased by 46,500 on a quarter-on-quarter basis in the first quarter of 2022, extending the gains in the preceding quarter (54,600) (Exhibit 1.6). Excluding MDWs, total employment rose by 41,100. Residents and non-residents both registered employment growth in the first quarter, with non-residents forming the bulk of the employment increase as border restrictions were progressively eased.

**Exhibit 1.6: Change in Total Employment, Quarter-on-Quarter**



<sup>1</sup> Retrenchment figures pertain to private sector establishments with at least 25 employees and the public sector.

<sup>2</sup> The annual average overall, resident and citizen unemployment rates in 2018 and 2019 were 2.2 per cent, 3.0 per cent and 3.2 per cent respectively.

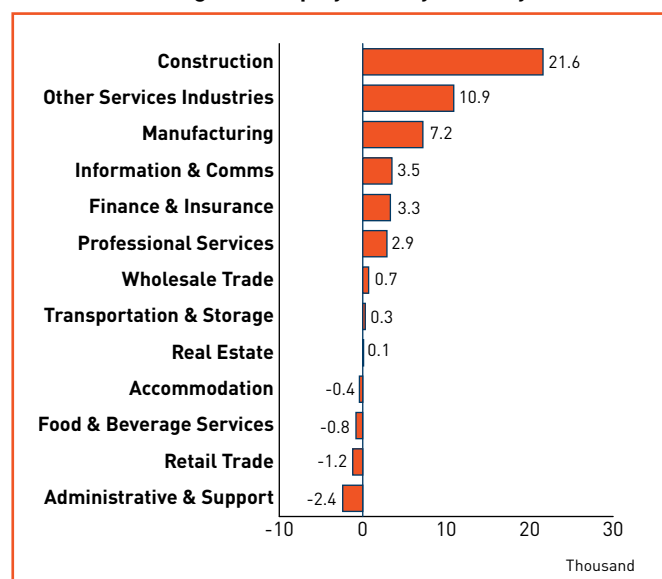
<sup>3</sup> Based on seasonally-adjusted data on the number of unemployed persons.

<sup>4</sup> This is the lowest retrenchment level on record since the start of the data series in 1998. The previous low recorded was in the fourth quarter of 2021 (1,500).

<sup>5</sup> Based on preliminary estimates.

Total employment growth was led by the construction sector (+21,600), driven by an increase in the number of work permit holders (Exhibit 1.7). In the overall services sector, employment rose by 17,000 (or +11,600 excluding MDWs), supported by employment gains in the other services industries (+10,900), information & communications (+3,500) and finance & insurance (+3,300) sectors. Over the same period, manufacturing employment grew by 7,200, the same pace as in the preceding quarter.

**Exhibit 1.7: Changes in Employment by Industry in 1Q 2022**



## Hiring Expectations

According to EDB's latest Business Expectations Survey for the Manufacturing Sector, hiring expectations in the sector were positive, with a net weighted balance of 21 per cent of manufacturers expecting to increase hiring in the second quarter of 2022 as compared to the first quarter. Firms in the miscellaneous segment of the general manufacturing cluster were the most optimistic, with a net weighted balance of 48 per cent of firms expecting to increase hiring in the second quarter. By contrast, firms in the other electronic modules & components segment of the electronics cluster were the most pessimistic, with a net weighted balance of 28 per cent of firms expecting a lower level of hiring in the second quarter.

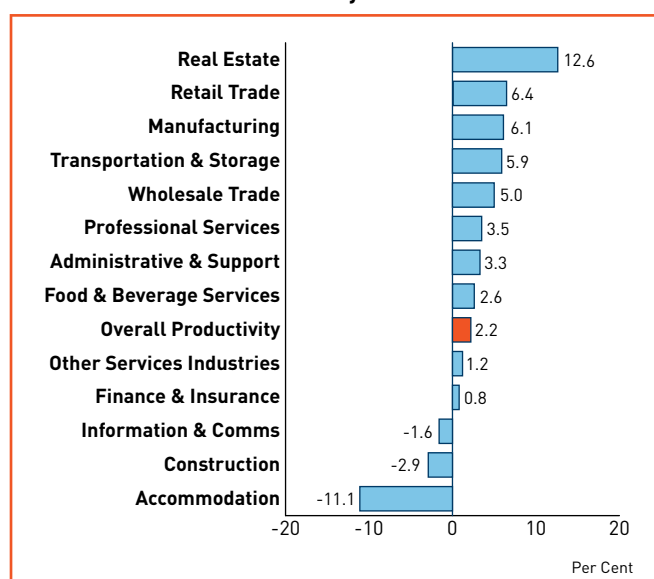
Hiring expectations for services firms were also positive. According to DOS' latest Business Expectations Survey for the Services Sector, a net weighted balance of 11 per cent of services firms expected to increase hiring in the second quarter of 2022 as compared to the first quarter. Firms in all services sectors registered a positive outlook. In particular, firms in the accommodation sector had the strongest hiring sentiments, with a net weighted balance of 23 per cent of firms expecting to increase hiring in the second quarter. On the other hand, firms in the administrative & support services and other services sectors had the least positive hiring sentiments – both sectors saw a net weighted balance of 5 per cent of firms expecting to hire more workers in the second quarter.

## COMPETITIVENESS

### Productivity

Overall labour productivity, as measured by real value-added per actual hour worked, rose by 2.2 per cent year-on-year in the first quarter of 2022, moderating from the 5.5 per cent increase in the previous quarter (Exhibit 1.8) as GDP growth slowed and hours worked growth picked up.<sup>6</sup>

**Exhibit 1.8: Changes in Value-Added per Actual Hour Worked for the Overall Economy and Sectors in 1Q 2022**



<sup>6</sup> Overall labour productivity, as measured by real value-added per worker, rose by 2.1 per cent in the first quarter of 2022, continuing the 5.8 per cent growth in the preceding quarter. The difference in trends between real value-added per actual hour worked and real value-added per worker in the first quarter was due to a slight fall in the number of actual hours worked per worker.

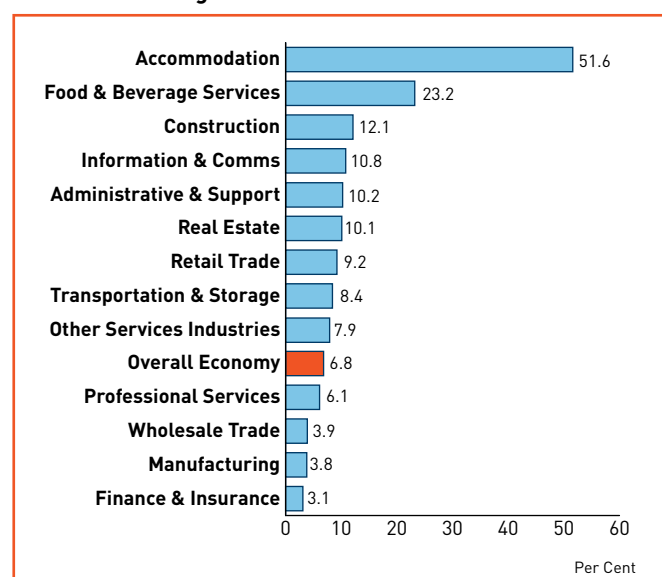
Among the sectors, the real estate (12.6 per cent), retail trade (6.4 per cent), manufacturing (6.1 per cent) and transportation & storage (5.9 per cent) sectors recorded the strongest productivity gains in the first quarter. The wholesale trade (5.0 per cent), professional services (3.5 per cent), administrative & support services (3.3 per cent), food & beverage services (2.6 per cent), other services industries (1.2 per cent) and finance & insurance (0.8 per cent) sectors also posted productivity improvements. By contrast, productivity declines were observed in the accommodation (-11.1 per cent), construction (-2.9 per cent) and information & communications (-1.6 per cent) sectors.

In the first quarter, the productivity of outward-oriented sectors as a whole rose by 3.5 per cent year-on-year, extending the 7.2 per cent increase in the previous quarter.<sup>7</sup> Meanwhile, the productivity of domestically-oriented sectors as a whole rose by 2.2 per cent year-on-year, slightly faster than the 2.0 per cent increase in the preceding quarter.

## Unit Labour Cost and Unit Business Cost

Overall unit labour cost (ULC) for the economy rose by 6.8 per cent on a year-on-year basis in the first quarter of 2022, similar to the increase of 6.7 per cent in the preceding quarter (Exhibit 1.9). The higher overall ULC in the first quarter was due to an increase in total labour cost per worker, which outpaced gains in labour productivity as measured by real value-added per worker.

**Exhibit 1.9: Changes in Unit Labour Cost in 1Q 2022**



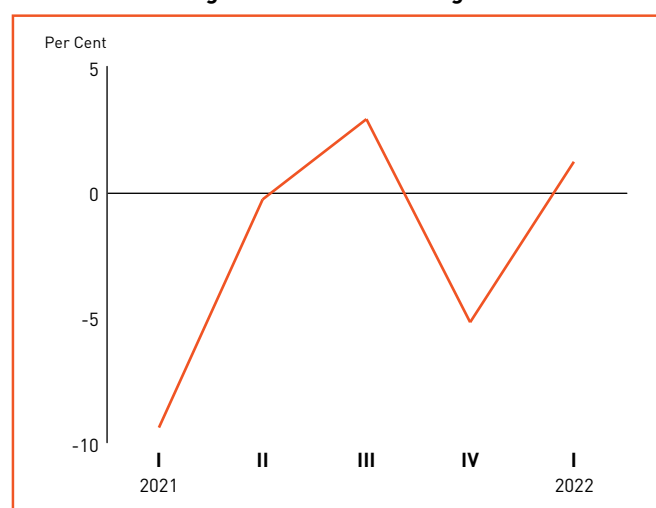
By sectors, the ULC in the construction sector was 12.1 per cent higher in the first quarter due to the combined effect of an increase in total labour cost per worker and a fall in labour productivity.

Similarly, the ULC for services producing industries rose by 7.2 per cent. Among the services sectors, ULC increased the most in the accommodation sector (51.6 per cent), reflecting a significant pickup in total labour cost per worker alongside productivity declines. On the other hand, even though ULC in the finance & insurance sector rose (3.1 per cent) as its total labour cost per worker increased by more than its labour productivity, the increase was the smallest among the services sectors.

Over the same period, the ULC for the manufacturing sector increased by 3.8 per cent. The rise in ULC occurred on the back of an increase in total labour cost per worker, which more than offset productivity gains in the sector.

Unit business cost (UBC) for the manufacturing sector edged up by 1.2 per cent year-on-year in the first quarter, reversing the 5.2 per cent decline in the previous quarter (Exhibit 1.10). This was due to increases in the manufacturing ULC (3.8 per cent) and unit services cost (0.4 per cent), which more than offset a fall in unit non-labour production taxes (-8.4 per cent).

**Exhibit 1.10: Changes in the Manufacturing Unit Business Cost**

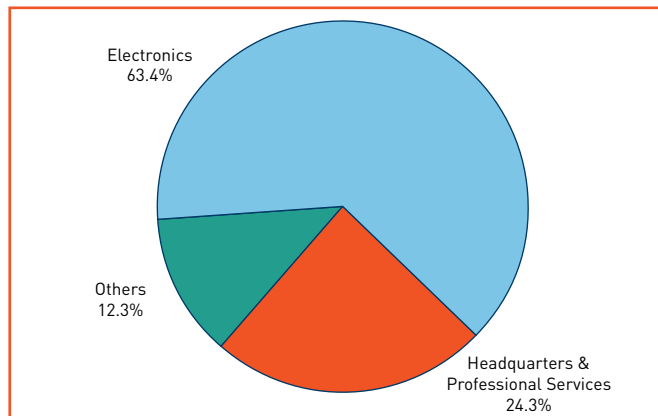


<sup>7</sup> Outward-oriented sectors refer to manufacturing, wholesale trade, transportation & storage, accommodation, information & communications, finance & insurance and professional services. Domestically-oriented sectors refer to construction, retail trade, food & beverage services, real estate, administrative & support services and other services industries.

## Investment Commitments

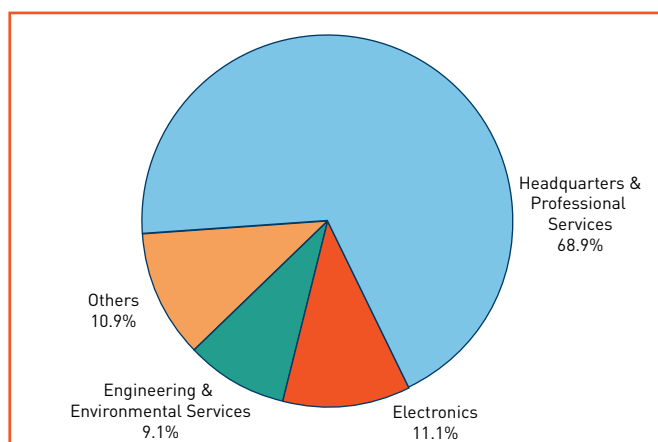
Investment commitments garnered by the Economic Development Board (EDB) in terms of Fixed Asset Investments (FAI) and Total Business Expenditure (TBE) amounted to \$2.2 billion and \$894 million respectively in the first quarter of 2022 (Exhibit 1.11 and Exhibit 1.12).

**Exhibit 1.11: Fixed Asset Investments by Industry Cluster in 1Q 2022**



For FAI, the largest contribution came from the manufacturing sector, which attracted \$1.6 billion worth of commitments. Within manufacturing, the electronics cluster garnered the largest amount of commitments, at \$1.4 billion. Meanwhile, the headquarters & professional services cluster attracted the highest amount of FAI commitments within the services sector, at \$535 million. Investors from the United States were the largest source of FAI commitments with \$1.1 billion (47.8 per cent), followed by investors from Europe, who contributed \$579 million (26.4 per cent).

**Exhibit 1.12: Total Business Expenditure by Industry Cluster in 1Q 2022**



For TBE, the services sector attracted the highest amount of commitments, at \$734 million. This was driven by the headquarters & professional services cluster, which garnered \$616 million in TBE commitments, followed by the engineering & environmental services cluster, with \$80.9 million. Among the manufacturing clusters, the electronics cluster attracted the largest amount of TBE commitments, at \$99.2 million. Foreign investors contributed the most to TBE commitments, at \$833 million (93.2 per cent). This was in turn driven predominantly by investors from the United States with \$283 million (31.7 per cent), followed by those from Europe with \$189 million (21.1 per cent).

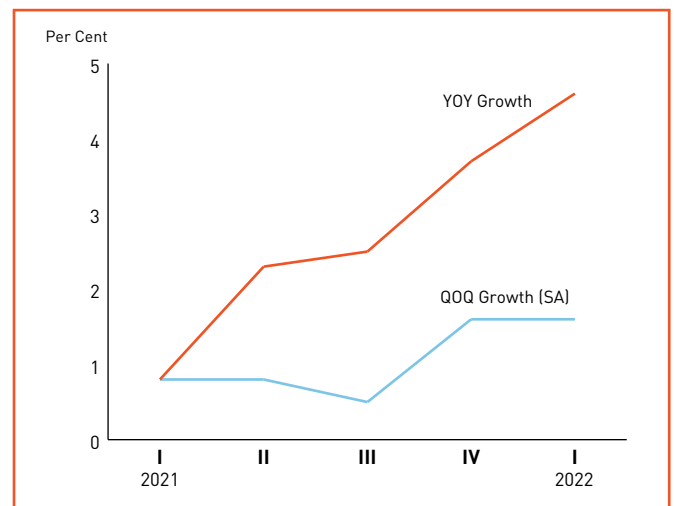
When these projects are fully implemented, they are expected to generate \$1.4 billion of value-added and create more than 3,000 jobs in the coming years.

## PRICES

### Consumer Price Index

The Consumer Price Index-All Items (CPI-All Items) rose by 4.6 per cent on a year-on-year basis in the first quarter of 2022, picking up from the 3.7 per cent increase in the preceding quarter (Exhibit 1.13). On a quarter-on-quarter seasonally-adjusted basis, CPI-All Items increased by 1.6 per cent, the same pace of increase as in the previous quarter.

**Exhibit 1.13: Changes in CPI**



Price increases in the following CPI categories contributed positively to CPI-All Items inflation on a year-on-year basis in the first quarter (Exhibit 1.14). Food prices rose by 2.7 per cent on the back of an increase in the costs of food serving services like hawker food and restaurant meals, as well as non-cooked food items such as vegetables, fish & seafood and meat. Housing & utilities costs increased by 4.2 per cent due to a rise in accommodation and electricity costs. Prices of household durables & services went up by 1.7 per cent on account of more expensive household durables and domestic & household services. Healthcare costs picked up by 1.5 per cent because of an increase in the costs of health insurance, outpatient services and hospital services. Transport costs climbed by 15.4 per cent as the prices of cars and petrol, as well as airfares<sup>8</sup>, increased. Recreation & culture prices rose by 1.4 per cent as a result of the higher costs of recreational & cultural services and holiday travel<sup>9</sup>. Education costs increased by 2.1 per cent due to higher fees at commercial institutions and universities. Prices of miscellaneous goods & services inched up by 0.1 per cent because of a rise in the cost of personal effects items.

**Exhibit 1.14: Percentage Changes in CPI over Corresponding Quarter of Previous Year**

Per Cent

	2021				2022
	I	II	III	IV	I
<b>All items</b>	0.8	2.3	2.5	3.7	<b>4.6</b>
<b>Food</b>	1.5	1.0	1.4	1.9	<b>2.7</b>
<b>Clothing &amp; Footwear</b>	-5.3	-6.0	-5.6	-5.3	<b>-3.5</b>
<b>Housing &amp; Utilities</b>	-0.3	0.6	2.1	3.1	<b>4.2</b>
<b>Housing Durables &amp; Services</b>	1.1	1.4	1.6	1.8	<b>1.7</b>
<b>Healthcare</b>	0.3	1.0	1.7	1.6	<b>1.5</b>
<b>Transport</b>	3.1	10.6	8.7	13.0	<b>15.4</b>
<b>Communication</b>	0.9	0.1	-2.0	-1.3	<b>-2.6</b>
<b>Recreation &amp; Culture</b>	-0.2	1.0	1.4	2.0	<b>1.4</b>
<b>Education</b>	0.9	1.1	1.3	1.7	<b>2.1</b>
<b>Miscellaneous Goods &amp; Services</b>	-1.3	-0.2	-0.4	-0.2	<b>0.1</b>

On the other hand, price declines in the following CPI categories contributed negatively to CPI-All Items inflation in the first quarter. Clothing & footwear prices fell by 3.5 per cent due to cheaper ready-made garments and footwear. Communication costs declined by 2.6 per cent on the back of lower telecommunication services & equipment costs.

## INTERNATIONAL TRADE

### Merchandise Trade

Singapore's total merchandise trade expanded by 20.8 per cent on a year-on-year basis in the first quarter of 2022, following the 28.8 per cent growth in the preceding quarter (Exhibit 1.15). The expansion in total merchandise trade was due to an increase in both oil (48.2 per cent) and non-oil (16.0 per cent) trade.

**Exhibit 1.15: Growth Rates of Total Merchandise Trade, Merchandise Exports and Merchandise Imports (In Nominal Terms)**

Per Cent

	2021					2022
	I	II	III	IV	ANN	I
<b>Merchandise Trade</b>	4.9	27.2	19.0	28.8	19.7	<b>20.8</b>
<b>Merchandise Exports</b>	6.9	26.0	17.4	26.9	19.1	<b>18.8</b>
<b>Domestic Exports</b>	-0.2	25.8	18.8	34.8	19.0	<b>20.8</b>
<b>Oil</b>	-19.2	85.7	49.2	78.2	38.0	<b>45.4</b>
<b>Non-Oil</b>	9.6	10.1	9.0	20.1	12.1	<b>11.4</b>
<b>Re-Exports</b>	13.6	26.3	16.2	21.1	19.2	<b>17.2</b>
<b>Merchandise Imports</b>	2.7	28.6	20.9	31.0	20.4	<b>23.1</b>
<b>Oil</b>	-12.5	115.4	51.9	94.8	49.4	<b>50.7</b>
<b>Non-Oil</b>	6.5	17.7	15.6	21.2	15.3	<b>17.4</b>

Total merchandise exports rose by 18.8 per cent in the first quarter, following the 26.9 per cent expansion in the preceding quarter. This was due to an increase in both domestic exports (20.8 per cent) and re-exports (17.2 per cent).

<sup>8</sup> As overseas travel was limited in April 2020 – March 2022 due to international and domestic measures to contain the COVID-19 pandemic, changes in the prices of flights that were not available were imputed using the overall change in CPI-All Items, in line with international guidelines. With more flights resuming and prices becoming available, actual airfares are progressively being incorporated into the CPI.

<sup>9</sup> As overseas travel was limited in April 2020 – March 2022, the CPI for holiday expenses was imputed using the overall change in CPI-All Items. With the easing of border restrictions, the prices of available holiday-related services are increasingly being incorporated into the CPI.

The growth in domestic exports was on account of higher oil domestic exports as well as non-oil domestic exports (NODX). In particular, oil domestic exports expanded by 45.4 per cent due to higher oil prices. In volume terms, oil domestic exports declined by 9.4 per cent.

Meanwhile, NODX rose by 11.4 per cent in the first quarter, extending the 20.1 per cent increase in the previous quarter. The rise in NODX was supported by an increase in both electronics and non-electronics domestic exports.

Total merchandise imports expanded by 23.1 per cent in the first quarter, following the 31.0 per cent expansion in the previous quarter. The growth in imports was due to an increase in both oil and non-oil imports. Specifically, oil imports surged by 50.7 per cent, while non-oil imports rose by 17.4 per cent due to higher electronics and non-electronics imports.

## Services Trade

Total services trade increased by 6.8 per cent on a year-on-year basis in the first quarter of 2022, slower than the 10.6 per cent increase in the previous quarter (Exhibit 1.16). Both the exports and imports of services saw positive year-on-year growth in the quarter.

**Exhibit 1.16: Growth Rates of Total Services Trade, Services Exports and Services Imports (In Nominal Terms)**

Per Cent

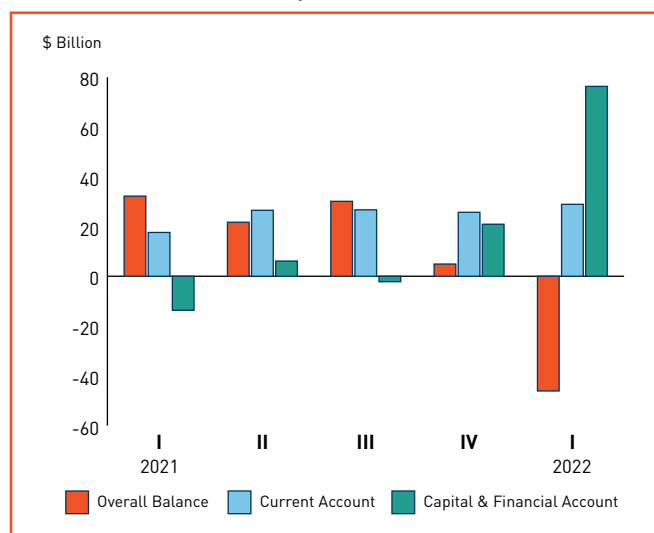
	2021					2022
	I	II	III	IV	ANN	I
<b>Total Services Trade</b>	-6.8	14.2	11.5	10.6	6.8	<b>6.8</b>
<b>Services Exports</b>	-5.6	14.4	11.1	9.2	6.7	<b>7.1</b>
<b>Services Imports</b>	-8.0	14.0	11.8	12.1	6.8	<b>6.6</b>

Services exports rose by 7.1 per cent, following the 9.2 per cent increase in the preceding quarter. The increase in services exports was largely attributable to the growth in the exports of other business services and travel services, as well as receipts from charges for the use of intellectual property. Meanwhile, services imports expanded by 6.6 per cent, easing from the 12.1 per cent increase in the previous quarter. The rise in services imports was mainly due to a pickup in the imports of transport services, travel services and other business services.

## BALANCE OF PAYMENTS

The overall balance of payments recorded a deficit of \$46.1 billion in the first quarter of 2022, compared to the surplus of \$4.9 billion in the preceding quarter (Exhibit 1.17).

**Exhibit 1.17: Balance of Payments**



## Current Account

The current account surplus rose to \$28.9 billion in the first quarter of 2022, from \$25.7 billion in the previous quarter. This was due to an increase in the services trade surplus as well as a narrowing of the primary and secondary income deficits, which more than offset a decline in the goods trade surplus.

The surplus in the goods balance fell by \$3.0 billion to \$40.0 billion in the first quarter, as goods imports increased by more than goods exports.

By contrast, the surplus in the services balance rose by \$2.6 billion to \$2.9 billion in the first quarter, supported by an increase in net receipts for financial and other business services.

At the same time, the primary income deficit declined by \$3.1 billion to \$13.1 billion in the first quarter, as primary income receipts rose faster than payments.

Meanwhile, the secondary income deficit narrowed to \$0.9 billion as secondary receipts rose while payments fell.

## Capital and Financial Account<sup>10</sup>

The capital and financial account registered a net outflow of \$76.3 billion in the first quarter of 2022, higher than the \$20.9 billion net outflow recorded in the preceding quarter. This was due to an increase in the net outflows of portfolio investment and “other investment”, which more than offset the change in the position of financial derivatives from net outflows to net inflows, as well as an increase in the net inflows of direct investment.

Net outflows of portfolio investment rose by \$39.5 billion to \$51.7 billion in the first quarter. This reflected in part a reversal to a net outflow position among the resident deposit-taking corporations, as well as an increase in outflows in the resident non-bank private sector.

At the same time, net outflows of “other investment” rose to \$54.2 billion in the first quarter, from \$19.1 billion in the previous quarter. This was partly attributable to an increase in net outflows among the resident deposit-taking corporations.

In comparison, financial derivatives registered a turnaround to a net inflow position of \$7.9 billion in the first quarter, from a net outflow position of \$4.3 billion in the preceding quarter.

Finally, net inflows of direct investment rose to \$21.6 billion in the first quarter, from \$14.6 billion in the preceding quarter, as residents’ direct investments abroad fell while foreign direct investments into Singapore rose.

<sup>10</sup> Net inflows in net balances are indicated by a minus (-) sign. For more details regarding the change in sign convention to the financial account, please refer to DOS’s information paper on “Singapore’s International Accounts: Methodological Updates and Recent Developments”.



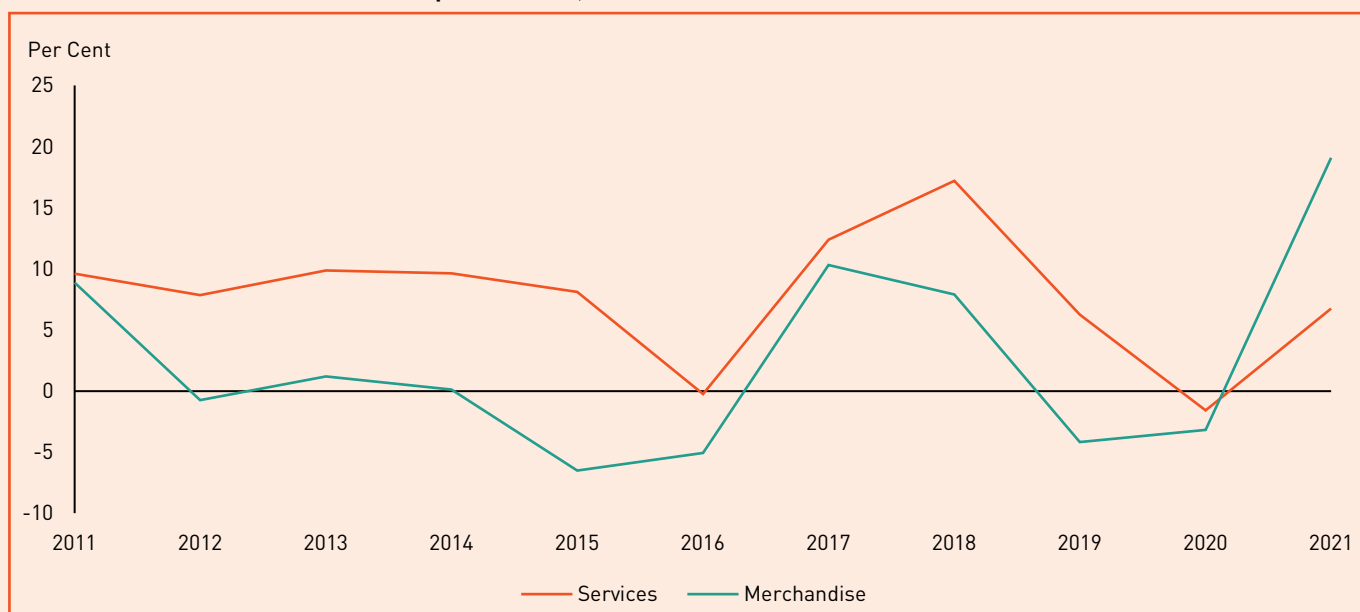
# IMPACT OF THE COVID-19 PANDEMIC ON SINGAPORE'S SERVICES EXPORTS

**Prior to the pandemic, Singapore's services exports saw healthy growth that outpaced the growth in merchandise exports**

The services sector plays an important role in Singapore's economy, and this is reflected in the rising contribution of services exports.<sup>1</sup> Prior to the onset of the COVID-19 pandemic in 2020, Singapore's services exports growth was healthy, averaging 8.9 per cent per annum, between 2010 and 2019. Notably, over this period, the growth in services exports had consistently outpaced that in merchandise exports (Exhibit 1).<sup>2</sup> As a result, the value of services exports rose steadily from around 28.7 per cent of the value of merchandise exports in 2011 to approximately 55.2 per cent by 2019<sup>3</sup>.

However, services exports shrank by 1.6 per cent in 2020 with the onset of the COVID-19 pandemic, before rebounding by 6.7 per cent in 2021. This article examines the impact of the COVID-19 pandemic on Singapore's services exports in more detail.

**Exhibit 1: Services and Merchandise Exports Growth, 2011-2021 (%)**



Source: Department of Statistics

**Services exports fell in 2020 as a result of the COVID-19 pandemic, driven largely by the plunge in travel services exports**

Between 2010 and 2019, the main services export categories driving the growth of Singapore's services exports were other business services<sup>4</sup> (+42.8 percentage-points [pp]), transport services (+24.6pp), financial services (+18.4pp), and telecommunication, computer & information services (+9.9pp). (Refer to Annex A for detailed descriptions of the various services export categories.) These export categories collectively contributed 95.6pp of the 115 per cent increase in services exports over the period (Exhibit 2).

<sup>1</sup> See for example Feng and Teo (2014).

<sup>2</sup> Between 2011 and 2019, services exports grew by 96.0% cumulatively, while merchandise exports expanded by 1.8%.

<sup>3</sup> In 2011, the value of Singapore's services exports was S\$150 billion, which was 28.7% of the value of its merchandise exports (S\$523 billion). By 2019, the value of Singapore's services exports had risen to S\$294 billion, or around 55.2% of the S\$533 billion of merchandise exports.

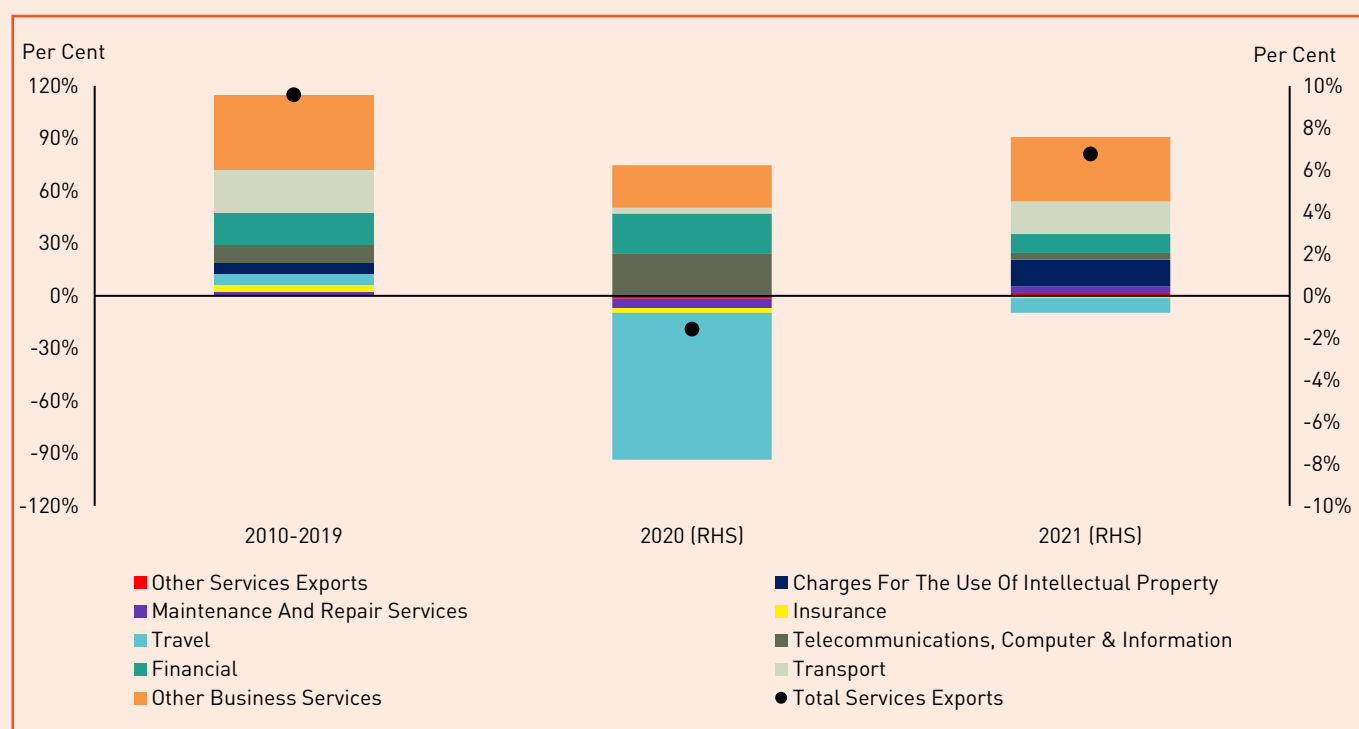
<sup>4</sup> Other business services exports comprise the exports of accounting services, advertising & market research services, architectural services, business management services, engineering & technical services, legal services, research & development services, operating leasing services, trade-related services, and others.

The onset of the COVID-19 pandemic led to a 1.6 per cent drop in Singapore's services exports in 2020. This was largely due to a 74.2 per cent decline in travel services exports (i.e., the consumption of goods and services by travellers to Singapore for less than one year), which accounted for -7.0pp of the fall in services exports. In turn, the plunge in travel services exports came on the back of border closures imposed by countries around the world, including Singapore, to prevent the cross-border spread of the COVID-19 virus. Reflecting the impact of these border closures, international visitor arrivals to Singapore plummeted by 85.7 per cent while tourism receipts fell by 82.6 per cent in 2020.<sup>5</sup>

However, the contraction in travel services exports in 2020 was partially offset by positive contributions from the exports of other business services (+2.0pp), telecommunications, computer & information services (+2.0pp) and financial services (+1.9pp).

In 2021, Singapore's services exports rebounded by 6.7 per cent. Growth was primarily supported by positive contributions from the exports of other business services (+3.1pp), transport services (+1.6pp), charges for the use of intellectual property (+1.3pp) and financial services (+0.9pp). Meanwhile, the exports of travel services continued to contribute negatively, at -0.7pp, as border restrictions remained largely in place throughout the year.

**Exhibit 2: Contribution to Total Services Exports Growth by Categories (pp)**

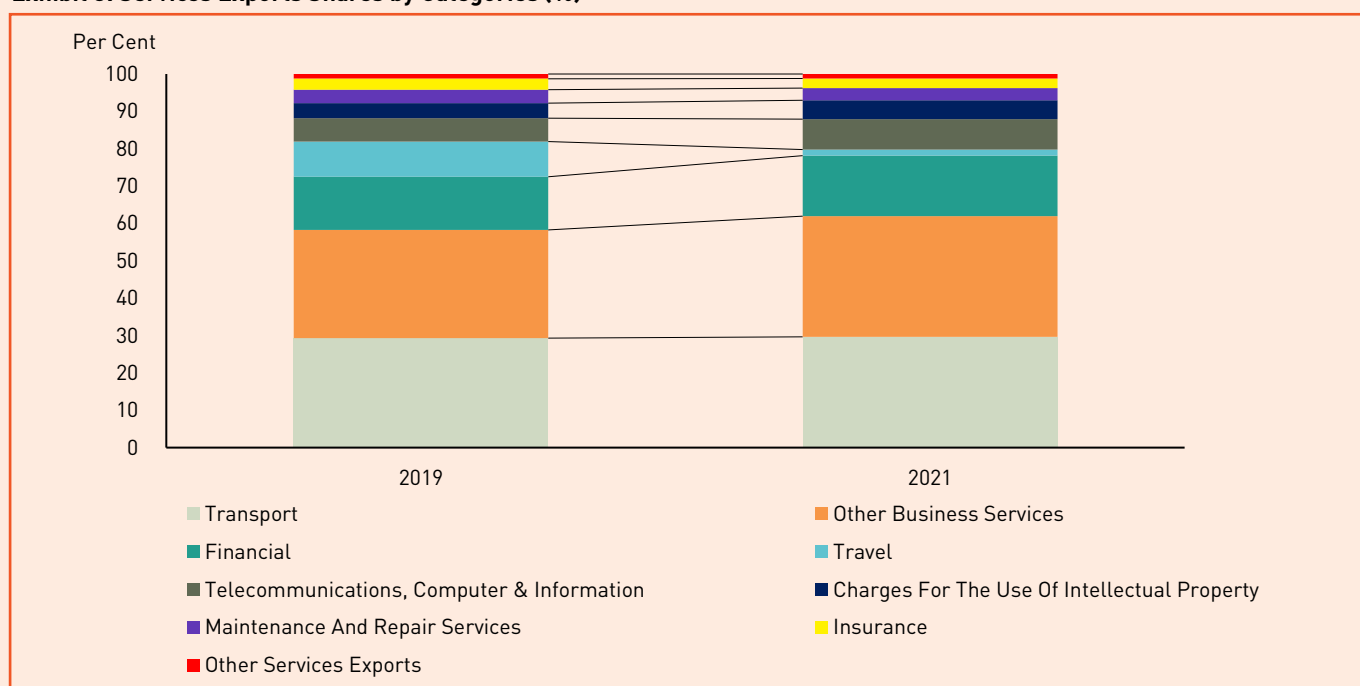


Source: Department of Statistics

Note: Other services exports comprise the exports of construction services, personal, cultural & recreational services, government goods & services and manufacturing services on physical inputs owned by others. These export categories accounted for 0.8pp, -0.1pp and 0.1pp of the growth in total services exports in 2010-2019, 2020 and 2021, respectively

## Reflecting these trends, the travel services share of total services exports fell in 2021 as compared to 2019

Prior to the pandemic, the top three services export categories as at 2019 were transport services (29.3 per cent of total services exports), other business services (28.9 per cent) and financial services (14.2 per cent). Travel services exports was the fourth largest category, accounting for 9.4 per cent of total services exports in 2019. However, due to the impact of the pandemic on travel services exports in both 2020 and 2021, its share of total services exports fell sharply to 1.7 per cent by 2021. Meanwhile, the top three services export categories remained the same, with their combined share of total services exports increasing from 72.5 per cent in 2019 to 78.2 per cent in 2021 (Exhibit 3).

**Exhibit 3: Services Exports Shares by Categories (%)**

Source: Department of Statistics

Note: Other services exports comprise the exports of construction services, personal, cultural & recreational services, government goods & services and manufacturing services on physical inputs owned by others. These export categories collectively accounted for 1.2 per cent of total services exports in 2021.

The rest of this article examines the quarterly profile of Singapore's services exports performance over the course of the pandemic and up to 1Q22.

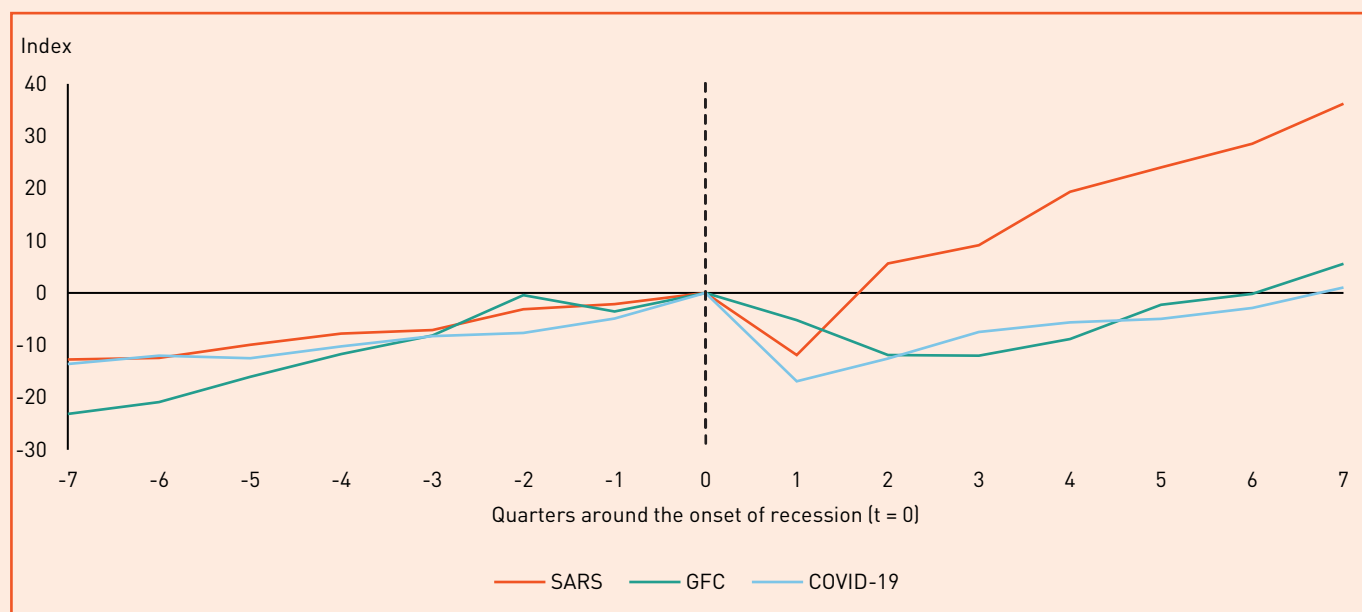
### Compared to past crises, the impact of the COVID-19 pandemic on Singapore's services exports was larger and more prolonged

This section compares the impact of the COVID-19 pandemic on Singapore's services exports against that observed during two other crisis periods in Singapore, namely the Global Financial Crisis (GFC) in 2008/2009 and SARS in 2003. In the chart in Exhibit 4, the value of services exports is normalised to 0 in the quarter of the onset of each crisis.<sup>6</sup> It therefore shows the deviation in the level of services exports in the quarters before and after the onset of each crisis compared to its level at the start of the crisis.

As can be seen, Singapore's services exports saw the sharpest decline in the immediate quarter after the onset of the COVID-19 pandemic, falling by 16.9 per cent in 2Q20 compared to 1Q20. This is as compared to the 5.2 per cent and 11.9 per cent declines one quarter after the onset of the GFC and SARS, respectively.

Furthermore, in terms of the time taken to recover to levels at the start of the crisis, the recovery from the impact of COVID-19 was the most protracted, with services exports taking seven quarters to return to its level at the start of the pandemic. By contrast, services exports recovered two and six quarters after the onset of SARS and GFC, respectively.

<sup>6</sup> The quarter of the onset of the crisis is defined as 1Q03, 3Q08 and 1Q20 for the SARS, GFC and COVID-19 crises, respectively.

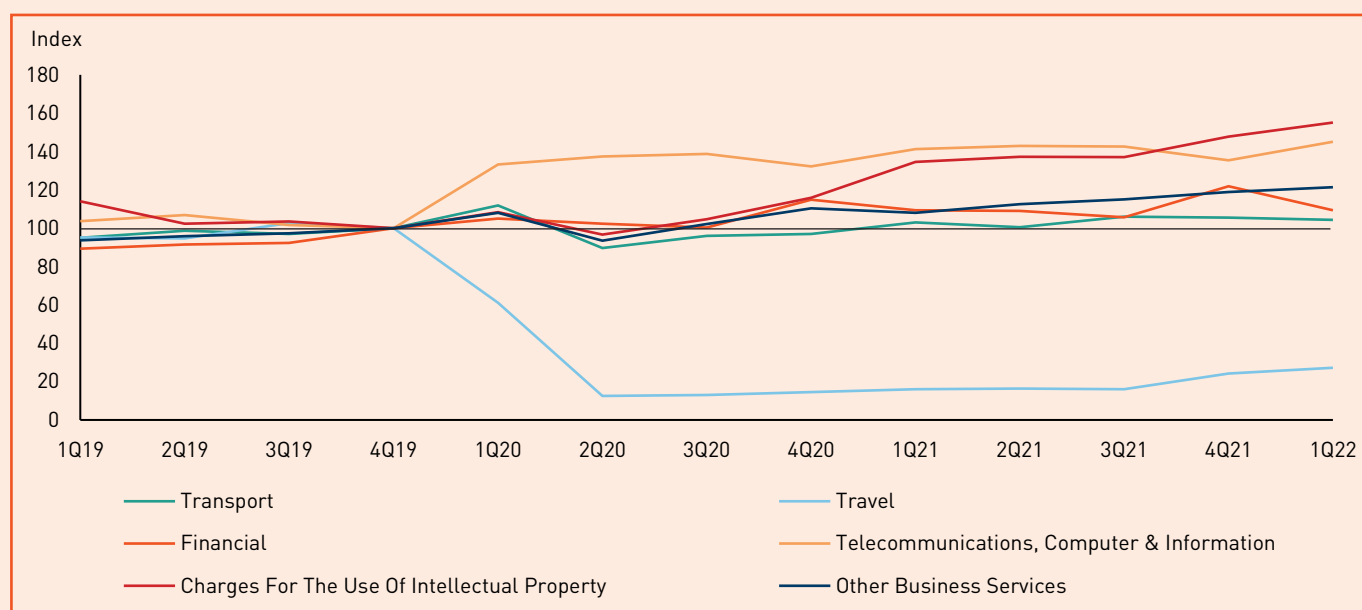
**Exhibit 4: Services Exports Trends During Crises**

Source: Department of Statistics

Note: Services exports were normalised to 0 at the onset of the crisis (t = 0), which is defined as 1Q03, 3Q08 and 1Q20 for the SARS, GFC and COVID-19 crises, respectively.

### By export categories, travel services exports were the most badly affected by the pandemic and remained below pre-pandemic levels as at 1Q22

As highlighted earlier, travel services exports were the most badly hit by the pandemic due to the border restrictions imposed by countries globally. In 2Q20, one quarter after the onset of the pandemic, travel services exports plunged by 86.8 per cent year-on-year. In level terms, the value of travel services exports in 2Q20 fell to only 12.5 per cent of its pre-pandemic value in 4Q19<sup>7</sup>. Since then, travel services exports have remained weak, recovering to just 27.1 per cent of its pre-pandemic level by 1Q22 (Exhibit 5).

**Exhibit 5: Trends in Services Exports by Selected Services Categories (Index 4Q19 = 100)**

Source: Department of Statistics

Note: To avoid clutter, the exports of government goods & services, manufacturing services on physical inputs owned by others, personal, cultural & recreational services, construction services, insurance services and maintenance and repair services were omitted from the graph. Each of these categories of exports accounted for less than 4.0 per cent of total services exports in 2019.

<sup>7</sup> Pre-pandemic level (i.e., 4Q19) is defined as the quarter prior to the onset of the pandemic (i.e., 1Q20).

## On the other hand, services exports in categories such as charges for the use of intellectual property, telecommunications, computer & information services, other business services, and financial services were resilient amidst the pandemic

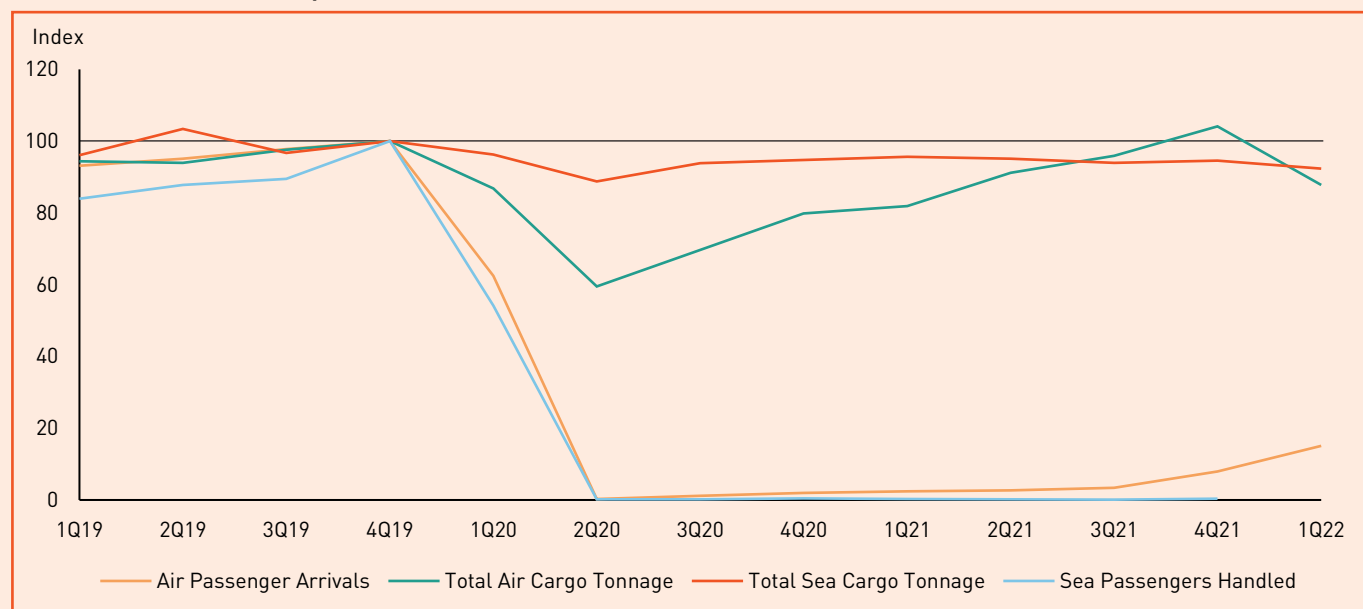
By contrast, Singapore's services exports in categories such as charges for the use of intellectual property, telecommunications, computer & information services, other business services, and financial services continued to expand during the pandemic (Exhibit 5). As at 1Q22, they were 55.2 per cent, 45.1 per cent, 21.4 per cent and 9.3 per cent above their pre-pandemic levels, respectively. These export categories were relatively less affected by the pandemic as many of the services could be delivered remotely to clients, thus rendering them more resilient to the impact of global border restrictions.<sup>8</sup>

Additionally, the pandemic had catalysed the push for digital transformation among enterprises in the region, which helped to support Singapore's exports of telecommunications, computer & information services. Similarly, Singapore's financial services exports were bolstered by the exports of payments processing players, which had benefitted from the shift to online business platforms.<sup>9</sup>

## Exports of transport services<sup>10</sup> during the pandemic was supported by the exports of freight transport services, even as that of other transport services remained weak

The exports of transport services generally held up during the pandemic, rising to 4.3 per cent above pre-pandemic levels by 1Q22. However, this masked significant weakness in the exports of other transport services. The imposition of border restrictions globally led to both the number of air passenger arrivals and sea passengers handled plunging in 2Q20 to 0.3 per cent and 0.1 per cent of their pre-pandemic levels in 4Q19 (Exhibit 6). Correspondingly, other transport services exports in 2Q20 fell to 41.9 per cent of its pre-pandemic level (Exhibit 7). Since then, its performance has remained subdued, mirroring the trends in the number of air and sea passengers, and was only at 65.4 per cent of its pre-pandemic level by 1Q22.

**Exhibit 6: Air and Sea Transport Indicators (Index 4Q19 = 100)**



Sources: Maritime and Port Authority Singapore, Singapore Cruise Centre Private Limited, Civil Aviation Authority of Singapore

Note: Data on the number of sea passengers handled was only available up to 4Q21.

<sup>8</sup> This was also the case globally, with the global exports of these categories collectively falling by 1.8% in 2020, significantly smaller than the 20.0% decline in total services exports over the same period. Source: UNCTAD

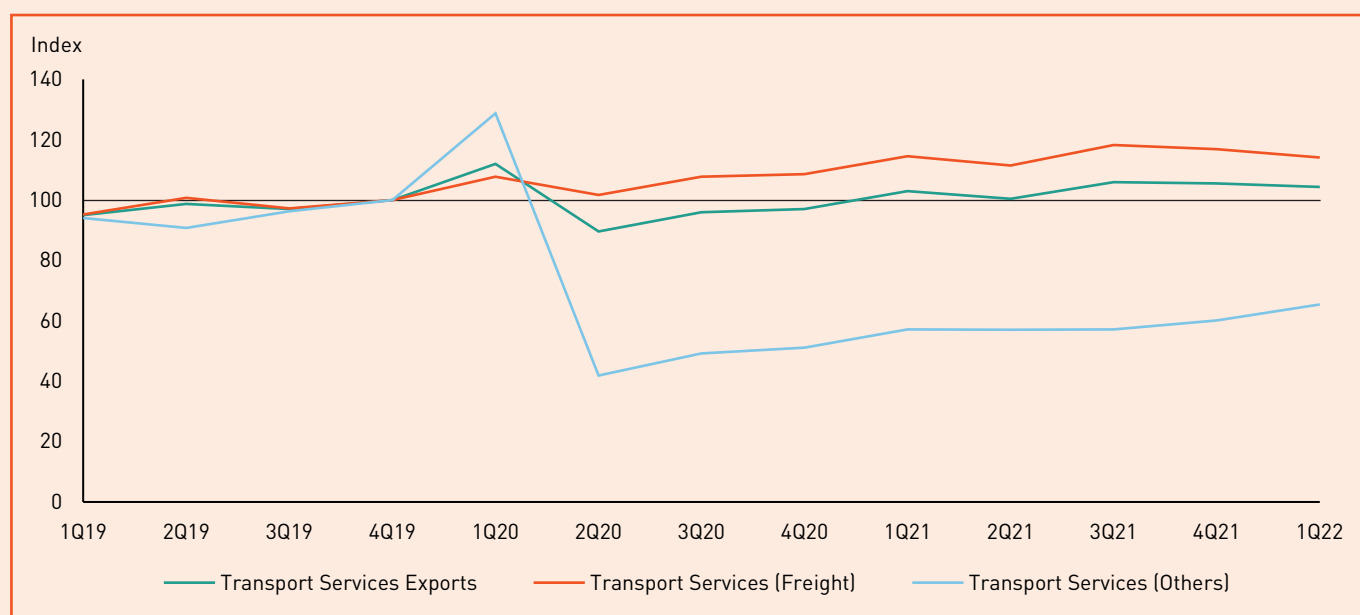
<sup>9</sup> Globally, cross-border payments grew in 2020 even as travel and trade volumes declined. Furthermore, the number of non-cash transactions rose by 6% in 2020, with the pandemic accelerating reductions in cash usage, particularly in markets such as Indonesia and Thailand. Source: McKinsey & Company (2021)

<sup>10</sup> Transport services can be divided into freight transport services and other transport services. Freight transport services include the movement of goods and the carriage of mails for all modes of transport, while other transport services include passenger services, postal & courier services and other services for all modes of transport.

By contrast, total air cargo tonnage had recovered to its pre-pandemic level by 4Q21<sup>11</sup>, driven by strong air cargo demand in key segments such as e-commerce, pharmaceuticals and electronics (Exhibit 6).<sup>12</sup> Meanwhile, sea cargo tonnage was resilient throughout the pandemic and remained only slightly below its pre-pandemic level in 1Q22, weighed down by ongoing supply chain disruptions. The strong recovery in air cargo, together with the resilience in sea cargo, meant that the exports of freight transport services expanded amidst the pandemic, and was 14.1 per cent above its pre-pandemic level by 1Q22.

Supported by the exports of freight transport services, which more than offset the weakness in the exports of other transport services, overall transport services exports saw a recovery to pre-pandemic level by 1Q21, just a year after the onset of the pandemic (Exhibit 7).

**Exhibit 7: Singapore's Transport Services Exports and its Components (Index 4Q19 = 100)**



Source: Department of Statistics

## CONCLUSION

Singapore's services exports are expected to continue to grow in 2022, as the further easing of border restrictions would likely lead to increases in travel services exports and other transport services exports, which have remained below their pre-pandemic levels thus far. In addition, services exports in categories such as financial services, telecommunications, computer & information services, and other business services are likely to continue to expand alongside global demand in tandem with the post-pandemic recovery of major economies around the world.

Over the longer term, there will be many new opportunities for Singapore's services exports, especially as economic growth and the rising middle class in economies like China and ASEAN will lead to an increase in demand for services. At the same time, it is important for Singapore to continue to develop its capabilities as a business and logistics hub, so that it remains well-positioned to serve the region's demand for services (e.g., financial services, freight transport services and other business services). With a vibrant services sector, complemented by a dynamic manufacturing sector, Singapore's economy is poised for sustained growth in the years ahead.

*Contributed by:*

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Economist  
Economics Division  
Ministry of Trade and Industry

<sup>11</sup> Air cargo tonnage returned to below pre-pandemic level in 1Q22, as demand was weighed down by pandemic controls in China and Hong Kong, which limited exports from these markets. Air cargo demand also eased during the Chinese New Year holiday period.

<sup>12</sup> Source: Singapore Airlines Group

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## ANNEX A: DESCRIPTION OF SERVICES EXPORTS CATEGORIES

Services Categories	Share of Services Exports in 2019	Share of Services Exports in 2021	Description
Other Business Services	28.9%	32.3%	Accounting services, advertising and market research services, architectural services, business management services, engineering and technical services, legal services, research and development services etc.
Transport	29.3%	29.6%	Carriage of passengers, the movement of goods, charter of carriers with crew, and related supporting and auxiliary services.
Financial	14.2%	16.2%	Financial intermediary and auxiliary services which can be charged explicitly or implicitly.
Telecommunications, Computer & Information	6.2%	8.1%	The transmission of sound, images and other information by telephone, cable, satellite, etc, as well as business network services, teleconferencing and related technical support services.
Charges for the use of intellectual property	4.0%	5.1%	Fees and charges for the use of research & development outcomes, as well as franchises and trademarks licencing fees, reproduction and/or distribution rights of computer software and audio-visual products, etc.
Maintenance and Repair Services	3.6%	3.3%	Repair work performed by residents on goods that are owned by non-residents, and include maintenance and repairs performed on ships, aircraft and other transportation equipment.
Insurance	3.0%	2.6%	Charges for reinsurance, life insurance, general insurance and freight insurance.
Travel	9.4%	1.7%	Goods and services consumed by travellers during visits to a particular economy for less than one year.
Construction	0.6%	0.5%	Work performed on construction activities by employees or enterprises.
Personal, Cultural and Recreational	0.4%	0.4%	Audio-visual & related services, health services, education services and other personal, cultural & recreational services.
Manufacturing Services on Physical Inputs owned by Others	0.1%	0.2%	Processing, assembly, labelling, packing and so forth undertaken by entities that do not own the goods concerned.
Government Goods and Services	0.1%	0.1%	Expenditure of foreign diplomatic and consular missions and foreign armed forces in Singapore, including personal expenditure incurred by diplomats and consular staff located in Singapore.





Image courtesy of PSA Singapore



CHAPTER

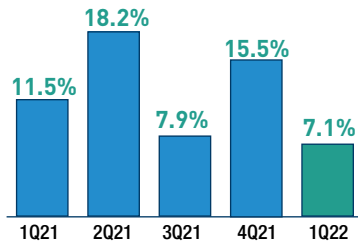
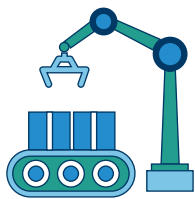
**02**

# SECTORAL PERFORMANCE

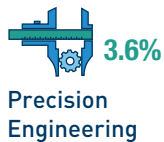
# SECTORAL PERFORMANCE

## MANUFACTURING

### REAL GROWTH

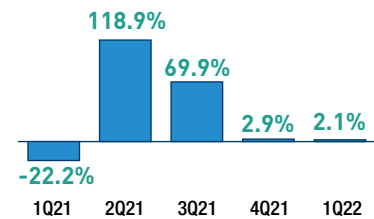
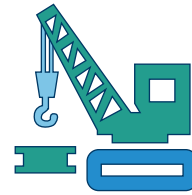


### CLUSTERS IN MANUFACTURING SECTOR (Y-O-Y CHANGE)



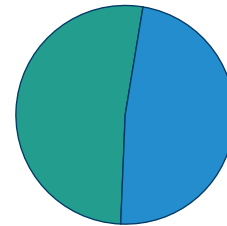
## CONSTRUCTION

### REAL GROWTH



### CERTIFIED PAYMENTS IN 1Q22

**51.8%**  
Public



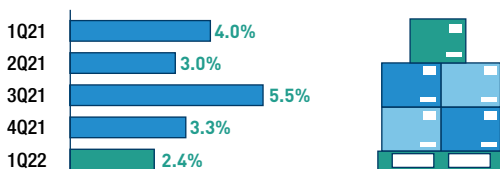
**48.2%**  
Private

### CONTRACTS AWARDED IN 1Q22 (Y-O-Y CHANGE)



## WHOLESALE TRADE

### REAL GROWTH



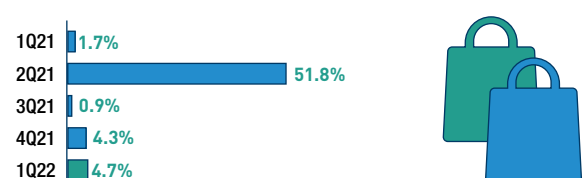
Foreign Wholesale Trade Index Growth **6.6%**



Domestic Wholesale Trade Index Growth **-14.9%**

## RETAIL TRADE

### REAL GROWTH



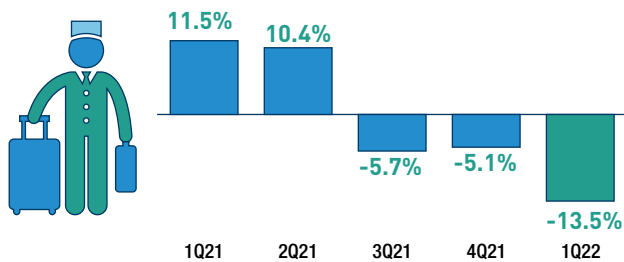
Retail Sales Index Growth (Non-Motor Vehicles) **8.6%**



Retail Sales Index Growth (Motor Vehicles) **-17.4%**

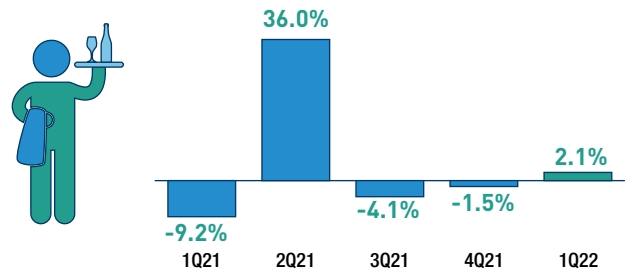
## ACCOMMODATION

### REAL GROWTH

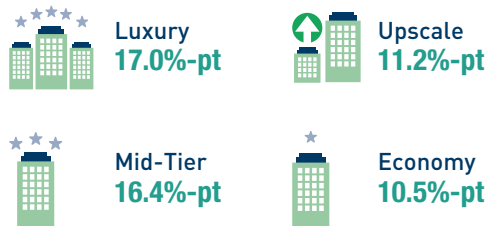


## FOOD & BEVERAGE SERVICES

### REAL GROWTH



### OCCUPANCY RATES OF HOTELS (Y-O-Y CHANGE)



### F&B SALES INDEX GROWTH (Y-O-Y CHANGE)



## TRANSPORTATION & STORAGE

### REAL GROWTH



Total Sea Cargo  
Handled Growth

-3.4%

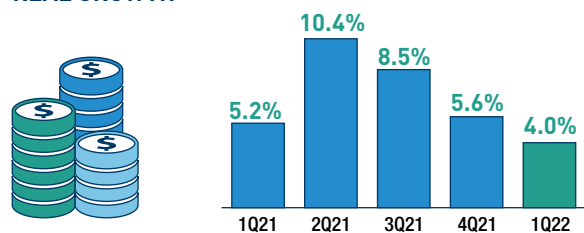


Air Passengers  
Handled Growth

496.6%

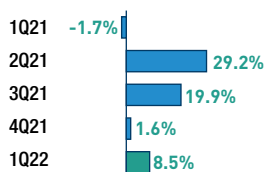
## FINANCE & INSURANCE

### REAL GROWTH



## REAL ESTATE

### REAL GROWTH



### PRIVATE RESIDENTIAL REAL ESTATE



Units Transacted  
(Y-O-Y Change)

-34.0%



Price Index  
(Q-O-Q Change)

0.7%

## OVERVIEW

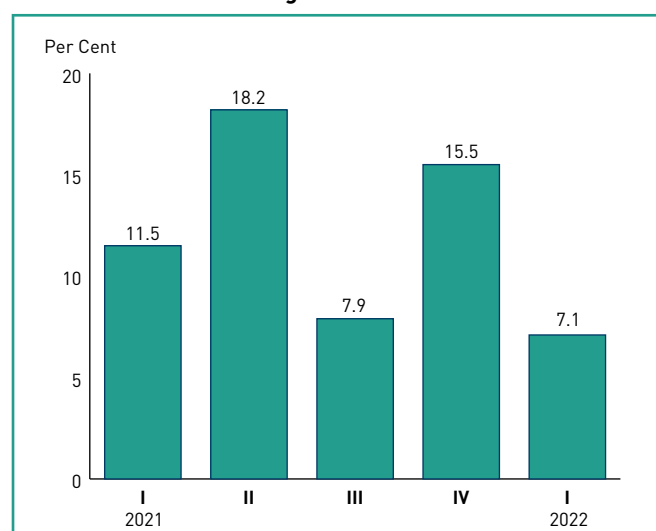
In the first quarter of 2022,

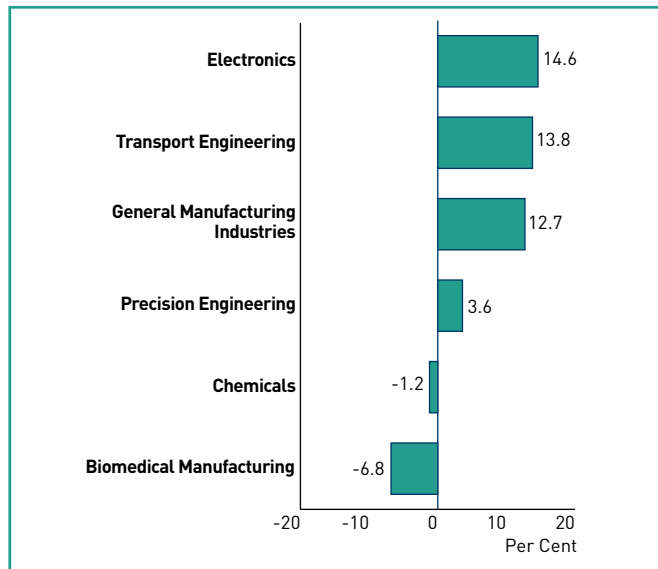
- ▶ The manufacturing sector expanded by 7.1 per cent year-on-year, extending the 15.5 per cent growth in the preceding quarter. Growth of the sector was supported by output expansions across all clusters, except for the biomedical manufacturing and chemicals clusters.
- ▶ The construction sector grew by 2.1 per cent year-on-year, easing from the 2.9 per cent expansion in the previous quarter.
- ▶ Growth in the wholesale trade sector came in at 2.4 per cent year-on-year, moderating from the 3.3 per cent recorded in the preceding quarter.
- ▶ The retail trade sector expanded by 4.7 per cent year-on-year, following the 4.3 per cent expansion in the previous quarter.
- ▶ The transportation & storage sector clocked growth of 5.9 per cent year-on-year, moderating from the 7.5 per cent growth in the preceding quarter. The expansion of the sector was driven mainly by the air transport segment, which grew from a low base in the same quarter a year ago.
- ▶ The accommodation sector shrank by 13.5 per cent year-on-year, worsening from the 5.1 per cent contraction in the preceding quarter.
- ▶ The food & beverage services sector expanded by 2.1 per cent year-on-year, a turnaround from the 1.5 per cent contraction in the previous quarter.
- ▶ Growth in the finance & insurance sector came in at 4.0 per cent year-on-year, moderating from the 5.6 per cent in the previous quarter.
- ▶ The real estate sector expanded by 8.5 per cent year-on-year, faster than the 1.6 per cent growth in the previous quarter.
- ▶ The professional services sector grew by 8.1 per cent year-on-year, improving from the 4.9 per cent expansion in the previous quarter.

## MANUFACTURING

The manufacturing sector expanded by 7.1 per cent on a year-on-year basis in the first quarter of 2022, extending the 15.5 per cent growth in the previous quarter (Exhibit 2.1). This was on account of output expansions across all clusters, except for the biomedical manufacturing and chemicals clusters (Exhibit 2.2).

**Exhibit 2.1: Manufacturing Sector's Growth Rate**



**Exhibit 2.2: Manufacturing Clusters' Growth Rates in 1Q 2022**

The electronics cluster grew by 14.6 per cent year-on-year in the first quarter, supported by output expansions across all segments except for the computer peripherals & data storage segment. Specifically, output in the semiconductors segment surged by 17.1 per cent on account of robust demand from 5G markets and data centres amidst the global semiconductor shortage. Meanwhile, the other electronics modules & components and infocomms & consumer electronics segments clocked expansions of 15.2 per cent and 14.1 per cent respectively. By contrast, output in the computer peripherals & data storage segment declined by 2.8 per cent during the quarter.

Output in the transport engineering cluster increased by 13.8 per cent year-on-year in the first quarter, supported by expansions in the aerospace and marine & offshore engineering (M&OE) segments. The aerospace segment's output rose sharply by 26.0 per cent<sup>1</sup> as the loosening of global travel restrictions in the first quarter of 2022 compared to the same quarter a year ago resulted in higher levels of international air traffic and an accompanying demand for maintenance, repair & overhaul activities. Similarly, the M&OE segment grew by 6.3 per cent, supported by a higher level of work done in offshore projects. By contrast, the land transport segment contracted by 10.2 per cent due to a lower level of production of parts and accessories for motor vehicles.

The general manufacturing cluster expanded by 12.7 per cent year-on-year in the first quarter, supported by output expansions across all segments. In particular, the food, beverages & tobacco segment grew by 14.4 per cent on account of a higher level of output of beverage and milk products, while the miscellaneous industries segment expanded by 10.0 per cent due to an increase in the level of production of construction-related products, wearing apparel and jewellery. Meanwhile, the printing segment's output increased by 2.0 per cent.

Output in the precision engineering cluster rose by 3.6 per cent year-on-year in the first quarter, supported by an 8.1 per cent increase in the output of the machinery & systems (M&S) segment. Growth of the M&S segment was bolstered by an increase in the production of semiconductor equipment and measuring devices, as well as a higher level of mechanical engineering work. By contrast, the precision modules & components segment contracted by 5.6 per cent, weighed down by a lower production level of optical and wire & cable products.

The biomedical manufacturing cluster contracted by 6.8 per cent year-on-year in the first quarter due to a fall in output in both the pharmaceuticals and medical technology segments. The pharmaceuticals segment shrank by 9.2 per cent on account of a different mix of active pharmaceutical ingredients (APIs) produced. Meanwhile, output in the medical technology segment declined by 2.0 per cent<sup>2</sup> due to lower export demand for medical devices.

Output in the chemicals cluster fell by 1.2 per cent year-on-year in the first quarter, driven by an output contraction of 5.9 per cent in the petrochemicals segment due to plant maintenance shutdowns. Conversely, the petroleum segment grew by 10.3 per cent from a low base a year ago when public health measures such as travel restrictions to contain COVID-19 infections globally weighed on global demand for refined products (e.g., jet fuel). At the same time, the other chemicals and specialty chemicals segments expanded by 4.6 per cent and 0.5 per cent respectively, with the former recording a higher level of production of fragrances.

<sup>1</sup> There was also a low base of maintenance, repair & overhaul activities during the first quarter of 2021.

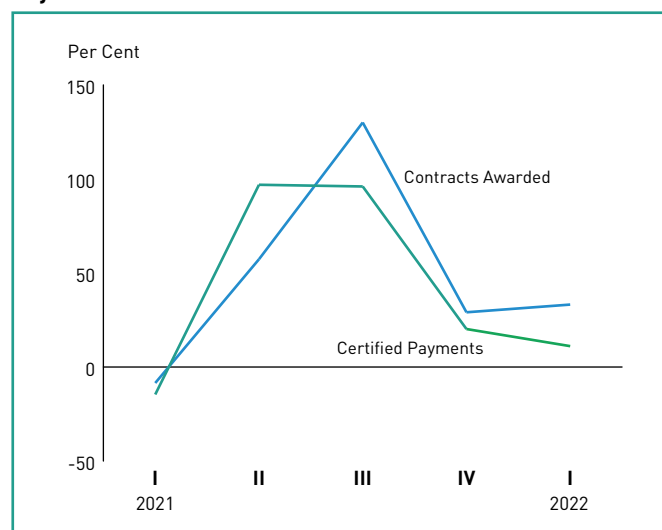
<sup>2</sup> High base effects also contributed to the contraction as output in the medical technology segment expanded by 16.6 per cent in the first quarter of 2021.

## CONSTRUCTION

The construction sector grew by 2.1 per cent year-on-year in the first quarter of 2022, easing from the 2.9 per cent expansion in the previous quarter.

In the first quarter, nominal certified progress payments (a proxy for construction output) rose by 11.1 per cent year-on-year, moderating from the 20.2 per cent increase recorded in the previous quarter (Exhibit 2.3). Higher certified progress payments were seen in both the private (13.0 per cent) and public (9.4 per cent) sectors. The growth in private certified progress payments was largely driven by higher outturns in private residential (25.9 per cent) and institutional & others building (38.5 per cent) works. On the other hand, the increase in public certified progress payments was led by expansions in public industrial (43.8 per cent) and institutional & others building (14.4 per cent) works.

**Exhibit 2.3: Changes in Contracts Awarded and Certified Payments**



Meanwhile, construction demand in terms of contracts awarded rose by 33.2 per cent year-on-year in the first quarter, extending the 29.1 per cent increase in the previous quarter. This was due to the higher demand for public sector construction works (71.1 per cent), which more than offset the lower demand for private sector construction works (-19.9 per cent). The former was mainly driven by a rise in contracts awarded for public civil engineering (161 per cent) and residential building (71.9 per cent) works, while the latter was led by a fall in contracts awarded for private residential (-17.6 per cent) and institutional & others building (-44.2 per cent) works.

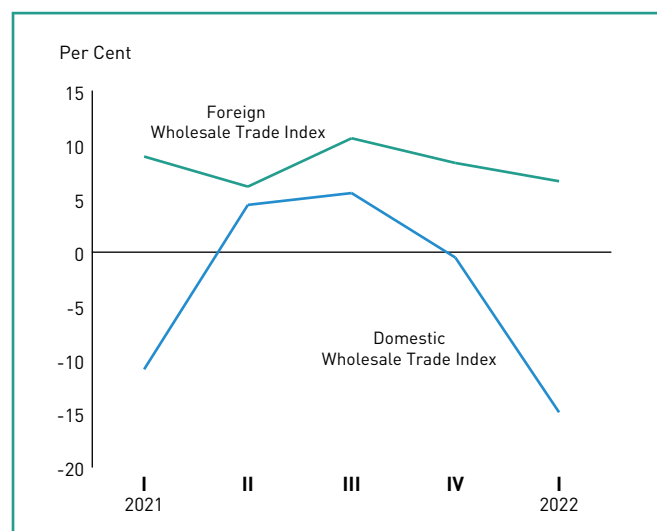
## WHOLESALE TRADE

The wholesale trade sector expanded by 2.4 per cent year-on-year in the first quarter of 2022, moderating from the 3.3 per cent expansion in the previous quarter.

Growth of the sector was bolstered by a 6.6 per cent year-on-year increase in foreign wholesale trade sales volume (Exhibit 2.4), although this was lower than the 8.3 per cent growth seen in the previous quarter. The increase in foreign wholesale trade sales volume came on the back of a pickup in the sales volumes of petroleum & petroleum products (8.8 per cent), other wholesale trade (12.2 per cent)<sup>3</sup> and electronic components (8.4 per cent).

On the other hand, the domestic wholesale trade sales volume slumped by 14.9 per cent year-on-year in the first quarter, worsening from the 0.5 per cent decline in the previous quarter. This was largely due to a fall in the sales volume of petroleum & petroleum products (-32.0 per cent), which outweighed increases in the sales volumes of telecommunications & computers (13.7 per cent) and other wholesale trade (9.5 per cent).

**Exhibit 2.4: Changes in Wholesale Trade Index in Chained Volume Terms**



<sup>3</sup> The "other wholesale trade" segment consists of a diverse range of products that include agricultural raw materials and live animals, tropical produce, personal effects and medicinal and pharmaceutical products, among others.

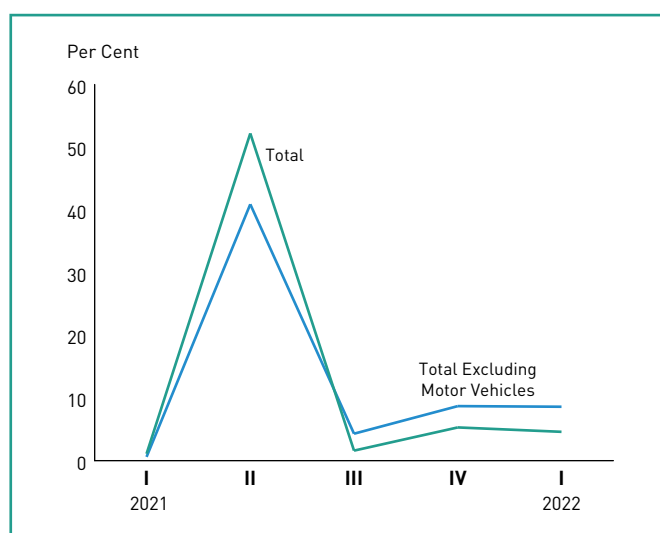
## RETAIL TRADE

The retail trade sector posted growth of 4.7 per cent year-on-year in the first quarter of 2022, extending the 4.3 per cent expansion in the previous quarter.

Overall retail sales volume increased by 4.6 per cent year-on-year in the first quarter, following the 5.3 per cent growth in the fourth quarter of 2021 (Exhibit 2.5). Growth in retail sales volume was attributable to non-motor vehicular sales (8.6 per cent), as motor vehicular sales (-17.4 per cent) saw a decline due to a fall in Certificate of Entitlement (COE) quotas.<sup>4</sup>

In turn, non-motor vehicular sales volume was supported by a pickup in the sales of durable goods such as computer & telecommunications equipment (17.0 per cent) and furniture & household equipment (4.1 per cent). Segments that are more dependent on physical sales such as cosmetics, toiletries & medical goods (21.2 per cent), wearing apparel & footwear (21.2 per cent), watches & jewellery (17.2 per cent) and department stores (16.3 per cent) continued their strong growth, likely driven by the relaxation of travel restrictions and the attendant increase in tourists in the first quarter of 2022.<sup>5</sup> On the other hand, the sales volumes of mini-marts & convenience stores (-7.4 per cent), petrol service stations (-3.8 per cent) and optical goods & books (-7.1 per cent) declined during the quarter.

**Exhibit 2.5: Changes in Retail Sales Index in Chained Volume Terms**

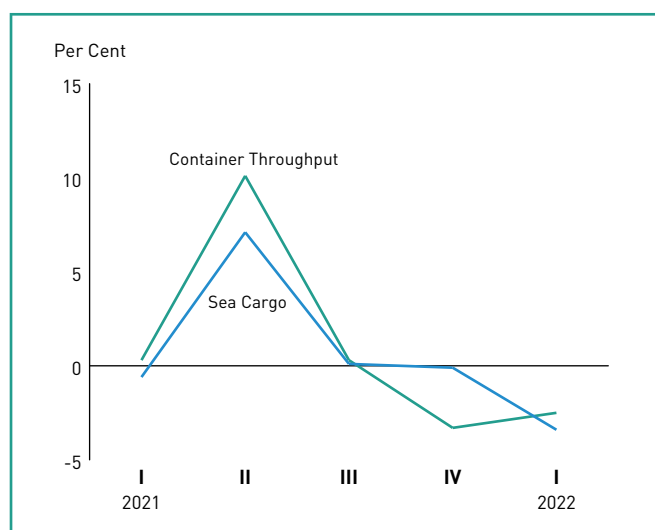


## TRANSPORTATION & STORAGE

The transportation & storage sector expanded by 5.9 per cent year-on-year in the first quarter of 2022, moderating from the 7.5 per cent expansion in the previous quarter. The sector's growth was driven mainly by the air transport segment, which expanded from the low base in the first quarter of 2021.

For the water transport segment, the volume of sea cargo handled fell by 3.4 per cent year-on-year in the first quarter, extending the 0.1 per cent decline recorded in the previous quarter (Exhibit 2.6). The drop in sea cargo volume handled was due to lower general cargo volume (-2.9 per cent) as well as oil-in-bulk cargo volume (-2.2 per cent). Meanwhile, container throughput declined by 2.5 per cent during the quarter.

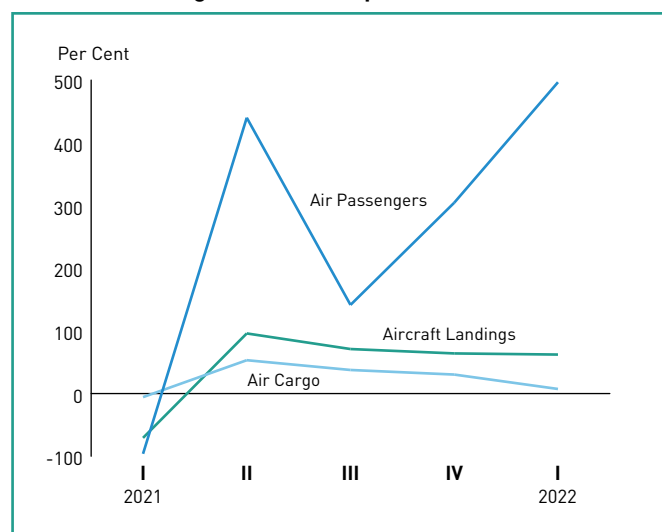
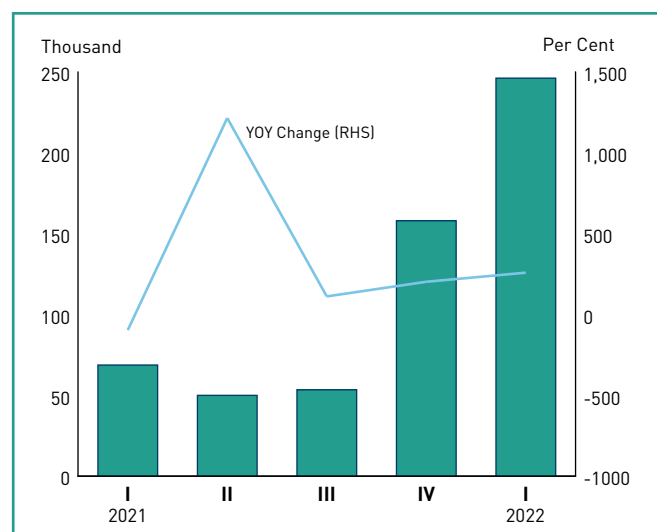
**Exhibit 2.6: Changes in Container Throughput and Sea Cargo Handled**



The air transport segment expanded year-on-year in the first quarter on the back of an increase in quotas for Vaccinated Travel Lanes (VTLs) during the quarter. In particular, the volume of air passenger traffic handled at Changi Airport surged by 497 per cent year-on-year in the first quarter, extending the 304 per cent increase in the previous quarter (Exhibit 2.7). These high growth rates were due to the low bases in the first quarter of 2021 and the fourth quarter of 2020 respectively, as the volume of air passenger traffic plunged by nearly 100 per cent in both quarters. In absolute terms, air passenger traffic volume in the first quarter of 2022 only reached 15.7 per cent of the volume seen in the first quarter of 2019 (i.e., pre-COVID level). Meanwhile, total air cargo shipments handled at Changi Airport rose by 7.3 per cent year-on-year in the first quarter, moderating from the 30.3 per cent growth recorded in the previous quarter. At the same time, the number of aircraft landings climbed by 62.2 per cent to reach 18,072 in the first quarter, extending the 64.0 per cent increase in the preceding quarter.

<sup>4</sup> The lower COE quotas in the first quarter of 2022 were largely due to a decline in the number of vehicles deregistered over the period of October 2021 to December 2021. The drop was exacerbated by a high base in the first quarter of 2021 as a result of the redistribution of COE quotas from the suspension of COE bidding exercises in 2020 during the Circuit Breaker period.

<sup>5</sup> Travel restrictions in the first quarter of 2022 were considerably more relaxed compared to the year before, with the expansion of the quarantine-free Vaccinated Travel Lanes (VTLs) launched in the fourth quarter of 2021.

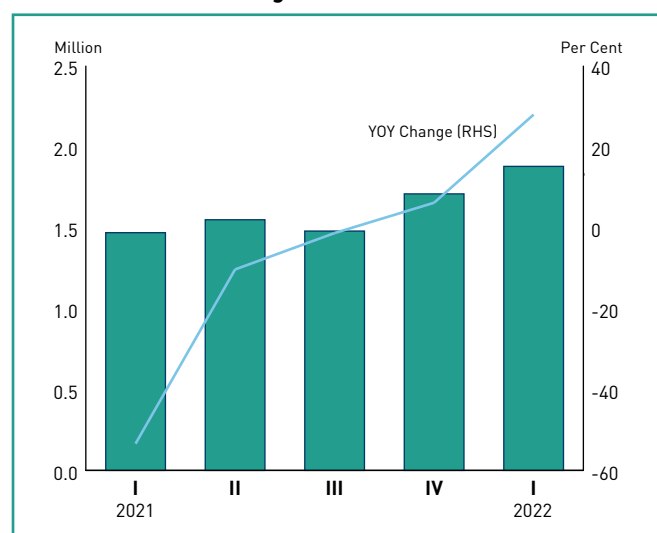
**Exhibit 2.7: Changes in Air Transport****Exhibit 2.8: Visitor Arrivals**

## ACCOMMODATION

The accommodation sector shrank by 13.5 per cent year-on-year in the first quarter of 2022, worsening from the 5.1 per cent contraction in the preceding quarter. The contraction during the quarter was driven by a sharp decline in government demand for hotel rooms to serve as quarantine and stay-home notice dedicated facilities, due to the shift towards home recovery and the relaxation of travel restrictions.

In the first quarter, total visitor arrivals surged by 258 per cent year-on-year, extending the 202 per cent growth recorded in the fourth quarter of 2021 (Exhibit 2.8). The strong growth in both quarters was on account of low base effects, as the number of visitor arrivals plunged by nearly 100 per cent in both the first quarter of 2021 and the fourth quarter of 2020. In level terms, the number of visitor arrivals in the first quarter of 2022 was around 246,000, representing just 5.2 per cent of the 4.7 million visitor arrivals registered in the first quarter of 2019 (i.e., pre-COVID level).

At the same time, gross lettings at gazetted hotels increased by 28.0 per cent year-on-year in the first quarter, accelerating from the 6.2 per cent growth in the previous quarter (Exhibit 2.9). As available room-nights fell even as gross lettings rose, the average occupancy rate of gazetted hotels climbed by 13.8 percentage-points on a year-on-year basis to reach 61.0 per cent in the first quarter. However, this was lower than the average occupancy rate of 71.1 per cent recorded in the previous quarter.

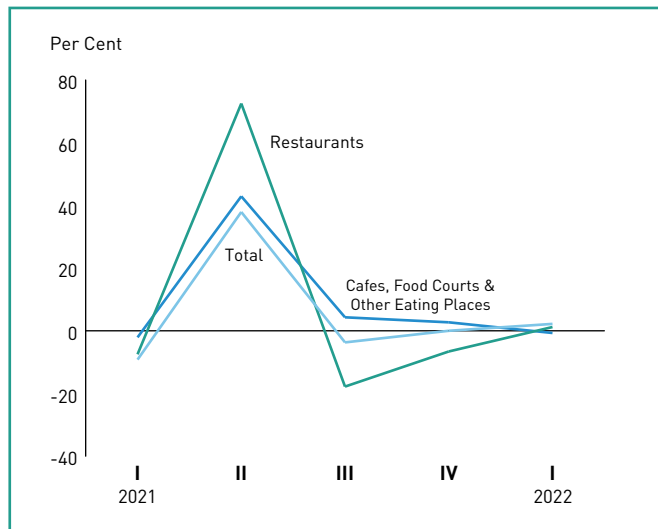
**Exhibit 2.9: Gross Lettings at Gazetted Hotels**

## FOOD & BEVERAGE SERVICES

The food & beverage services sector expanded by 2.1 per cent year-on-year in the first quarter of 2022, a turnaround from the 1.5 per cent contraction in the preceding quarter.

Overall food & beverage sales volume rose by 2.2 per cent year-on-year in the first quarter, better than the flat growth recorded in the fourth quarter of 2021 (Exhibit 2.10). The increase in sales volume in the first quarter was supported in part by the relaxation of Singapore's travel restrictions and attendant increase in tourists during the quarter. The food caterers (39.1 per cent), fast food outlets (2.0 per cent) and restaurants (1.2 per cent) segments saw expansions in their sales volumes, while the cafes, food courts & other eating places segment (-0.7 per cent) saw a modest decline.

**Exhibit 2.10: Changes in Food & Beverage Services Index in Chained Volume Terms**

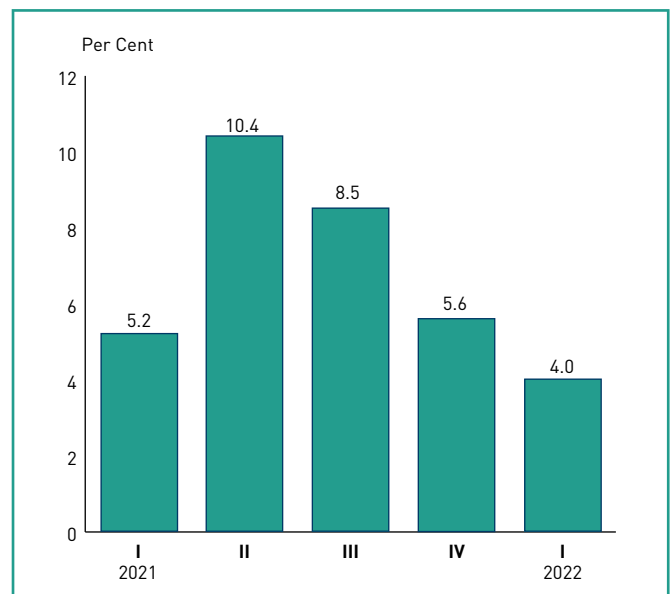


## FINANCE & INSURANCE

The finance & insurance sector grew by 4.0 per cent year-on-year in the first quarter of 2022, moderating from the 5.6 per cent expansion achieved in the preceding quarter.

Growth in the first quarter was largely driven by the other auxiliary activities and insurance segments. The former, which includes payment processing activities, continued to benefit from a pickup in consumer spending, while the latter was bolstered by the improved sales of single-premium life insurance products. By contrast, the banks segment shrank as both credit intermediation and net fees & commissions fell.

**Exhibit 2.11: Finance & Insurance Sector's Growth Rate**



## REAL ESTATE

The real estate sector expanded by 8.5 per cent year-on-year in the first quarter of 2022, faster than the 1.6 per cent growth registered in the preceding quarter. The growth of the sector was largely due to the low base (-1.7 per cent) in the same quarter of last year, when rentals for commercial office (-4.8 per cent) and retail space (-16.5 per cent) declined amidst tight workplace and border restrictions.

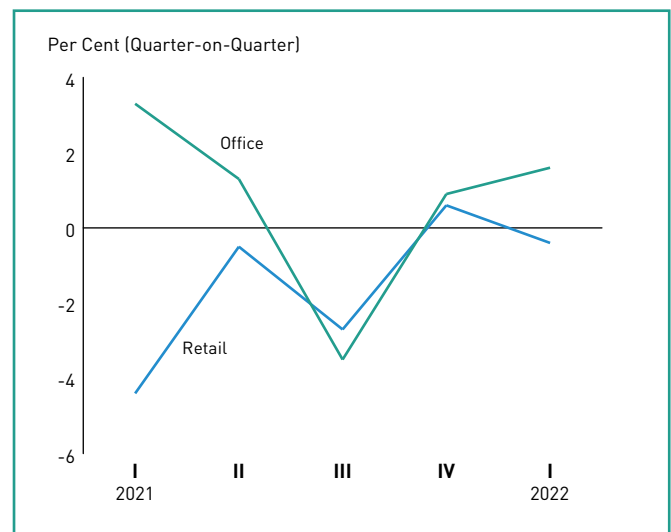
Within the sector, the number of private residential property sales transactions fell by 32.6 per cent on a quarter-on-quarter basis in the first quarter, following the tightening of property market cooling measures in December 2021. Meanwhile, private residential property prices rose by 0.7 per cent on a quarter-on-quarter basis, slowing from the 5.0 per cent increase seen in the fourth quarter of 2021 (Exhibit 2.12).

**Exhibit 2.12: Total Sales Transactions for Private Residential Units and Private Residential Property Price Index**



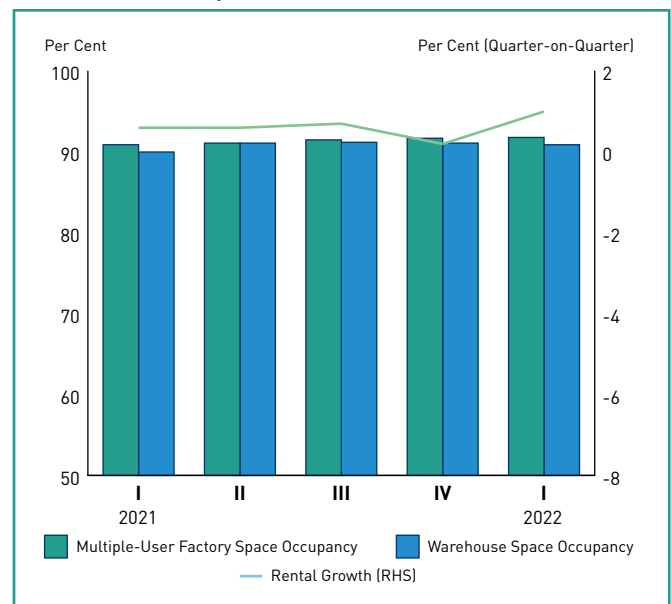
Conditions in the commercial and industrial property space markets were mixed. For the private retail space market, rentals edged down by 0.4 per cent on a quarter-on-quarter basis in the first quarter, reversing the 0.6 per cent rise in the previous quarter (Exhibit 2.13). The average occupancy rate of private retail space came in at 90.5 per cent during the quarter, slightly lower than the 90.9 per cent registered in the preceding quarter. Meanwhile, rentals for private office space rose by 1.6 per cent on a quarter-on-quarter basis, extending the 0.9 per cent increase in the preceding quarter. The average occupancy rate of private office space was 86.2 per cent in the first quarter, unchanged from the preceding quarter.

**Exhibit 2.13: Changes in Rentals of Private Sector Office and Retail Spaces**



Similarly, private industrial rentals rose by 1.0 per cent on a quarter-on-quarter basis in the first quarter, picking up from the 0.2 per cent increase in the preceding quarter. The occupancy rates of private sector multiple-user factory and warehouse spaces stood at 91.8 per cent and 90.9 per cent respectively, similar to that seen in the previous quarter (91.6 per cent and 91.1 per cent respectively) (Exhibit 2.14).

**Exhibit 2.14: Occupancy Rate and Rental Growth of Private Sector Industrial Space**



## PROFESSIONAL SERVICES

In the first quarter of 2022, the professional services sector grew by 8.1 per cent year-on-year, improving from the 4.9 per cent growth in the previous quarter. All segments within the sector expanded. Growth of the sector was mainly driven by the architectural & engineering, technical testing & analysis segment and the other professional, scientific & technical services segment.





CHAPTER

**03**

# ECONOMIC OUTLOOK

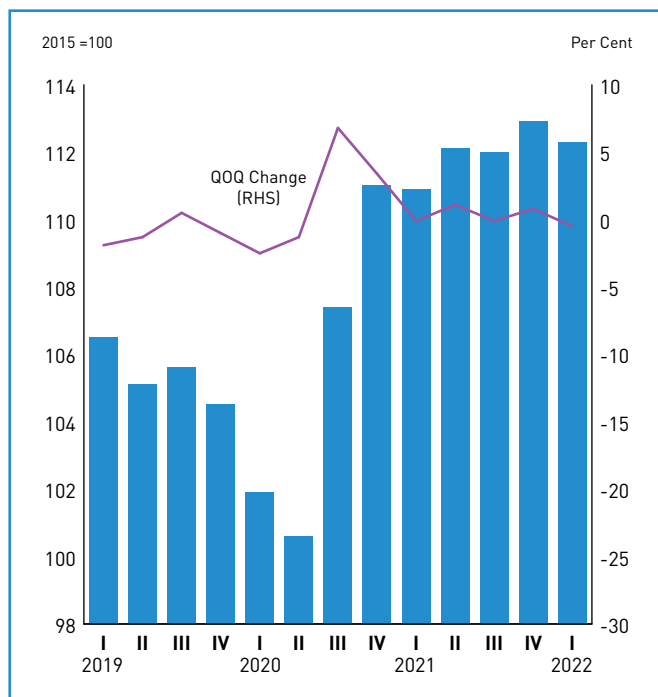
# ECONOMIC OUTLOOK

## LEADING INDICATORS

On a quarter-on-quarter basis, the composite leading index (CLI) declined by 0.5 per cent in the first quarter of 2022, a reversal from the 0.8 per cent increase in the previous quarter (Exhibit 3.1).

Of the nine components in the CLI, four components picked up on a quarter-on-quarter basis, namely domestic liquidity, stock price, new companies formed and non-oil retained imports. By contrast non-oil sea cargo handled, money supply, wholesale trade, US Purchasing Managers' Index and stock of finished goods declined compared to the previous quarter.

**Exhibit 3.1: Composite Leading Index Levels and Growth Rate**



## OUTLOOK FOR 2022

Since February, the external economic environment has deteriorated, due in part to the onset of the Russia-Ukraine conflict. In particular, the conflict has disrupted the global supply of energy, food and other commodities, which has in turn exacerbated global inflationary pressures and adversely affected the growth of many economies. Meanwhile, stringent measures implemented in China to contain its domestic COVID-19 outbreaks are likely to weigh on its economy and contribute to global supply bottlenecks. Consequently, global supply disruptions are projected to be more severe and prolonged than earlier expected, potentially persisting throughout 2022. This, in turn, is likely to constrain production and dampen GDP growth in some external economies by more than previously projected.

In the US, GDP growth is projected to moderate in 2022. While its strong labour market recovery is likely to support consumption, continued supply disruptions and more aggressive monetary policy tightening amidst elevated inflationary pressures may limit the extent of its increase this year. Meanwhile, the growth outlook of the Eurozone economy has weakened due to the Russia-Ukraine conflict as the latter has led to higher inflation and more severe supply bottlenecks, which are likely to dampen the recovery in both consumption and industrial activities. Heightened economic uncertainty arising from the conflict has also dented economic sentiments, which could in turn weigh on domestic demand in the Eurozone.

In Asia, China's GDP growth in 2022 is expected to be slower than earlier projected, as consumption is likely to remain weak due to the imposition of stringent COVID-19 measures to contain its domestic outbreaks. Economic uncertainty arising from its COVID-19 situation, as well as continued stresses in its property market, are also likely to pose a drag on investment growth in the near term. Meanwhile, the growth of Southeast Asian economies such as Malaysia, Indonesia and Thailand is projected to improve in 2022, supported by a pickup in domestic demand with the easing of public health measures in these economies, as well as sustained demand for their merchandise exports.

On balance, MTI's assessment is that the external demand outlook for the Singapore economy has weakened compared to three months ago. At the same time, downside risks in the global economy remain significant. First, the Russia-Ukraine conflict has led to a surge in energy and food commodity prices, as well as significant global economic uncertainty. If the conflict is prolonged or escalates, it could further exacerbate inflationary pressures and weigh on global economic growth. Second, if global supply disruptions are more severe than expected due to renewed COVID-19 outbreaks or further escalations in the Russia-Ukraine conflict, global industrial production may be constrained more substantially than currently projected. Third, if monetary policy tightening in the advanced economies is faster than anticipated, market adjustments could be disorderly and risks to financial stability could intensify. In particular, the onset of large capital outflows from regional economies with high dollar-denominated debt levels could lead to tighter financial conditions and derail growth in these economies. Fourth, the trajectory of the COVID-19 pandemic remains a risk. While vaccination rates and booster rollouts have picked up in many economies, the potential emergence of more virulent strains of the virus continues to pose a risk to the global economy.

Domestically, the COVID-19 situation has stabilised following the cresting of the Omicron wave. This, along with our high vaccination rate and strong booster take-up, has allowed for a faster-than-expected lifting of our domestic and border restrictions since end-March.

Against this backdrop, the growth outlook for some outward-oriented sectors in the Singapore economy has weakened this year. For instance, as China is a key market for petroleum and chemicals products from Singapore, its economic slowdown is likely to adversely affect the growth prospects of Singapore's chemicals cluster and the fuel & chemicals segment of the wholesale trade sector. Meanwhile, growth in the water transport segment is expected to be weighed down by prolonged supply disruptions and port congestions worldwide.

Nonetheless, there are also sectors in the Singapore economy which have seen a strengthening of their growth outlook. First, the electronics cluster is expected to expand more strongly than earlier projected, bolstered by robust global demand for semiconductors from the 5G and automotive markets, as well as cloud services and data centres. Second, the rollout of the Vaccinated Travel Framework, alongside the easing of border restrictions in regional economies, is likely to boost the growth of the professional services sector as firms in segments like consultancy and legal can now better engage their overseas clients. Similarly, air travel and visitor arrivals are expected to pick up more quickly than earlier projected, thereby accelerating the recovery of aviation- and tourism-related sectors like air transport and arts, entertainment & recreation. Third, the relaxation of domestic and border restrictions since end-March will support a faster pace of recovery in consumer-facing sectors such as retail trade and food & beverage services, as well as further alleviate labour shortages in sectors that are reliant on migrant workers such as construction.

Taking into account the performance of the Singapore economy in the first quarter, as well as the latest global and domestic economic developments, MTI continues to expect the Singapore economy to grow by **"3.0 to 5.0 per cent"** in 2022, **although growth is now more likely to come in at the lower half of the forecast range.**





## FEATURE ARTICLE

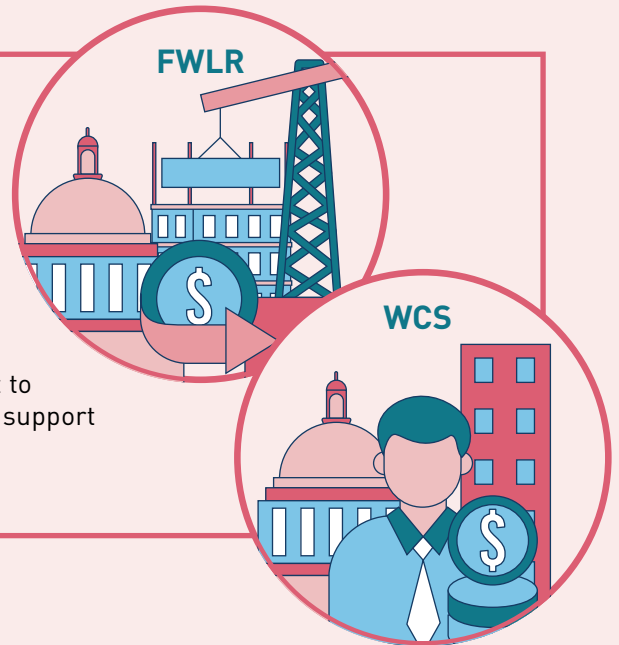
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**IMPACT OF FOREIGN WORKER  
LEVY REBATE AND WAGE  
CREDIT SCHEME DURING THE  
COVID-19 PANDEMIC**

# IMPACT OF FOREIGN WORKER LEVY REBATE AND WAGE CREDIT SCHEME DURING THE COVID-19 PANDEMIC

## INTRODUCTION

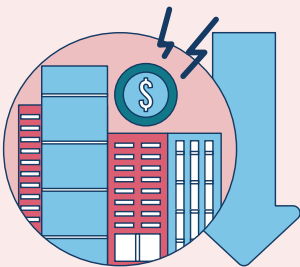
To ensure that firms were able to retain enterprise capabilities to emerge stronger from the COVID-19 pandemic, the Government provided Foreign Worker Levy Rebate (FWLR) to employers during the crisis, particularly for firms in the Construction, Marine Shipyard and Process sectors. Meanwhile, the Wage Credit Scheme (WCS), which was introduced in Budget 2013 as a transitional salary support scheme to help firms adjust to rising costs as they restructure, was enhanced in 2020 to further support workers and businesses during the pandemic.



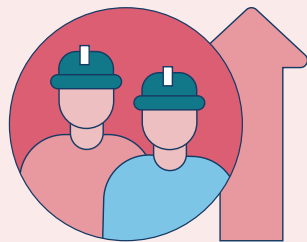
## FINDINGS

### FWLR

The FWLR reduced the likelihood of firms facing financial distress and supported the hiring and retention of Work Permit and S Pass Holders in the construction sector.



Reduced likelihood of firm financial distress



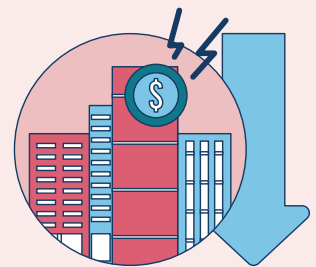
Hiring and retention of Work Permit and S Pass Holders in the construction sector

### WCS

The WCS reduced the likelihood of firms facing financial distress and supported the hiring of local workers earning less than \$5,000.



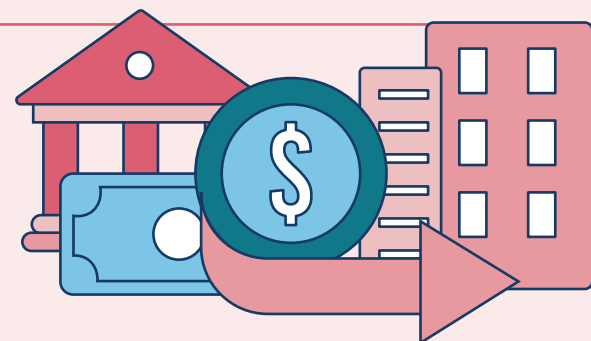
Hiring and retention of local workers



Reduced likelihood of firm financial distress

## POLICY TAKEAWAY

This study highlights the importance of providing cash transfers to firms to help them fulfil short-term cash obligations and retain workers (and hence capabilities) during times of heightened economic stress.



## EXECUTIVE SUMMARY

- ▶ Using a set of high-frequency (monthly) firm-level indicators and scheme disbursement data, this study examines the impact of the foreign worker levy rebates (FWLR) and Wage Credit Scheme (WCS) payouts disbursed during the COVID-19 pandemic on firm-level outcomes.
- ▶ We found that both the FWLR and WCS payouts helped to lower the likelihood of firm financial distress and also supported the hiring and retention of workers, especially Work Permit and S Pass Holders in the construction sector in the case of the FWLR, and local workers earning less than \$5,000 in the case of the WCS. This highlights the importance of providing cash transfers to firms to help them fulfil short-term cash obligations and retain workers (and hence capabilities) during times of heightened economic stress.
- ▶ The high-frequency nature of this analysis implies that the estimated impact of the schemes should be seen as the short-term impact and is meant to provide a prompt sensing of their effectiveness during the pandemic. A more comprehensive study to analyse the longer-term benefits and costs of the schemes should be conducted once annual data on firm-level outcomes (e.g., financial information, value-added) are available.

*The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry (MTI) or other government agencies.<sup>1</sup>*

## INTRODUCTION

At the onset of the COVID-19 pandemic, governments around the world implemented public health measures such as border closures and lockdowns to stem the spread of the virus. These measures severely disrupted business activities in many sectors, especially those in consumer-facing, tourism-related and aviation-related sectors. The resulting supply-side shocks also triggered demand-side shocks, as the disruptions in economic activity alongside the uncertainty brought on by the pandemic led to layoffs and a pullback in global consumption and investment demand. To cushion the impact of these shocks on households and firms, governments worldwide rolled out a range of stimulus measures, including tax rebates and cash transfer payments. For the policies targeted at firms, they were broadly aimed at helping to ease the cashflow concerns of firms and/or to support them in retaining capabilities (e.g., workers with experience and skills) to prevent longer-term economic scarring that would have occurred had they lost these capabilities.

In Singapore, to help employers retain and care for their foreign workers during the Circuit Breaker (CB) period<sup>2</sup>, the Government announced in April 2020 that it would provide foreign worker levy rebates (FWLR) to employers as part of the Solidarity Budget<sup>3</sup>. The rebate was initially set at \$750 per month for each Work Permit Holder (WPH) or S Pass Holder (S Pass) and was given to firms in all sectors from April to June 2020, before being stepped down to \$375 per month in July 2020, after Singapore exited the CB. From August 2020 onwards, the rebate was provided only to firms in the Construction, Marine Shipyard and Process (CMP) sectors (Exhibit 1). This is because firms in these sectors had a high level of dependence on foreign workers and continued to face manpower disruptions due to COVID-19-related restrictions. For instance, construction firms were required to segregate their workers into teams and were not allowed to cross-deploy workers across multiple worksites, which in turn weighed on their productivity and activity levels.

<sup>1</sup> We would like to thank MOM and MOF for their inputs to this study and acknowledge the contributions of Mr Tan Di Song and Mr Kuhan Harichandra to the study. We would also like to thank Ms Yong Yik Wei for her useful suggestions and comments. All errors belong to the authors.

<sup>2</sup> CB measures were implemented from 7 April to 1 June 2020 to stem the rise in domestic COVID-19 infections. These measures included the suspension of non-essential services and the closure of most workplace premises.

<sup>3</sup> Concurrently, the Government gave all firms a full 100 per cent foreign worker levy waiver in March and April 2020. The waiver remained at 100 per cent for all firms in the CMP sectors from May to September 2020, before being progressively stepped down to 75 per cent in October 2020, 50 per cent in November 2020, and 25 per cent in December 2020.

Meanwhile, the Wage Credit Scheme (WCS), which was introduced in Budget 2013 as a transitional salary support scheme to help firms adjust to rising costs as they restructure, was enhanced in Budget 2020 to further support workers and businesses during the pandemic. Under the WCS, the Government would co-fund a portion of the wage increases (co-funding ratio) of Singapore Citizen employees, up to a certain gross monthly wage level (gross wage ceiling), with the co-funding amount disbursed to firms in the form of annual cash payouts. In Budget 2020, the co-funding ratio for wage increases in 2019 and 2020 was raised by 5 percentage-points (pp) to 20 per cent and 15 per cent respectively, and the gross wage ceiling was raised from \$4,000 to \$5,000, thus enabling more firms to receive the WCS payout (Exhibit 1). As the 2020 WCS was paid out in March 2020, prior to the announcement of these enhancements, only the additional payout arising from the higher co-funding ratio and wage ceiling was disbursed in June 2020. This provided additional liquidity to firms that had raised the wages of their Singaporean Citizen employees prior to the COVID-19 pandemic. In 2021, even though the WCS co-funding ratio was tapered down to 15 per cent, the gross wage ceiling was maintained at \$5,000. The WCS payout that was made in March 2021 thus continued to provide liquidity assistance to firms that had raised the wages of eligible employees in 2020.

**Exhibit 1: Details and Timeline of Foreign Worker Levy Rebate and Wage Credit Scheme Payouts (March 2020 to May 2022)**

Scheme	March 2020	April to June 2020	July 2020	August to September 2020	October 2020 to April 2021	May 2021 to May 2022
Foreign Worker Levy Rebate		\$750 per WPH or S Pass, for firms in all sectors.	\$375 WPH or S Pass, for firms in all sectors. <sup>^</sup>	\$375 per WPH or S Pass, for firms in CMP sectors only.	\$90 per WPH, for firms in CMP sectors only.	\$250 per WPH, for firms in CMP sectors only.
Wage Credit Scheme	2020 WCS payout (March 2020): Co-funding ratio of 15 per cent for wage increase in 2019. Gross wage ceiling of \$4,000.	Enhanced WCS 2020 payout (June 2020): Co-funding ratio of 20 per cent for wage increase in 2019. Gross wage ceiling of \$5,000.  Additional payout in 2020 due to the higher co-funding ratio and wage ceiling announced in Budget 2020.			2021 WCS payout (March 2021): Co-funding ratio of 15 per cent for wage increase in 2020. Gross wage ceiling of \$5,000.	

<sup>^</sup>: FWLR in July 2020 was restricted to businesses that were not allowed to resume operations after Circuit Breaker.

The FWLR and WCS were akin to cash transfers that were provided to help firms cope with the varying impact of the COVID-19 pandemic as it unfolded. For instance, while the FWLR was initially disbursed to all firms that hired WPHs and S Passes to help them cope with the CB restrictions, it was subsequently extended only for firms in CMP sectors because they were especially affected by the worksite restrictions imposed by the Government. Likewise, while the Enhanced WCS payout in June 2020 could have helped firms to cope with operating expenses during the initial months of the pandemic when demand and revenues plunged, the 2021 WCS payout was intended to support firms that had transformed their businesses and raised their employees' wages as the economy recovered.

A previous study by Koh (2022) examined the impact of Enterprise Singapore's (ESG) loan financing schemes<sup>4</sup> on monthly firm-level outcomes, including firm financial distress and employment. We extended this study to examine the impact of the FWLR and WCS payouts on firms using the same firm-level indicators. This would help to shed light on whether the FWLR and WCS payouts helped to keep firms afloat and enabled them to retain manpower capabilities during the COVID-19 recession.

In the past, such impact evaluation analyses would have been carried out with a significant time lag due to the use of annual data on firm-level outcomes that are compiled with a time lag. Given the unprecedented scale of the economic fallout from the COVID-19 pandemic and the fast-evolving health situation, there was a need to use available high-frequency indicators to obtain a timely analysis of the impact of the schemes put in place to help firms and workers so as to calibrate the Government's responses to the pandemic more effectively<sup>5</sup>. Nonetheless, given the high-frequency and short-term nature of the analysis, it will be useful to carry out a more comprehensive longer-term analysis once annual firm-level data (e.g., financial information, value-added) is available.

## DATA AND SUMMARY STATISTICS

To carry out this analysis, a set of high-frequency (monthly) firm-level data was assembled. The key firm-level outcome indicators in the dataset were (i) a binary indicator of firm financial distress constructed from various data sources, which indicates whether a firm was prompt in meeting its payment obligations in a particular month (Exhibit 2); and (ii) firms' employment levels based on data from the Central Provident Fund Board (CPFB) and Ministry of Manpower (MOM). The high-frequency firm-level outcome indicators were matched to administrative data on the disbursements made to firms under the FWLR, WCS and other government support schemes, including the Jobs Support Scheme (JSS)<sup>6</sup> and ESG's financing schemes. The study covers the period from September 2019 to August 2021.

**Exhibit 2: Data Used in the Construction of the Firm Financial Distress Indicator**

Firm-level outcome	Source	Frequency
CPF late payments	CPFB	Monthly
Rental arrears	JTC	
Electricity payment arrears	EMA	
Foreign worker levy default	MOM	

Note: A firm was identified to be in financial distress, in a particular month, if the firm (1) was late in making employer's CPF contribution for the month; or (2) had defaulted on its payment of foreign worker levy; or (3) had an increase in outstanding JTC rental arrears or electricity payment arrears owed to SP Group as compared to the previous month.

**FWLR.** Over the period of April 2020 to August 2021, a total of 56,095 firms received the FWLR. From April 2020 to July 2020, which covered the CB period, most FWLR recipients were from the services sector. This is not surprising as the services sector accounted for the employment of 44.5 per cent of all WPHs and S Passes as of December 2019. However, following the tightening of eligibility requirements in August 2020 to only include firms in the CMP sectors, most FWLR recipients were from the construction sector (Exhibit 3). The bulk of the FWLR recipients were also smaller firms with no more than 50 employees (Exhibit 4). Compared to non-recipients, FWLR recipients had a higher proportion of firms in financial distress prior to the pandemic and also higher average employment levels (Exhibit 5).

<sup>4</sup> These schemes included the Temporary Bridging Loan Programme (TBL) and the enhancement to the Financing Scheme – Working Capital Loan (EWCL), which were introduced by the Singapore Government with the goal of expanding risk-sharing arrangements with participating financial institutions in order to provide working capital to eligible firms, especially SMEs, during the pandemic.

<sup>5</sup> Examples of high-frequency impact evaluations overseas include Chetty et al. (2020), which used data from credit card processors, payroll firms, job posting aggregators and financial services firms to evaluate the US Government's COVID-19 policies; or Meng (2021), which used high-frequency survey data on firms' revenue and employee hours to evaluate the Small Business Administration assistance programmes in the US. Ebeke et al. (2021) used detailed balance sheet and income statement data to conduct similar evaluations of Europe's COVID-19 policies and found that corporate sector relief measures significantly reduced liquidity shortfalls and helped to mitigate job and output losses.

<sup>6</sup> While the impact of the JSS is not examined in this study, the JSS payout was used as a control variable in the estimation methodology. For more information on the impact of JSS on firm-level outcomes, see Pang et al. (2021).

**Exhibit 3: Number of FWLR Recipients by Sector<sup>7</sup>, April 2020 to August 2021**

Notes: Data is as of August 2021. "Others" include Utilities, Postal and Courier sectors.  
Source: MOM

**Exhibit 4: Number of FWLR Recipients by Total Employment Size, April 2020 to August 2021**

Total Employment Size	FWLR
	Number of firms
≤10	39,102
11-50	16,638
51-100	1,938
>100	1,937

Notes: Total employment is based on firm's employment size as at December 2019.  
Source: Authors' calculation, based on data from MOM and CPF.

**Exhibit 5: Key Firm Characteristics of FWLR Recipients and Non-Recipients**

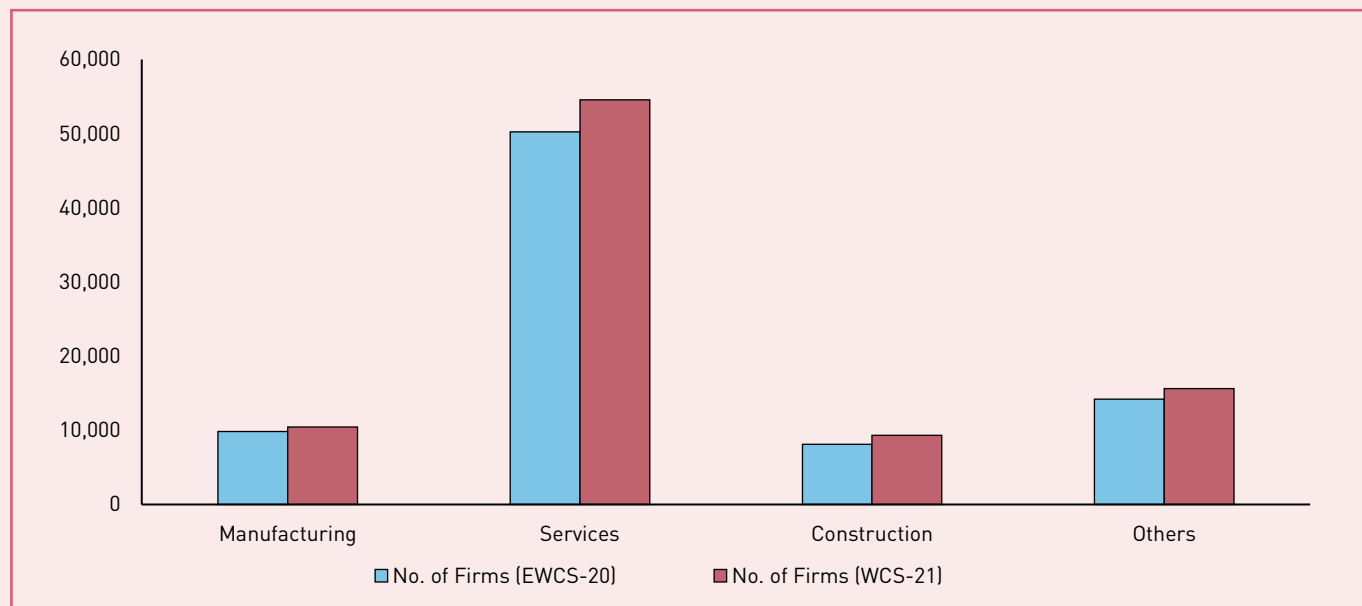
Key Firm Characteristics	FWLR	Non-FWLR Recipients
Proportion of Firms in Financial Distress	2.3 per cent	0.9 per cent
Average Total Employment	25	7

Notes: Employment level is based on the value in December 2019, while the proportion of firms in financial distress is based on the value in April 2020, which is the earliest date where all four variables used to construct the indicator (in Exhibit 2) are available.  
Source: Authors' calculation, based on data from MOM and other sources indicated in Exhibit 2.

<sup>7</sup> Services and "Others" firms that received FWLR after August 2020 were those that provided services to the CMP sectors and hired foreign workers to do so during this period. Manufacturing firms that received FWLR after August 2020 were those in the Marine and Process sectors.

**Wage Credit Scheme.** We studied only the impact of the Enhanced WCS paid out in June 2020 (EWCS-20) and the WCS paid out in March 2021 (WCS-21) because these were disbursed after major COVID-19 restrictions were implemented in Singapore (e.g., CB in April 2020). A total of \$0.5 billion and \$0.9 billion were disbursed through the EWCS-20 and WCS-21 payouts respectively, benefitting 97,912 and 98,121 firms.<sup>8</sup> Most WCS recipients were from the services sector (Exhibit 6) and were smaller firms with no more than 50 employees (Exhibit 7). Compared to non-recipients, WCS recipients had a slightly higher proportion of firms in distress prior to the pandemic and also higher average employment levels (Exhibit 8).

**Exhibit 6: Number of WCS Recipients by WCS Payout and Sector**



Notes: "Others" include Utilities, Postal and Courier sectors.

Source: IRAS

**Exhibit 7: Number of WCS Recipients and Average Payout by Total Employment Size**

Total Employment Size	EWCS-20		WCS-21	
	Number of firms	Average payout (\$)	Number of firms	Average payout (\$)
≤10	47,403	952	50,423	1,943
11-50	27,025	3,171	31,157	6,099
51-100	4,162	10,449	4,554	18,893
>100	3,763	77,818	3,766	145,047

Notes: Total employment is based on firm's employment size as at December 2019.

Source: Authors' calculation, based on data from IRAS and CPF.

**Exhibit 8: Key Firm Characteristics of WCS Recipients and Non-Recipients**

Key Firm Characteristics	WCS	Non-WCS Recipients
Proportion of Firms in Financial Distress	9 per cent	8 per cent
Average Total Employment	31	7

Notes: Employment level is based on the value in December 2019, while the proportion of firms in financial distress is based on the value in April 2020, which is the earliest date where all four variables used to construct the indicator (in Exhibit 2) are available.

Source: Authors' calculation, based on data from IRAS and other sources indicated at the start of this section.

<sup>8</sup> 12,436 out of the 111,727 firms that received the EWCS-20 and WCS-21 payouts were excluded from the study due to the lack of employment or wage data.

## METHODOLOGY

As the FWLR and WCS differed in terms of payout structure and frequency, different models were used to estimate the impact of each scheme on firm-level outcomes.

### FWLR – Two-Way Fixed Effects Model

We restricted the sample of firms in our analysis to only those that had received some amount of FWLR. This is because the firms that received FWLR (i.e., firms that employed WPHs or S Passes) differed significantly from those that did not (i.e., firms that did not employ WPHs and S Passes). For example, firms that received FWLR would have been affected by restrictions specific to foreign workers (e.g., lockdown of foreign worker dormitories) unlike those that did not. Comparing the two groups of firms could thus lead to biased results. Instead, we estimated the impact of the FWLR by restricting the sample of firms to those that received the FWLR and comparing the outcomes of firms that received higher versus lower amounts of FWLR.

Even after restricting the sample, an important consideration when evaluating the causal impact of the FWLR is that firms that received more rebates might differ from those that received less (i.e., selection bias). For instance, firms that received more FWLR (i.e., hired more WPHs and S Passes) might be more reliant on the output produced or revenue generated by foreign workers, and thus be at a greater risk of financial distress during periods when COVID-19 restrictions prevented the foreign workers from working.

To mitigate such selection biases, we adopted a two-way fixed effects regression model<sup>9</sup> to account for differences across firms that could have affected the amount of FWLR they received. In particular, the model accounted for time trends that affected all firms (e.g., recession conditions) as well as unique firm characteristics (including those not observed in the dataset) that did not change during the period of study (e.g., firm managerial culture). To further isolate the impact of the FWLR, the impact of other major Government support measures, such as the JSS payments received by firms, was also controlled for in the regression model. By mitigating selection biases<sup>10</sup>, the methodology employed provided more confidence that differences in firms' outcomes could be attributed to the receipt of FWLR.

Our regression specification was:

$$\log Y_{it} = \beta \times \log \text{cumFWLR}_{it} + \varphi'X_{it} + \gamma_i + \theta_t + \varepsilon_{it} \quad (1)$$

Where:

- $Y_{it}$  represents firm-level outcomes (e.g., firm financial distress, S Pass employment, WPH employment) for firm  $i$  in month  $t$ . For firm financial distress, a binary outcome indicator was used;
- $\text{cumFWLR}_{it}$  is the cumulative FWLR amount that firm  $i$  received in and prior to month  $t$ ;
- $X_{it}$  represents a set of controls that includes the disbursements under other major schemes (i.e., JSS and loan amounts under ESG's financing schemes) received by firm  $i$  in and prior to month  $t$ ;
- $\gamma_i$  and  $\theta_t$  represent the firm-level (cross-sectional) and month (time) fixed effects respectively;
- $\beta$  measures the average impact of an increase in the cumulative FWLR amount on firm-level outcomes;
- $\varepsilon_{it}$  is the error term.

We also ran separate regressions using equation (1) for manufacturing, services and construction firms, as well as a regression specification where we interacted the cumulative FWLR variable with the firm's employment size category. The firm-size regression specification is as follows:

$$\log Y_{it} = \beta \times \log \text{cumFWLR}_{it} + \psi' \text{firmsize}_i \times \log \text{cumFWLR}_{it} + \theta'X_{it} + \gamma_i + \theta_t + \varepsilon_{it} \quad (2)$$

Where:

- $\text{firmsize}_i$  represents the employment size category of firm  $i$  proxied by its total employment size in December 2019 (categories:  $\leq 10$ , 11-50, 51-100,  $> 100$ );
- All other variables are as defined in equation (1).

<sup>9</sup> Two-way fixed effects regression models have been widely used by academics and government researchers to evaluate the impact of various policies. See Toh et al. (2021) and Banerjee & Iyer (2005) for examples of studies that used two-way fixed effects regression models.

<sup>10</sup> Nonetheless, selection bias could still exist if there were time-varying characteristics that affected the amount of FWLR that firms received but were not captured in the high-frequency dataset.

## WCS – Difference-in-Differences (DiD) Model

The regression model used for the WCS differed from that used for the FWLR as there were only two WCS payouts across the sample period, compared to the monthly FWLR. Given the 9-month gap between the payouts (June 2020 and March 2021), we did not sum up the EWCS-20 and WCS-21 payouts for firms that received both payouts. Instead, we examined the firm-level outcomes of WCS recipients (treated group) immediately after receiving a payout, in comparison to non-recipients (control group).

To mitigate selection bias and ensure that firms in the treatment and control groups were similar, we first conducted propensity score matching<sup>11</sup>. This method allowed us to select a set of control firms that were similar to treated firms based on pre-treatment variables (i.e., firm-level outcomes in December 2019, prior to the EWCS-20 and WCS-21 payouts).

After selecting a comparable control group, we used the following DiD regression specification to estimate the causal impact of the EWCS-20 and WCS-21 payouts, by comparing differences in the firm-level outcomes of the treated and control groups<sup>12</sup> after the disbursement of the payouts (treatment):

$$\log Y_{it} = \sum_j \sum_k \beta^{jk} (WCS_i^j \times T_t^k) + \sum_j WCS_i^j + \sum_k T_t^k + \varepsilon_{it} \quad (3)$$

Where:

- $Y_{it}$  represents firm-level outcomes (e.g., firm financial distress, employment<sup>13</sup>) for firm  $i$  in month  $t$ . For firm financial distress, a binary outcome indicator was used;
- $WCS_i^j$  is a binary indicator for the combination of WCS payouts  $j$  received by firm  $i$  (i.e., whether the firm: (1) received EWCS-20 only, (2) received WCS-21 only, or (3) received both payouts);
- $T_t^k$  is a binary indicator for whether month  $t$  is in period  $k$ . The two relevant periods were: (1) after the EWCS-20 payout but before the WCS-21 payout (i.e., between June 2020 to Feb 2021), or (2) after the WCS-21 payout (i.e., March 2021 onwards);
- $\beta^{jk}$  represents the average impact of payout combination  $j$  in period  $k$ .

To obtain estimates of the impact of the WCS, we took the weighted average<sup>14</sup> of the following coefficients:

- $\beta^{1,1}$ , the average impact of EWCS-20 on firms that only received the EWCS-20 payout, after the EWCS-20 payout but before the WCS-21 payout;
- $\beta^{2,2}$ , the average impact of WCS-21 on firms that only received the WCS-21 payout, after the WCS-21 payout;
- $\beta^{3,1}$ , the average impact of EWCS-20 on firms that received both payouts, after the EWCS-20 payout but before the WCS-21 payout.

Our results thus reflect the average impact of the two WCS payouts on the outcomes of treated firms immediately after the receipt of their first payout<sup>15</sup>.

Separate regressions were also run using equation (3) for manufacturing, services and construction firms, as well as firms of various employment sizes.

<sup>11</sup> Propensity score matching helps to reduce any biases in estimates by selecting a control group of non-treated firms with observed characteristics that are similar to treated firms before the treatment. It does so by computing a propensity score based on observed characteristics, indicating the probability that each firm will receive the WCS, and only selecting firms with scores similar to the treated firms but did not actually receive the WCS to be in the control group. The variables used for the matching include pre-treatment employment, average local wages, firm age, sector, entity type (e.g., local company) and firm outcomes.

<sup>12</sup> We also checked that, prior to the EWCS-20 payout, firm-level outcomes in the treated and control group had the same trend over time. This is a common check to ensure the validity of a DiD model.

<sup>13</sup> Specifically, we run regressions for total employment (i.e., Singaporeans, Permanent Residents and foreigners), local employment only (i.e., Singaporeans and Permanent Residents) and local workers earning less than or equal to \$5,000.

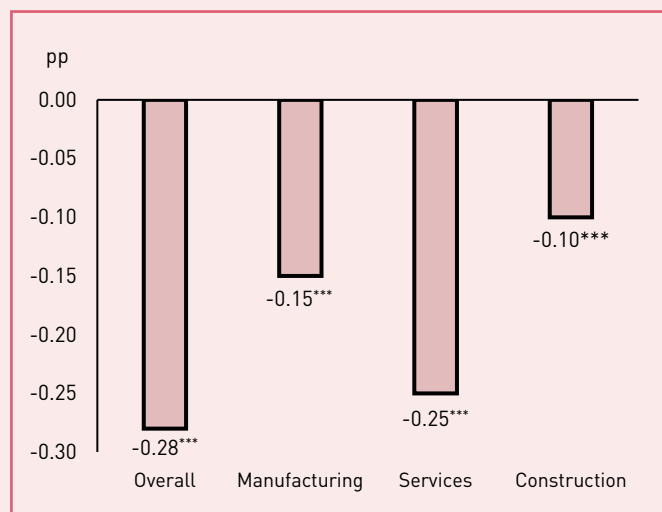
<sup>14</sup> Final estimates were weighted by the number of firms in each payout combination.

<sup>15</sup> We excluded the  $\beta^{1,2}$  and  $\beta^{3,2}$  coefficients as these reflect effects in periods not immediately after a firm had received a WCS payout for the first time. Doing so ensures that the coefficients for firms across the different payout combinations were comparable.

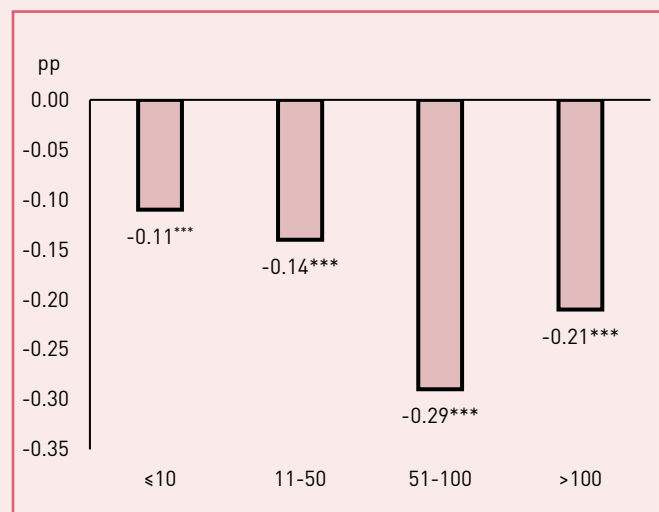
## RESULTS

Our findings showed that the FWLR helped to alleviate financial distress among firms that employed WPHs and S Passes. Specifically, firms that received an additional average amount of FWLR experienced a reduction in the likelihood of firm financial distress by 0.28 pp (Exhibit 9a). This reduction in the likelihood of firm financial distress was seen for firms across all sectors. We also observed that the FWLR had a statistically significant effect on reducing the probability of firm financial distress across firms of all employment sizes, suggesting that the FWLR was effective in helping firms to address their short-term payment obligations (Exhibit 9b).

**Exhibit 9a: Impact of Additional Average FWLR on Firm-level Financial Distress, by Sector (pp)**



**Exhibit 9b: Impact of Additional Average FWLR on Firm-level Financial Distress, by Total Employment Size (pp)**



Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

Notes: Bars with bolded borders indicate estimates that are statistically significant at the 10 per cent level.

We further observed that the FWLR helped firms to retain their foreign workers. Specifically, in the construction sector, an additional average FWLR increased the retention of WPH and S Passes by 0.70 per cent and 0.42 per cent respectively (Exhibit 10). This is not surprising, as firms in this sector are dependent on foreign workers to carry out activities at construction worksites, and the rebate would have helped to offset the cost of retaining these workers amidst the disruptions during the COVID-19 pandemic.

**Exhibit 10: Impact of Additional Average FWLR on Firm-level Foreign Employment in the Construction sector (per cent)**

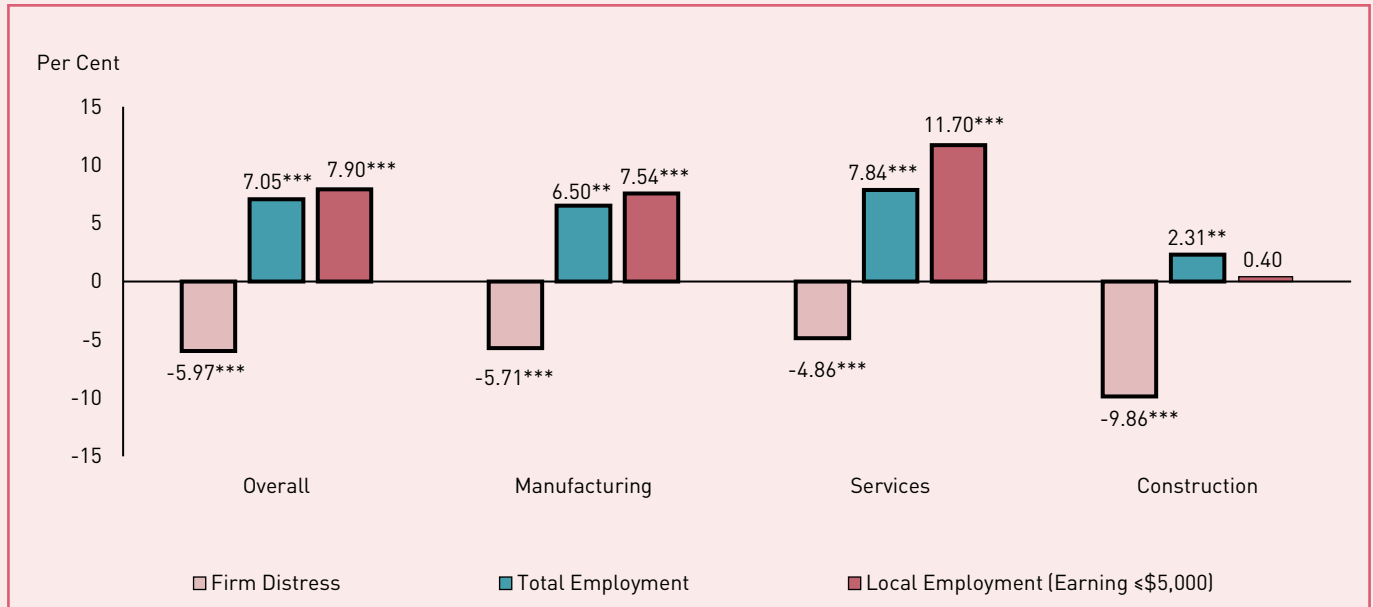


Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

Notes: Bars with bolded borders indicate estimates that are statistically significant at the 10 per cent level.

We saw similar effects for the WCS payouts, with the payouts alleviating firm financial distress and helping firms to hire and retain workers. Specifically, the WCS payouts led to a 5.97 pp fall in the likelihood of firm financial distress and a 7.05 per cent increase in total employment in a firm on average (Exhibit 11). The decline in likelihood of firm financial distress and increase in total employment was observed for firms across all sectors. The increase in total employment was driven by the hiring and retention of local workers earning  $\leq \$5,000$ .

**Exhibit 11: Average impact of WCS on Firm-level Outcomes, Overall and by Sector (per cent)**

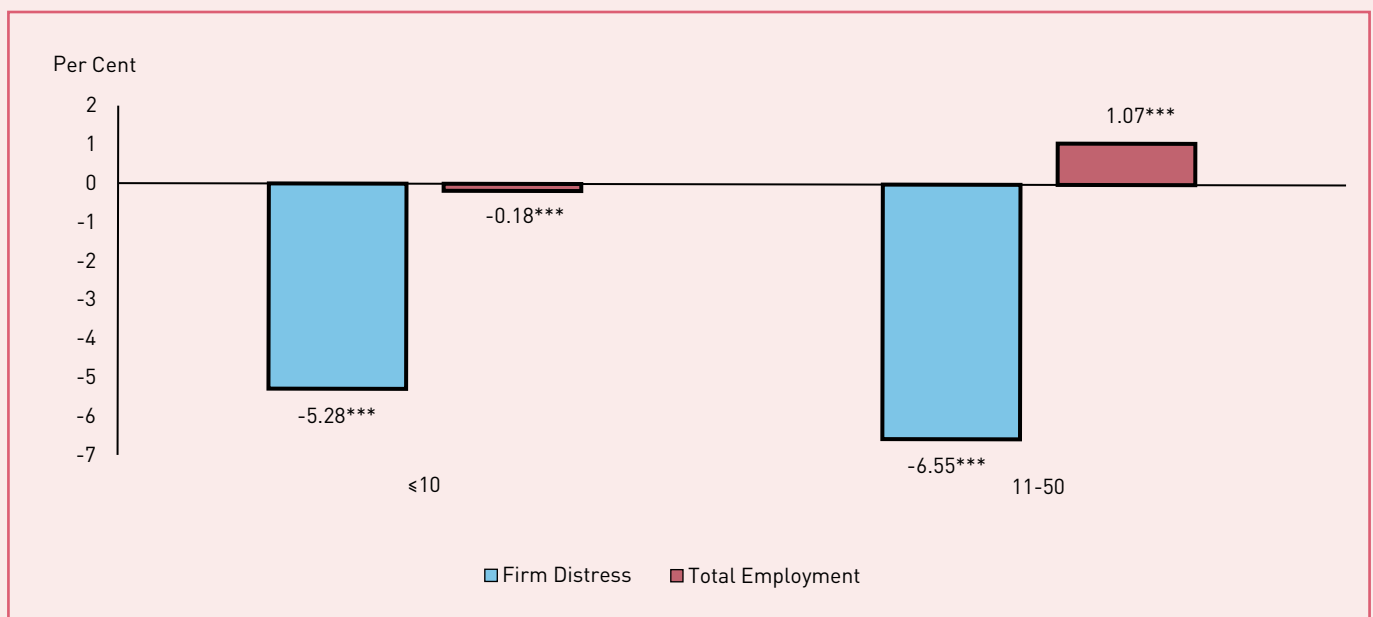


Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

Notes: (1) Impact on firm distress refers to the percentage-point (pp) impact; (2) Bars with bolded borders indicate estimates that are statistically significant at the 10 per cent level.

Breaking down the impact of the WCS payouts by firm size, we observed that while the payouts helped to increase the hiring and retention of workers in firms with 11–50 employees, it did not lead to an increase in employment in very small firms (i.e., those with  $\leq 10$  employees) (Exhibit 12). This may be due to these firms having less scope to increase employment with their WCS payouts, given the smaller amounts of cash received (see Exhibit 6). However, we saw that receipt of the payouts decreased the probability of financial distress for firms with  $\leq 10$  employees, as well as those with 11–50 employees, suggesting that the additional cashflow afforded by the WCS was effectively used to fulfil short-term payment obligations for the smaller firms.

**Exhibit 12: Average impact of WCS on Firm-level Outcomes by Total Employment Size (per cent)**



Statistical significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

Notes: (1) Impact on firm distress refers to the percentage-point (pp) impact; (2) Bars with bolded borders indicate estimates that are statistically significant at the 10 per cent level; (3) There were insufficient firms with  $\geq 51$  employees to create a comparable control group for analysis as over 97 per cent of firms with  $\geq 51$  employees were recipients of a WCS payout.

## CONCLUSION

Our study found that both the FWLR and WCS payouts helped to lower the probability of firm financial distress and also supported the hiring and retention of workers. This highlights the importance of providing cash transfers to firms to help them fulfil short-term cash obligations and retain workers (and hence capabilities) during times of heightened economic stress.

The high-frequency nature of this analysis implies that the estimated impact of the schemes should be seen as the short-term impact and is meant to provide a prompt sensing of the schemes' effectiveness during the pandemic. A more comprehensive study to analyse the longer-term benefits and costs of the schemes should be conducted once annual data on firm-level outcomes (e.g., financial information, value-added) are available.

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# FEATURE ARTICLE

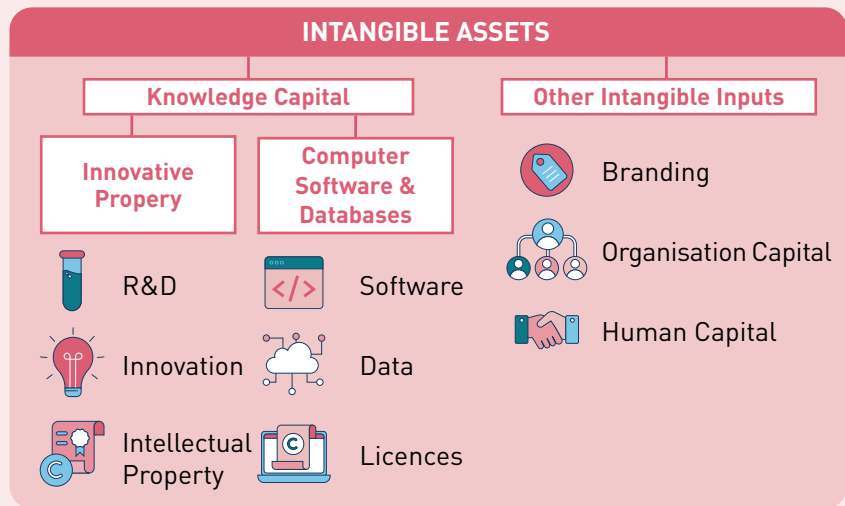
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**THE CONTRIBUTION OF INTANGIBLE  
ASSETS TO LABOUR PRODUCTIVITY  
GROWTH IN SINGAPORE, 2009-2019**

# THE CONTRIBUTION OF INTANGIBLE ASSETS TO LABOUR PRODUCTIVITY GROWTH IN SINGAPORE, 2009-2019

In Singapore, the share of intangible assets in the economy has risen steadily over time, reflecting an increase in investments in research and development (R&D) and computer software.

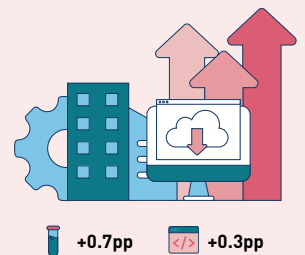
Against this backdrop, this article adopts a growth accounting approach at the aggregate and sectoral levels to examine the contribution of capital deepening in intangible assets to labour productivity growth between 2009 and 2019.



## OVERALL ECONOMY

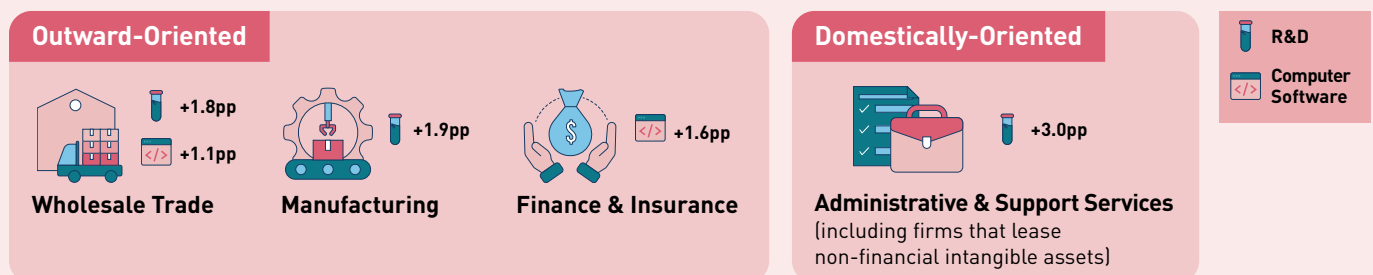
Capital deepening in intangible assets (i.e., R&D and computer software) was a major contributor to labour productivity growth from 2009 to 2019, accounting for 1.0 percentage-point (pp) per annum (p.a.) of the 3.0 per cent p.a. growth in labour productivity over this period.

Compared to other advanced economies, capital deepening in intangible assets was a more dominant driver of labour productivity growth in Singapore between 2009 and 2017.



## SECTORAL

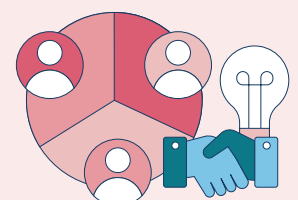
Intangible capital deepening was a strong contributor to productivity growth in the outward-oriented Wholesale Trade, Manufacturing and Finance & Insurance sectors, as well as the domestically-oriented Administrative & Support Services sector, although the relative contributions of R&D and computer software investments differed in these sectors.



## CONCLUSION

The increasing importance of intangible capital is reflected in its contribution to labour productivity growth in Singapore. With accelerating technological advancements, investments in intangible assets can help firms to overcome their physical constraints and tap on the global marketplace.

Under the Singapore IP Strategy (SIPS) 2030, the Singapore Government will continue to support firms in the adoption of intangible assets (including IP) for growth, and complement these efforts by raising the relevant capabilities of our workforce.



## EXECUTIVE SUMMARY

- Intangible assets are assets that do not have a physical or financial embodiment, including knowledge capital (e.g., computer software, research and development [R&D], intellectual property [IP]) and other intangible inputs (e.g., branding, content creation, buyer-seller trust, lender-borrower relationships, organisational effectiveness, managerial practices). In Singapore, the share of intangible assets in the economy has risen steadily over time, broadly reflecting an increase in investments in R&D and computer software.
- This article adopts a growth accounting approach at the aggregate and sectoral levels to examine the contribution of capital deepening in intangible assets (i.e., increase in amount of intangible capital per hour worked) to labour productivity growth between 2009 and 2019.
- At the aggregate level, capital deepening in intangible assets was found to be a major contributor to labour productivity growth from 2009 to 2019, accounting for 1.0 percentage-point (pp) per annum (p.a.) of the 3.0 per cent p.a. growth in labour productivity over this period. In turn, the capital deepening in intangible assets was supported by investments in R&D (0.7pp p.a.) and computer software (0.3pp p.a.). Compared to other advanced economies, capital deepening in intangible assets was a more dominant driver of labour productivity growth in Singapore between 2009 and 2017.
- At the sectoral level, intangible capital deepening was found to be a strong contributor to productivity growth in the outward-oriented Wholesale Trade, Manufacturing and Finance & Insurance sectors, as well as the domestically-oriented Administrative & Support Services sector, although the relative contributions of R&D and computer software investments differed in these sectors.
- With accelerating technological advancements, investments in intangible assets can help firms to overcome their physical constraints and tap on the global marketplace. Under the Singapore IP Strategy (SIPS) 2030, the Singapore Government will continue to support firms in the adoption of intangible assets (including IP) for growth, and complement these efforts by raising the relevant capabilities of our workforce.

*The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry (MTI), Agency for Science, Technology and Research (A\*STAR), Building and Construction Authority (BCA), Department of Statistics (DOS), Economic Development Board (EDB) or Intellectual Property Office of Singapore (IPOS).<sup>1</sup>*

## INTRODUCTION

Intangible assets, including intellectual property (IP), are becoming increasingly important drivers of economic growth and enterprise development in the global economy. Between 1996 and 2021, the value of intangible assets globally rose by 11 per cent per annum (p.a.), to reach an all-time high of US\$74 trillion, surpassing the value of physical assets (Brand Finance, 2021).

As Singapore develops into a knowledge-based and innovation-led economy, intangible assets offer an additional source of growth that can enable the Singapore economy to transcend its physical and labour constraints. At the same time, the COVID-19 pandemic has disrupted business models and strengthened the impetus for firms to undertake digital transformation as well as leverage intangible assets to create value.

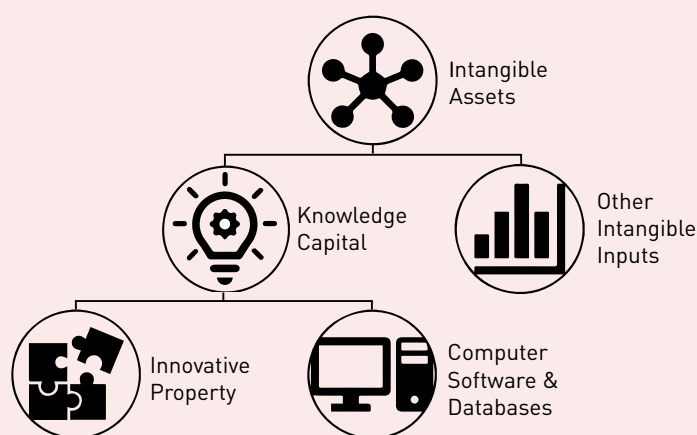
Given the growing importance of intangible assets in driving economic and business value, it is pertinent to have a better understanding of their contribution to Singapore's economy. In this regard, this study adopts a growth accounting approach at the aggregate and sectoral levels to examine the contribution of capital deepening in intangible assets (i.e., increase in amount of intangible capital per hour worked) on labour productivity growth between 2009 and 2019. In so doing, the study identifies the sources of labour productivity growth and offers insights on the growth processes within each sector over this period.

<sup>1</sup> We would like to thank A\*STAR, BCA, DOS, EDB and IPOS for their inputs to this study. We would also like to thank Ms Yong Yik Wei, Dr Kuan Ming Leong and Mr Lee Zen Wea for their useful suggestions and comments. All errors belong to the authors.

## OVERVIEW OF INTANGIBLE ASSETS

Intangible assets include knowledge capital (e.g., computer software, research and development [R&D], IP) and other intangible inputs (e.g., branding, content creation, buyer-seller trust, lender-borrower relationships, organisational effectiveness, managerial practices). Without a physical or financial embodiment, these assets are traditionally treated as intermediate expenses. However, various authors (e.g., Corrado et al., 2009; Haskel & Westlake, 2017) have argued that intangible inputs should be considered as capital (rather than intermediate expenses) given that they are not used up during the production process.

Specifically, Corrado et al. (2009) classified intangible assets into two broad categories – (i) knowledge capital (including innovative property and computer software & databases), and (ii) other intangible inputs.



An elaboration of the various types of intangible assets is as follows:

- Innovative property includes scientific R&D (i.e., based on scientific knowledge) and non-scientific R&D (including product and process innovation, IP [e.g., trademarks and copyrights] and entertainment & literary or artistic originals).
- Computer software & databases broadly refer to investments in informational inputs into computers that are used to produce output, and include computer software development, licences of computer software, as well as investments in and purchases of data.
- Other intangible inputs include branding (e.g., investment in brand equity through advertisements), organisational capital (e.g., managerial effectiveness, efficiency of work processes), and firm-specific human capital (e.g., costs of employer-provided training).

Intangible assets also have four unique economic properties that distinguish them from traditional physical capital – (i) scalability, (ii) sunkness, (iii) spillovers, and (iv) synergies (see Haskel & Westlake, 2017). These are described below:

- Scalability: Intangible assets are non-rivalrous and can be utilised repeatedly. For example, in the aviation industry, intangible assets such as R&D and design blueprints can be used for multiple airplanes once they are developed. Intangibles-intensive businesses can thus scale up quickly by leveraging the non-rivalrous nature of their IP and brand equity.

- **Sunkness:** Intangible assets tend to be firm-specific and difficult to recover. For example, if a firm invests in R&D but fails to make a scientific breakthrough, the firm is unlikely to be able to recoup its R&D investments.<sup>2</sup> This is in part because intangible assets are hard to value due to the absence of complete markets.
- **Spillovers:** Intangible inputs tend to be non-excludable and generate spillovers. Ideas can be reverse-engineered even with IP rights (e.g., a smartphone maker's patented technology, design and software can be adapted by other smartphone makers). This contrasts with physical assets, which are generally excludable (e.g., factories can restrict access to capital equipment).
- **Synergies:** Investments in intangibles may generate synergies and complementarities with existing products and ideas. For example, Apple's iPod was the product of several physical and intangible assets, including software (e.g., Advanced Audio Coding standard to store music), entertainment and artistic originals (e.g., licencing agreements with record companies), and branding and design (e.g., the iPod's unique click-wheel).

Given the value of intangible assets to businesses and the economy, there are ongoing efforts to better capture and measure intangible assets in official statistics and through other sources of data. For example, in the United States, to complement data on computer software capital stock in its National Accounts, Corrado et al. (2005) used survey data to estimate the capital stock of R&D, entertainment and artistic originals, brand equity, firm-specific human capital and organisational capital.<sup>3</sup> In Singapore, the Department of Statistics (DOS) has included computer software and R&D capital stock in the National Accounts statistics since 2006 and 2014 respectively.

## INTANGIBLE ASSETS IN SINGAPORE AND OTHER ADVANCED ECONOMIES

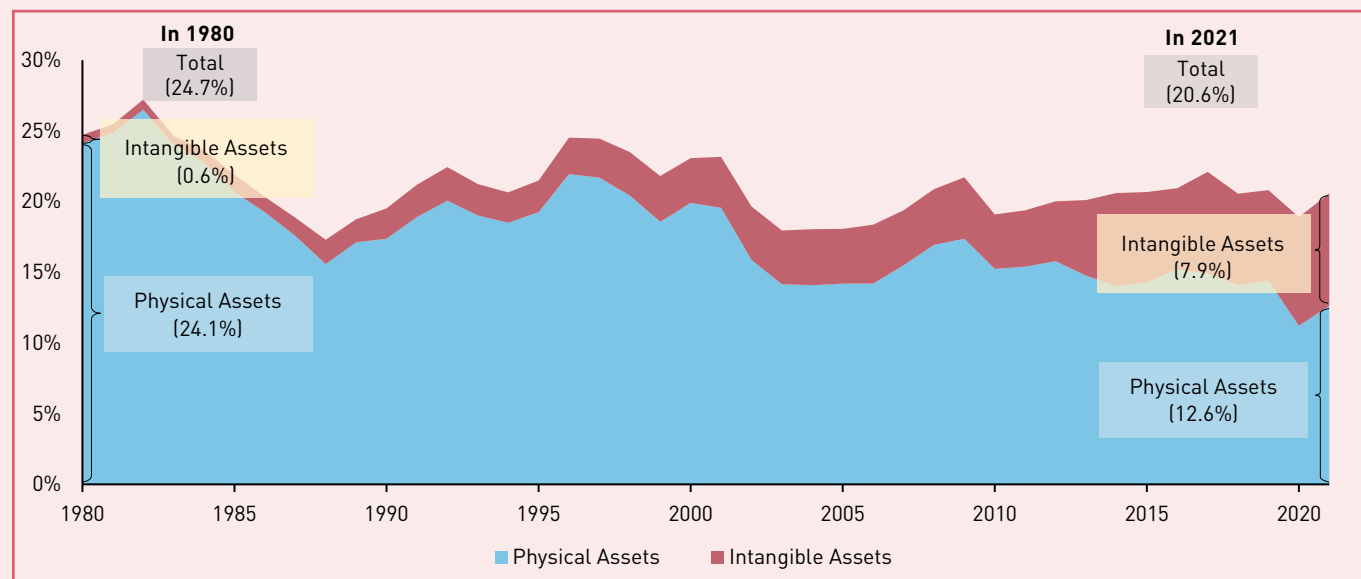
This section presents the trends in the accumulation of intangible assets in Singapore compared to other advanced economies, drawing on three sets of data. For Singapore, these are data on gross fixed capital formation (GFCF) from 1980 to 2021 and data on net capital stock from 2009 to 2019 (latest available for granular types of capital stock), both from DOS. GFCF and net capital stock data for other selected economies are obtained from the World KLEMS database, and cover the period of 2009 to 2017 (latest available).

### GFCF DATA

Reflecting the growing importance of intangible assets in Singapore, the share of intangible assets (defined as R&D and computer software) in Singapore's economy has increased over time, with these intangible assets accounting for 7.9 per cent of its gross domestic product (GDP) and 38.6 per cent of its GFCF in 2021 (Exhibit 1). Between 2009 and 2021, growth in GFCF of intangible assets (9.7 per cent p.a.) exceeded the growth in GFCF of physical assets (1.6 per cent p.a.). This was also seen over the shorter time period of 2009 and 2017, with the trends comparing favourably with that observed in other advanced economies such as the United States, Germany and Denmark (Exhibit 2).

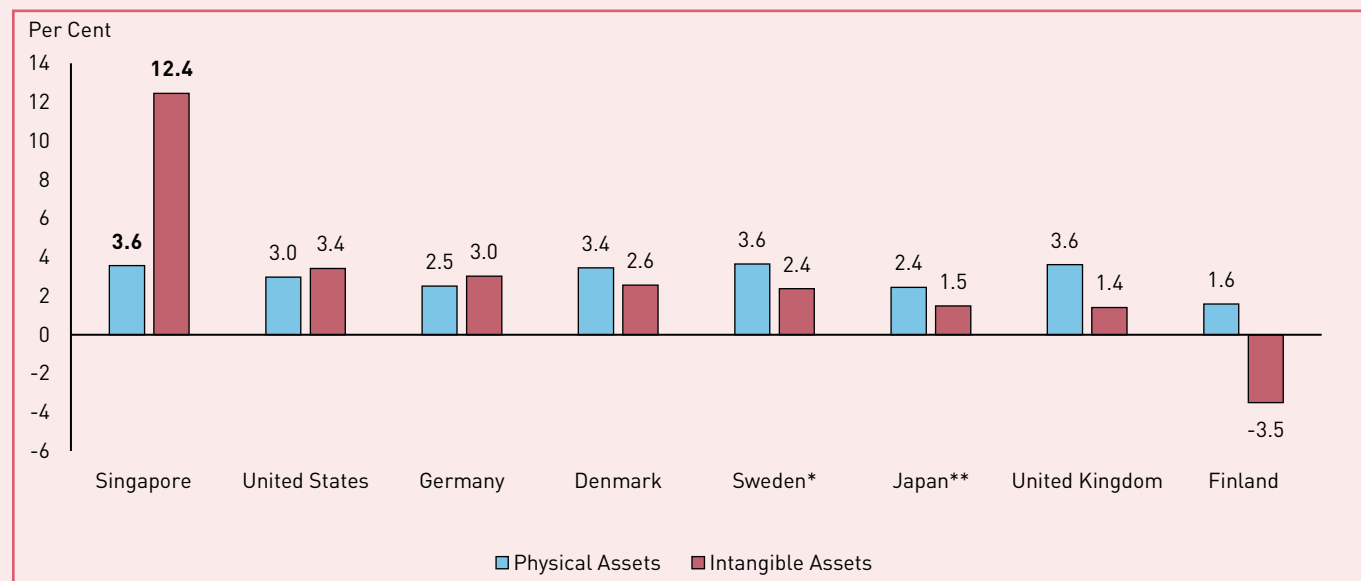
<sup>2</sup> By contrast, physical capital used in the process can be liquidated at market value.

<sup>3</sup> See Goodridge et al. (2016) for a similar approach undertaken in the United Kingdom.

**Exhibit 1: Gross Fixed Capital Formation in Physical and Intangible Assets as Share of GDP in Singapore, 1980-2021**

Source: DOS, MTI Staff Estimates

Note: Physical assets refer to non-residential construction & works, transport equipment and machinery & equipment, while intangible assets refer to computer software and R&D. Residential buildings and structures are excluded as they are not used in the production process of firms.

**Exhibit 2: Growth in Gross Fixed Capital Formation for Physical and Intangible Assets (p.a.), 2009-2017**

Source: DOS, World KLEMS and MTI Staff Estimates

Note: Data on GFCF are only available up to 2017 for many advanced economies. Intangible capital in the World KLEMS database include R&D, software & databases and other IP products (e.g., entertainment, literary and artistic originals). For Singapore, intangible assets exclude other IP products because the data is not available.

\*: The period of analysis for Sweden was 2009-2016 because 2017 data were unavailable.

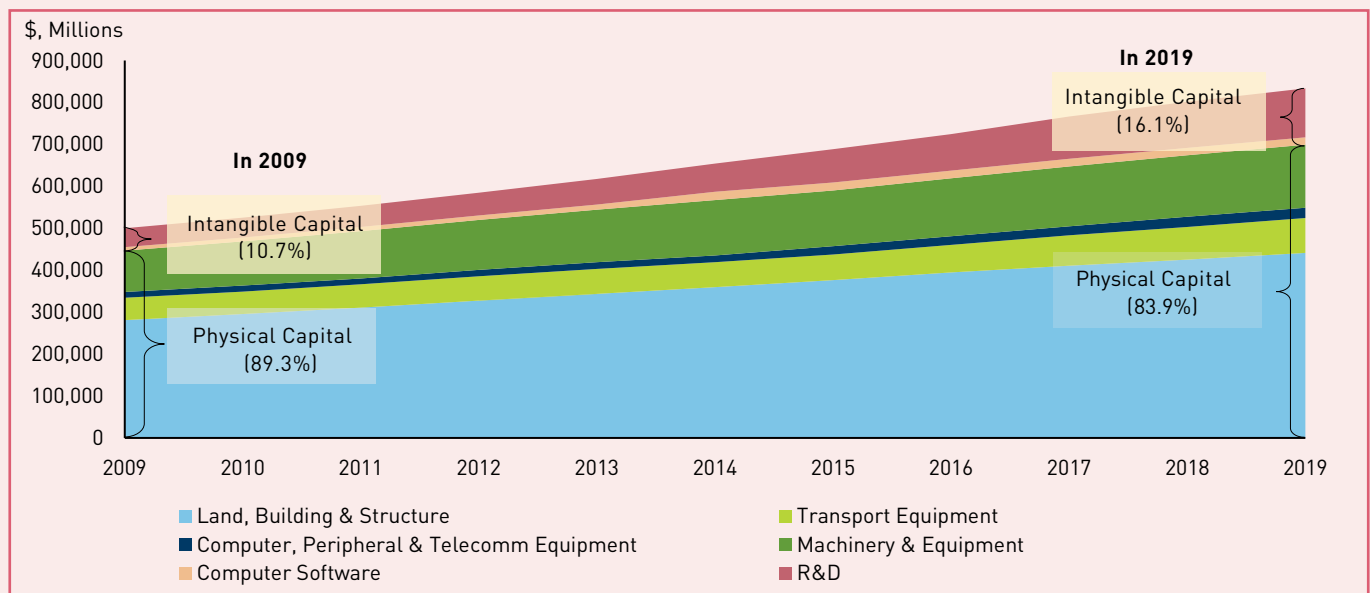
\*\* : The period of analysis for Japan was 2009-2015 because 2016 and 2017 data were unavailable.

## NET CAPITAL STOCK DATA<sup>4</sup>

A similar picture emerges using data on Singapore's net capital stock. Over the period of 2009-2019, the net capital stock of intangible assets (similarly defined as R&D and computer software) in Singapore increased by 9.7 per cent p.a., outstripping that for physical assets (4.6 per cent p.a.). By categories, growth in the net capital stock of R&D (10.0 per cent p.a.) and computer software (7.9 per cent p.a.) outpaced that in physical assets – computers, peripheral & telecommunications equipment (5.8 per cent p.a.), land, building & structure<sup>5</sup> (4.6 per cent p.a.), transport equipment (4.6 per cent p.a.), and machinery & equipment (4.3 per cent p.a.).

Consequently, the composition of net capital stock in Singapore saw a gradual shift towards intangible capital between 2009 and 2019, although physical capital continued to account for the bulk of net capital stock in the overall economy as at 2019 (Exhibit 3).

**Exhibit 3: Net Capital Stock in Physical and Intangible Assets in Singapore, 2009-2019**



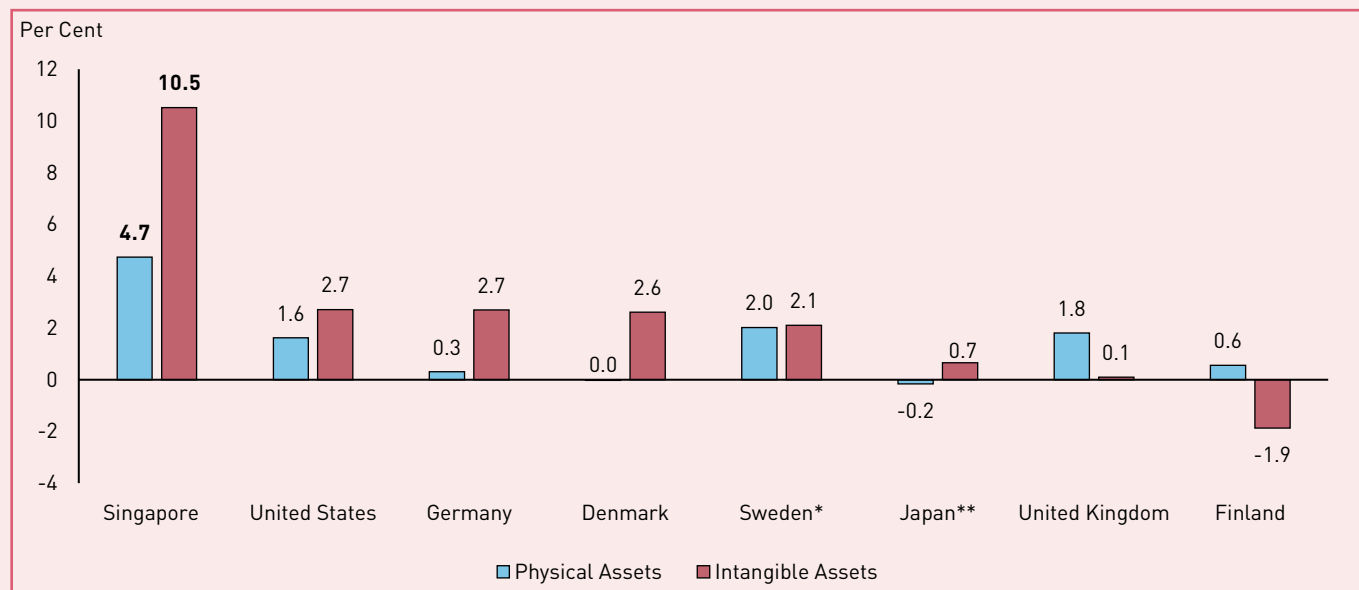
Source: DOS, MTI Staff Estimates

Note: Data on net capital stock present more granular types of capital, but have a shorter time series (2009-2019) as compared to data on GFCF (1980-2021). Net capital stock for land, building & structure excludes residential buildings and structures as they are not used in the production process of firms. The disaggregation between computer, peripheral & telecommunications equipment and machinery & equipment is based on the summation of net capital stock from all sectors because the disaggregation is not available from National Accounts aggregates.

Reflecting its strong growth trend, Singapore's net capital stock of intangible assets rose more quickly than that in advanced economies such as the United States, Germany and Denmark between 2009 and 2017 (Exhibit 4). Concomitantly, the share of intangible assets in Singapore's net capital stock increased more rapidly compared to that in other advanced economies (e.g., United States, Sweden) over this period (Exhibit 5).

<sup>4</sup> The net capital stock data cited in this section is consistent with that used for the subsequent growth accounting decomposition.

<sup>5</sup> The net capital stock of land, building & structure excludes residential buildings and structures because they are not used in the production process of firms.

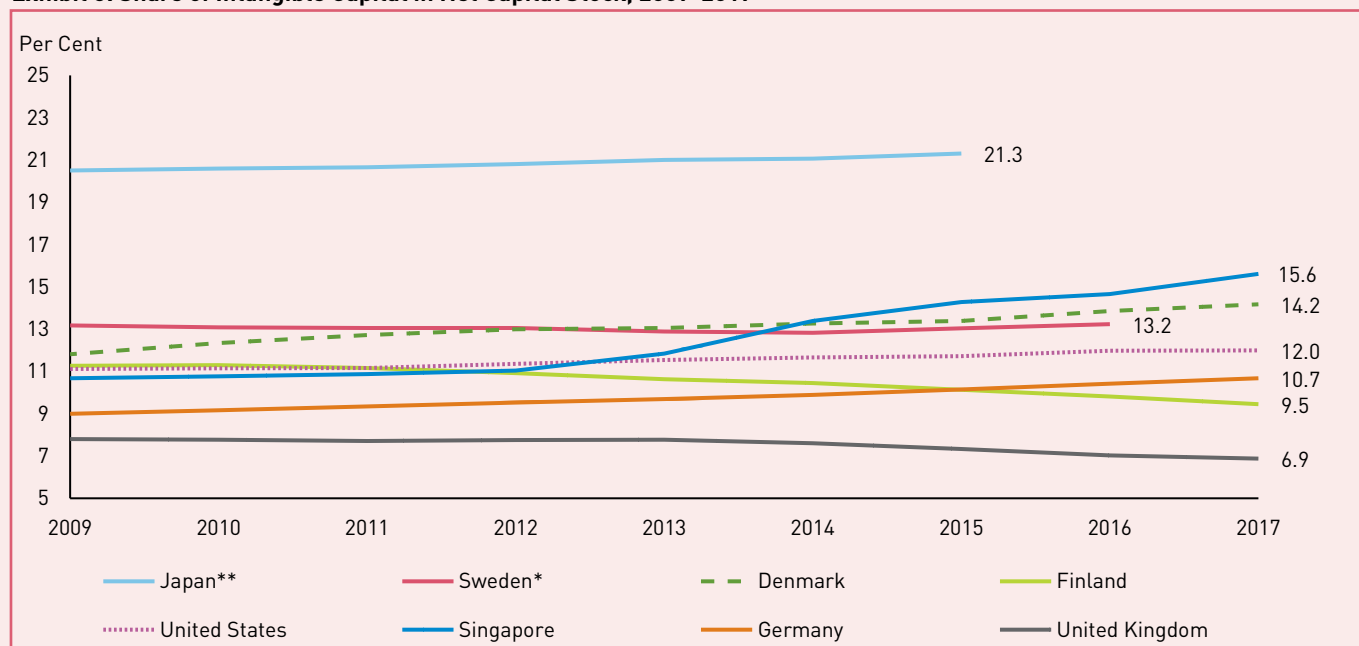
**Exhibit 4: Growth in Net Capital Stock for Physical and Intangible Assets (p.a.), 2009-2017**

Source: DOS, World KLEMS and MTI Staff Estimates

Note: Data on net capital stock composition are only available up to 2017 for many advanced economies. Intangible capital in the World KLEMS database include R&D, software & databases and other IP products (e.g., entertainment, literary and artistic originals). For Singapore, intangible assets exclude other IP products because the data is not available.

\*: The period of analysis for Sweden was 2009-2016 because 2017 data were unavailable.

\*\* : The period of analysis for Japan was 2009-2015 because 2016 and 2017 data were unavailable

**Exhibit 5: Share of Intangible Capital in Net Capital Stock, 2009-2017**

Source: DOS, World KLEMS and MTI Staff Estimates

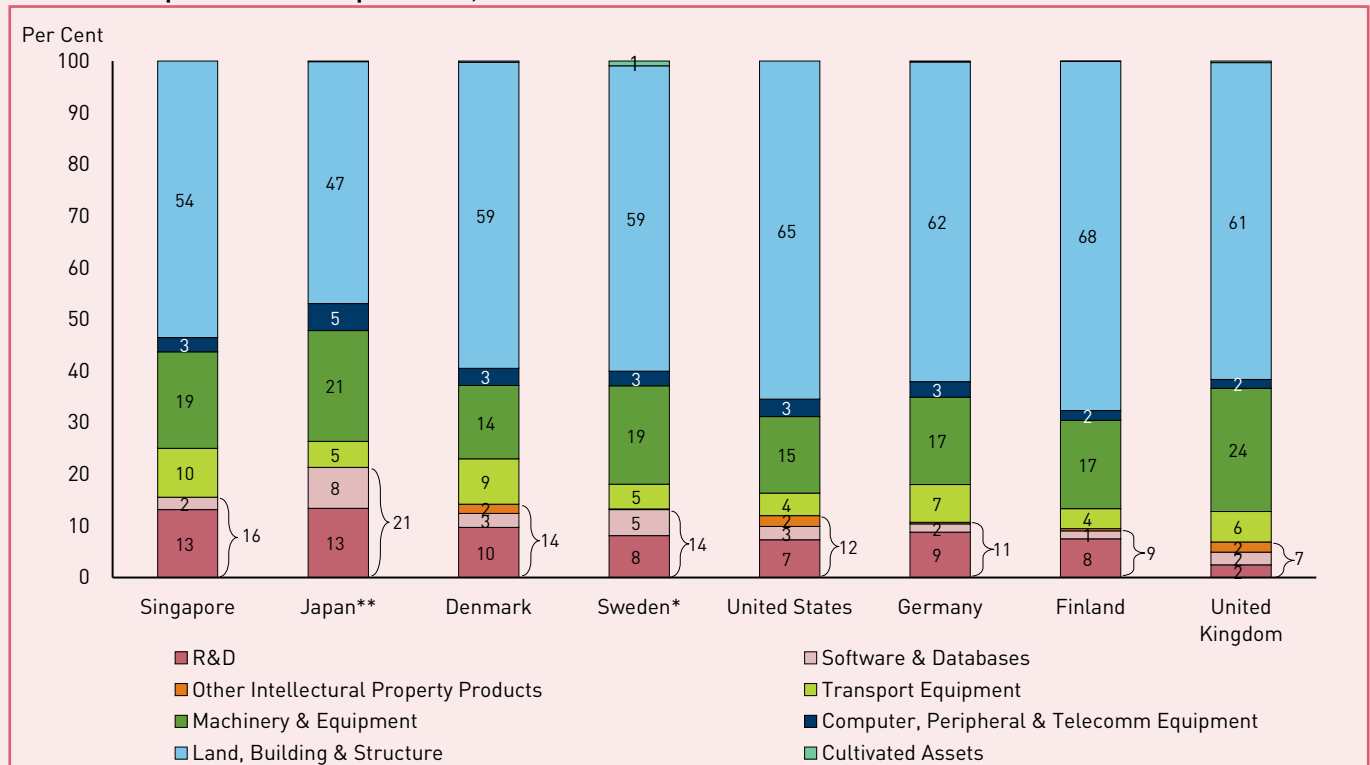
Note: Data on net capital stock composition are only available up to 2017 for many advanced economies. Intangible capital in the World KLEMS database include R&D, software & databases and other IP products (e.g., entertainment, literary and artistic originals). For Singapore, intangible assets exclude other IP products because the data is not available.

\*: The period of analysis for Sweden was 2009-2016 because 2017 data were unavailable.

\*\* : The period of analysis for Japan was 2009-2015 because 2016 and 2017 data were unavailable.

In terms of the composition of the intangible assets, R&D generally played a more dominant role in Singapore compared to the other advanced economies (Exhibit 6).

**Exhibit 6: Composition of Net Capital Stock, 2017**



Source: DOS, World KLEMS and MTI Staff Estimates

Note: Data on net capital stock composition are only available up to 2017 for many economies. Intangible capital in the World KLEMS database include R&D, software & databases and other IP products (e.g., entertainment, literary and artistic originals). For Singapore, intangible assets exclude other IP products because the data is not available. Cultivated assets refer to livestock for breeding and vineyards.

\*: 2016 figures were used for Sweden as 2017 data were unavailable.

\*\* : 2015 figures were used for Japan as 2016 and 2017 data were unavailable.

## LITERATURE REVIEW

Given the growing relevance of intangible assets across economies, academic studies overseas have focused on their economic contribution, including their relationship with productivity growth. In the United States, Corrado et al. (2009) applied a growth accounting approach and found that the contribution of intangible capital deepening to labour productivity growth doubled from 0.43 percentage-point (pp) p.a. over 1973–1995 to 0.84pp p.a. over 1995–2003, driven by an increase in computer software stock (0.27pp p.a.), firm-specific human and structural resources (0.27pp p.a.), and non-scientific innovative property stock<sup>6</sup> (0.14pp p.a.).

Adopting a similar approach for the United Kingdom, Goodridge et al. (2016) found that a fall in intangible capital stock weighed on labour productivity growth between 2010 and 2014 (–0.16 per cent p.a.). Specifically, intangible capital services from firm-level training (–0.12pp p.a.), copyright (–0.03pp p.a.), design (–0.02pp p.a.) and R&D (–0.02pp p.a.) contributed negatively to labour productivity growth, while software capital services (0.05pp p.a.) contributed positively to labour productivity growth over the period.

<sup>6</sup> Corrado et al. (2009) defined non-scientific innovative property to include non-scientific commercial R&D, costs of developing new motion picture films and other forms of entertainment, investment in new designs, and spending for new product development by financial services and insurance firms.

The academic literature suggests that the positive relationship between intangible assets and labour productivity growth may arise because intangible capital is often required as complements to other inputs. For example, Brynjolfsson et al. (2021) highlighted that general purpose technologies (GPTs) (e.g., artificial intelligence) often required complementary investment in other intangible assets (e.g., development of new business processes, software upgrading and investment in worker training) in order for the technologies to reap productivity returns. Using firm-level European data, Thum-Thysen et al. (2021) found positive spillover effects for firms that invested simultaneously in different intangible assets, with positive interaction effects for (i) investments in computer software & databases and employee training, (ii) investments in organisational capital and employee training, and (iii) investments in machinery & equipment and R&D.

At the same time, the academic literature also recognises that productivity gains from intangible capital deepening may require a gestation period. For example, Brynjolfsson et al. (2021) highlighted that extensive investment might be necessary to integrate newly-adopted GPTs into an organisation, with complementary investment in other physical/intangible assets and labour inputs required in order to reap rewards. Likewise, investment in early-stage basic research may require time before economic and productivity outcomes materialise (Trajtenberg et al., 1992; Guellec & De La Potterie, 2001). Given the process of investing and learning, the contribution of intangible assets to productivity growth could thus be weaker in the early years of intangible capital accumulation.

## METHODOLOGY

Drawing on data from A\*STAR, BCA, DOS and EDB, this study examines the contribution of intangible assets to Singapore's labour productivity growth at the aggregate and sectoral levels between 2009 and 2019.<sup>7</sup> This is done by building on earlier growth accounting studies (e.g., Goh & Fan, 2015; Fan & Teo, 2017; Toh & Ting, 2020) and further decomposing capital deepening into intangible and physical capital deepening.

This study focuses on intangible assets in the form of knowledge capital (i.e., computer software and R&D) since other intangible inputs (e.g., branding, organisational effectiveness and managerial practices) are difficult to measure and not captured in administrative data. Intangible inputs that are not measured will be captured in total factor productivity (TFP), which is calculated as a residual in the growth decomposition.

Specifically, the economy is modelled using a Cobb-Douglas production function with constant returns to scale:

$$Y = A \prod_i IK_i^{ic_i} \prod_j PK_j^{pc_j} \prod_k H_k^{b_k}$$

Where:  $Y$  = real output;

$A$  = TFP;

$IK_i, PK_j$  = net stock of  $i^{th}$  type of intangible capital,  $j^{th}$  type of physical capital;

$ic_i, pc_j$  = share of output of the  $i^{th}$  type of intangible capital,  $j^{th}$  type of physical capital;

$H_k$  = actual hour worked (AHW) of  $k^{th}$  type of labour;

$b_k$  = share of output of the  $k^{th}$  type of labour; and

$\sum_i ic_i + \sum_j pc_j + \sum_k b_k = 1$  (i.e., constant returns to scale).

<sup>7</sup> Based on available data, 2009 to 2019 reflects the longest possible period of analysis. Data on value-added (VA) per actual hour worked (AHW) are available from 2009, while capital stock data for the overall economy and sectors from A\*STAR (National R&D and Research, Innovation & Enterprise [RIE] Surveys), BCA (Construction Industry Survey), DOS (Annual Survey of Services) and EDB (Census of Manufacturing Activities) are available up to 2019. The study harmonises all statistics (e.g., VA, employment, AHW, wages, capital stock) to SSIC 2015 (i.e., based on data before the conversion of selected indicators to SSIC 2020 in February 2022).

Given that  $\Delta Y \approx \sum_i ic_i \Delta IK_i + \sum_j pc_j \Delta PK_j + \sum_k b_k \Delta H_k + \Delta A$  under the assumption that inputs are paid their marginal products in competitive markets, labour productivity growth can be decomposed into four components – (i) contribution from intangible capital deepening, (ii) contribution from physical capital deepening, (iii) contribution from changes in labour quality, and (iv) contribution from changes in TFP:

$$\Delta \frac{Y}{H} \approx \sum_i ic_i \left( \Delta \frac{IK_i}{H} \right) + \sum_j pc_j \left( \Delta \frac{PK_j}{H} \right) + S_L \times \sum_k (s_k - h_k) \Delta H_k + \Delta A$$

Where:  $S_L$  = total wage share of output;

$s_k$  = wage share of  $k^{th}$  type of labour;

$h_k$  = AHW share of  $k^{th}$  type of labour.

- **Capital Deepening:** Capital deepening of each capital type contributes positively to productivity growth when capital growth outpaces hours worked growth (i.e., there is more capital for each man-hour). In this article, intangible and physical capital inputs are examined separately:

° **Intangible Capital:** For intangible capital deepening, the contributions from (i) R&D, and (ii) computer software are considered.

° **Physical Capital:** For physical capital deepening, the contributions from (i) machinery & equipment, (ii) transport equipment<sup>8</sup>, and (iii) non-residential construction & works<sup>9</sup> are considered.

- **Labour Quality:** For this analysis, labour is divided into skilled and less-skilled labour based on occupational types.<sup>10</sup> The quality of each type of labour is proxied by the term  $(s_k - h_k)$ , which is positive when labour type  $k$  has higher wages than the other labour types. Hence, overall labour quality improves (and productivity increases) when the growth in total hours worked by skilled workers (with wages above the economy average) exceeds that of less-skilled workers (with wages below the economy average). A workforce that is more skilled raises productivity because better-trained workers tend to have more capacity to be efficient and innovative, and to produce higher-value products and services.
- **TFP:** TFP captures the residual output growth that is not attributed to changes in the quantity and quality of measured capital (intangible and physical) and labour inputs. It measures how efficiently inputs are used together in the production process, and encompasses the effects of a wide range of factors, including technological progress and the diffusion of technology across firms. Intangible inputs that are not captured in the data used for the decomposition (e.g., branding, organisational effectiveness, managerial practices) will also be captured in TFP.

Concerns have been raised in the literature that intangible assets may be used by firms to avoid taxes through profit-shifting practices. For example, Tørsløv et al. (2018) suggested that firms shifted intangible capital (e.g., trademarks, patents, logos, algorithms or financial portfolios) from high-tax countries to affiliates in low-tax countries, which would then receive royalties, interest or payment from final customers. Guvenen et al. (2017) noted that such profit-shifting practices could potentially generate a positive correlation between intangible assets and productivity (through profits), which was not premised on genuine productivity improvements.

This study circumvents such potential distortions by excluding (i) intangible assets such as trademarks and logos, and (ii) royalty income and payments for patent use, even though the purchases and sales of patents are included in the estimation of GFCF and net R&D capital stock. As such, transfer payments for the use of trademarks, logos and patents (if any) will not affect the contribution of intangible capital in the growth accounting results. Instead, they will be captured in the residual TFP term (if any).

<sup>8</sup> Transport equipment includes ships & boats, aircrafts and other transport equipment.

<sup>9</sup> Residential buildings are excluded because they are not used in the production process of firms. The imputed ownership of dwellings is also excluded from the productivity computations.

<sup>10</sup> Workers who are Professionals, Managers, Executives, and Associate Professionals & Technicians are classified as skilled workers, while workers who are Clerical Support Workers, Service & Sales Workers, Craftsmen & Related Trades Workers, Plant & Machine Operators & Assemblers, and Cleaners, Labourers & Related Workers are classified as less-skilled workers.

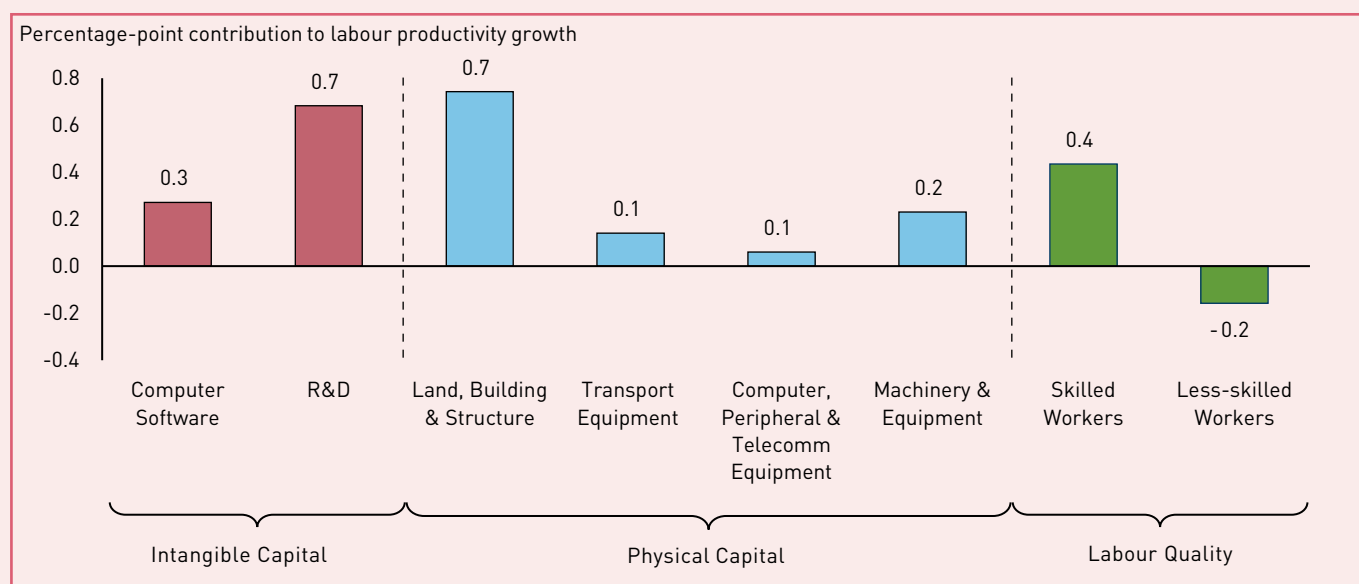
# CONTRIBUTION OF INTANGIBLE ASSETS TO SINGAPORE'S LABOUR PRODUCTIVITY GROWTH (2009-2019)

## CONTRIBUTION OF INTANGIBLE ASSETS TO OVERALL PRODUCTIVITY GROWTH

Between 2009 and 2019, Singapore's overall labour productivity<sup>11</sup> (real value-added [VA] per actual hour worked [AHW]) grew by 3.0 per cent p.a., supported by intangible capital deepening (particularly R&D) and physical capital deepening (particularly land, building & structure) (Exhibit 7).<sup>12</sup>

- Intangible capital deepening (1.0pp p.a.) was a major contributor to labour productivity growth from 2009 to 2019, driven mostly by R&D capital deepening (0.7pp p.a.), in line with the Government's Science & Technology (S&T) and Research, Innovation & Enterprise (RIE) plans.<sup>13</sup> Capital deepening in computer software also supported productivity growth over the decade (0.3pp p.a.).
- Physical capital deepening (1.2pp p.a.) was also a key driver of labour productivity growth over the decade, with the largest contributor being land, building & structure (0.7pp p.a.), in line with the Government's investment in public infrastructure (e.g., Mass Rapid Transit lines).
- Labour quality improvements (0.3pp p.a.) also supported labour productivity growth from 2009 to 2019. This was driven by an increase in hours worked by skilled workers that outpaced that of less-skilled workers.
- TFP growth (0.6pp p.a.) accounted for the rest of labour productivity growth over this period.

**Exhibit 7: Contribution of Intangible Capital Deepening, Physical Capital Deepening and Labour Quality Changes to Overall Labour Productivity Growth, 2009-2019**



Source: MTI Staff Estimates

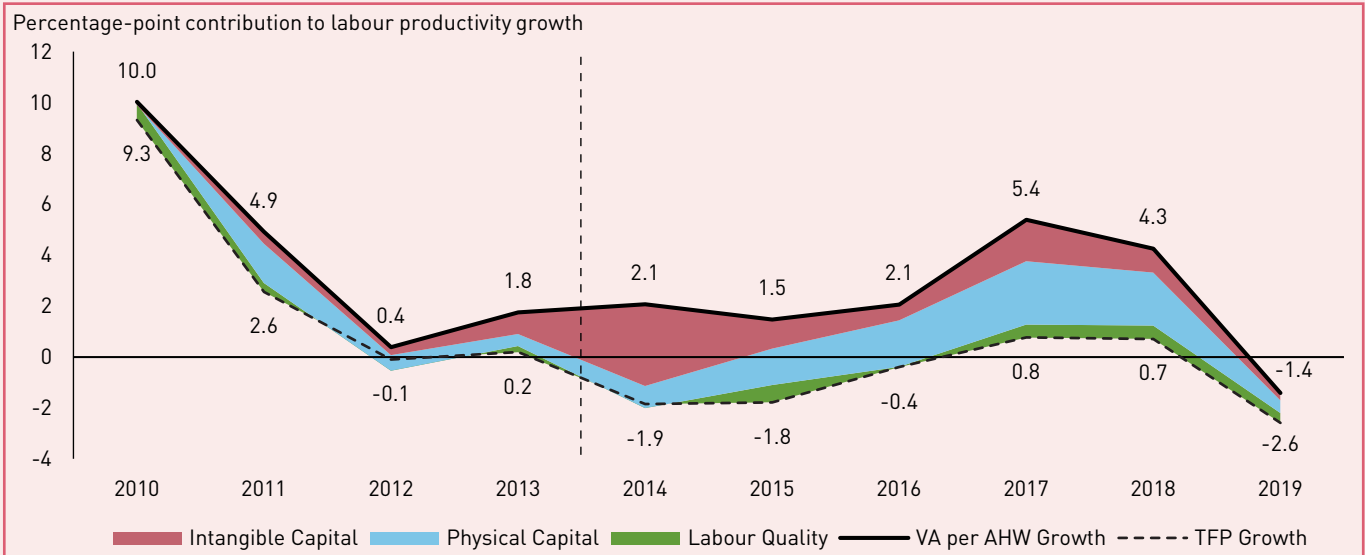
<sup>11</sup> Similar to earlier MTI studies (e.g., Toh & Ting, 2020), this excludes ownership of dwellings and taxes on products.

<sup>12</sup> For the period of 2010 to 2019 (i.e., excluding the rebound year of 2010), physical capital deepening (1.3pp p.a.) and intangible capital deepening (1.0pp p.a.) remained important drivers of overall labour productivity growth (i.e., 2.3 per cent p.a.). The contribution of labour quality to productivity growth also remained similar (0.2pp p.a.). However, the TFP contribution to productivity growth moderated to -0.3pp p.a., as the exclusion of 2010 data weighed on VA growth over the period of analysis.

<sup>13</sup> Under the S&T and RIE plans, the Singapore Government invested S\$13.5 billion over 2006-2010, S\$16 billion over 2011-2015 and S\$19 billion over 2016-2020 to catalyse R&D and innovation activities in Singapore.

Over the years, capital deepening in intangibles has become a more important contributor to labour productivity growth in Singapore. This has been particularly so since 2014 (Exhibit 8). Capital deepening in intangibles was also a more significant driver of labour productivity growth in Singapore compared to other advanced economies like the United States, Denmark and Sweden between 2009 and 2017 (Exhibit 9).

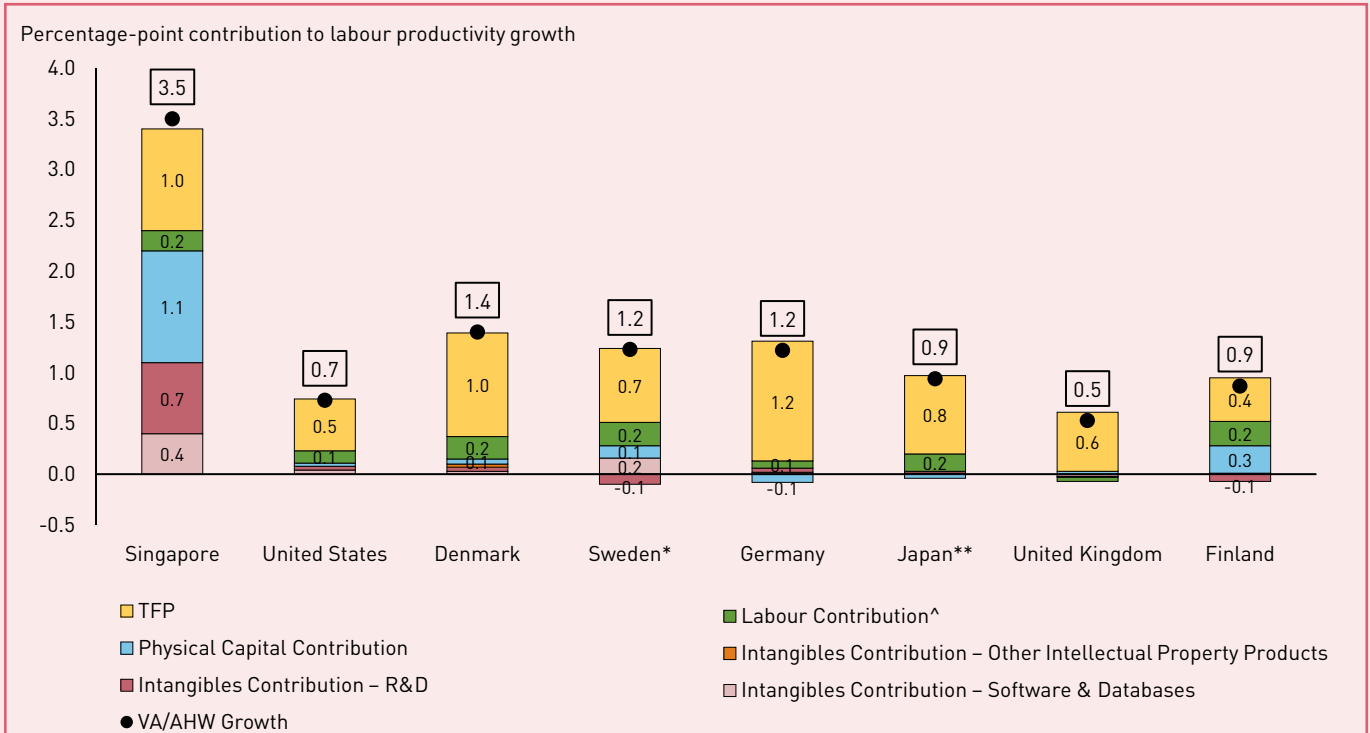
**Exhibit 8: Growth in Real Value-Added per Actual Hour Worked (VA per AHW) and TFP Growth, 2009-2019**



Source: MTI Staff Estimates

Note: TFP growth computed in this growth accounting analysis is not directly comparable to DOS' Multifactor Productivity (MFP) series because of differences in the decomposition method used. This study (i) used total VA for goods and services producing industries instead of GDP, (ii) used finer categories of capital inputs, (iii) used hours worked instead of employment as a measure of the quantity of labour inputs, and (iv) accounted for skilled and less-skilled workers. As TFP is computed as a residual in the decomposition, it is highly sensitive to changes in total VA (e.g., periods of economic slowdown such as in 2019) and other components of the growth accounting decomposition.

**Exhibit 9: Contribution of Intangible Capital Deepening, Physical Capital Deepening and Labour Changes to Labour Productivity Growth in Singapore and Other Advanced Economies, 2009-2017**



Source: DOS, World KLEMS and MTI Staff Estimates

Note: Data are only available up to 2017 for many advanced economies. The contribution of other IP products to productivity growth is not available or zero for most economies, except for Denmark (0.03pp p.a. between 2009 and 2017).

\*: 2016 figures were used for Sweden as 2017 data were unavailable.

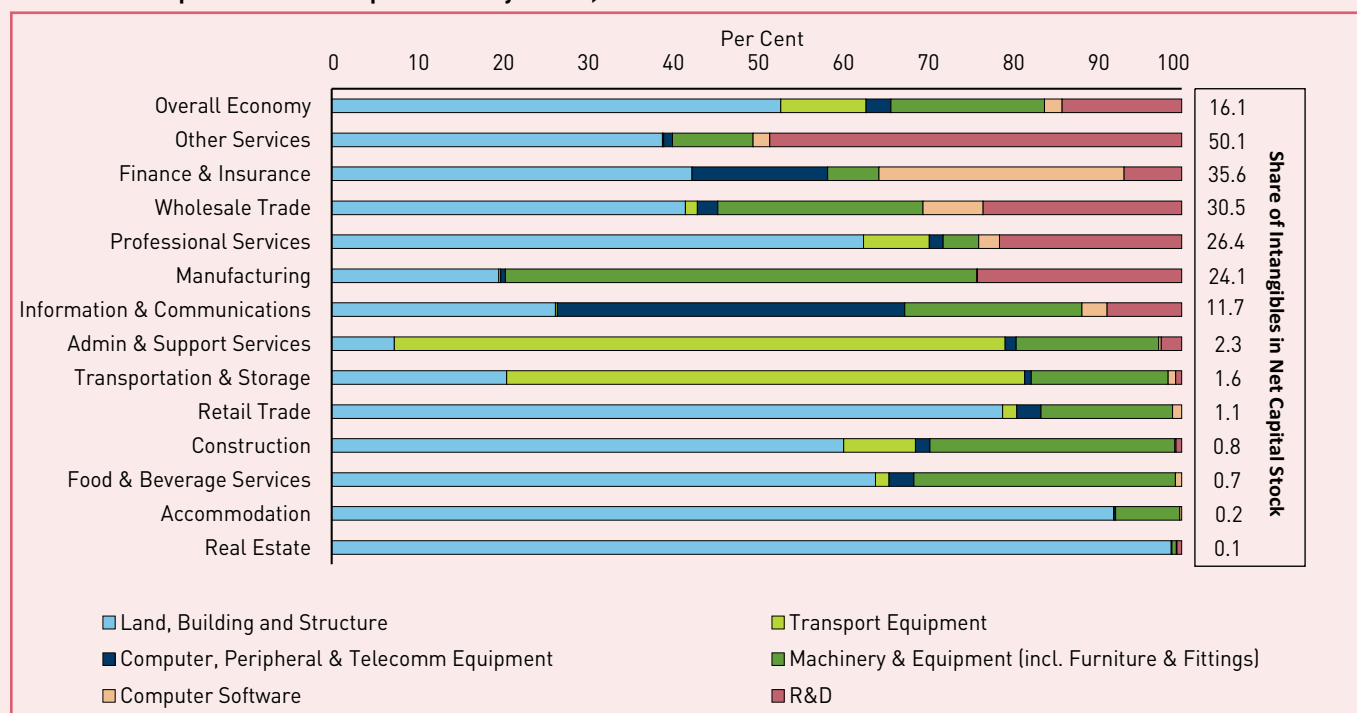
\*\* : 2015 figures were used for Japan as 2016 and 2017 data were unavailable.

^: Labour contribution is quality-adjusted for Singapore.

## CONTRIBUTION OF INTANGIBLE ASSETS TO SECTORAL PRODUCTIVITY GROWTH

Industries in Singapore differ in their level of intangible capital investments. In 2019, the outward-oriented Finance & Insurance, Wholesale Trade, Professional Services and Manufacturing sectors were among the most intangible capital-intensive in the economy (Exhibit 10).<sup>14</sup> By contrast, the Real Estate, Accommodation, Food & Beverage Services and Construction sectors were the most reliant on physical capital.

**Exhibit 10: Composition of Net Capital Stock by Sector, 2019**



Source: A\*STAR, BCA, DOS, EDB, MTI Staff Estimates

Notes: For the overall economy, the disaggregation between computer, peripheral & telecommunications equipment (CPTE) and machinery & equipment is based on the summation of net capital stock from all sectors because the disaggregation is not available from National Accounts aggregates. For the services sectors, CPTE, which is classified under DOS' definition of machinery & equipment, is disaggregated into a separate category. For the Finance & Insurance sector, the capital stock of transport equipment is attributed to machinery & equipment because it cannot be separated. For the Manufacturing sector, the capital stock of CPTE and computer software is negligible (0.5 per cent of net capital stock) and is fully accounted for under the former as the two cannot be disaggregated. The net capital stock of R&D for the Retail Trade, Food & Beverage Services, Accommodation and Real Estate sectors is assumed to be negligible because data are unavailable. Negligible R&D expenditure in these sectors is consistent with observations in past studies (e.g., Teo et al., 2020) and the OECD's Analytical Business Enterprise Research and Development (ANBERD) database (e.g., for the disaggregated Business Services sectors).

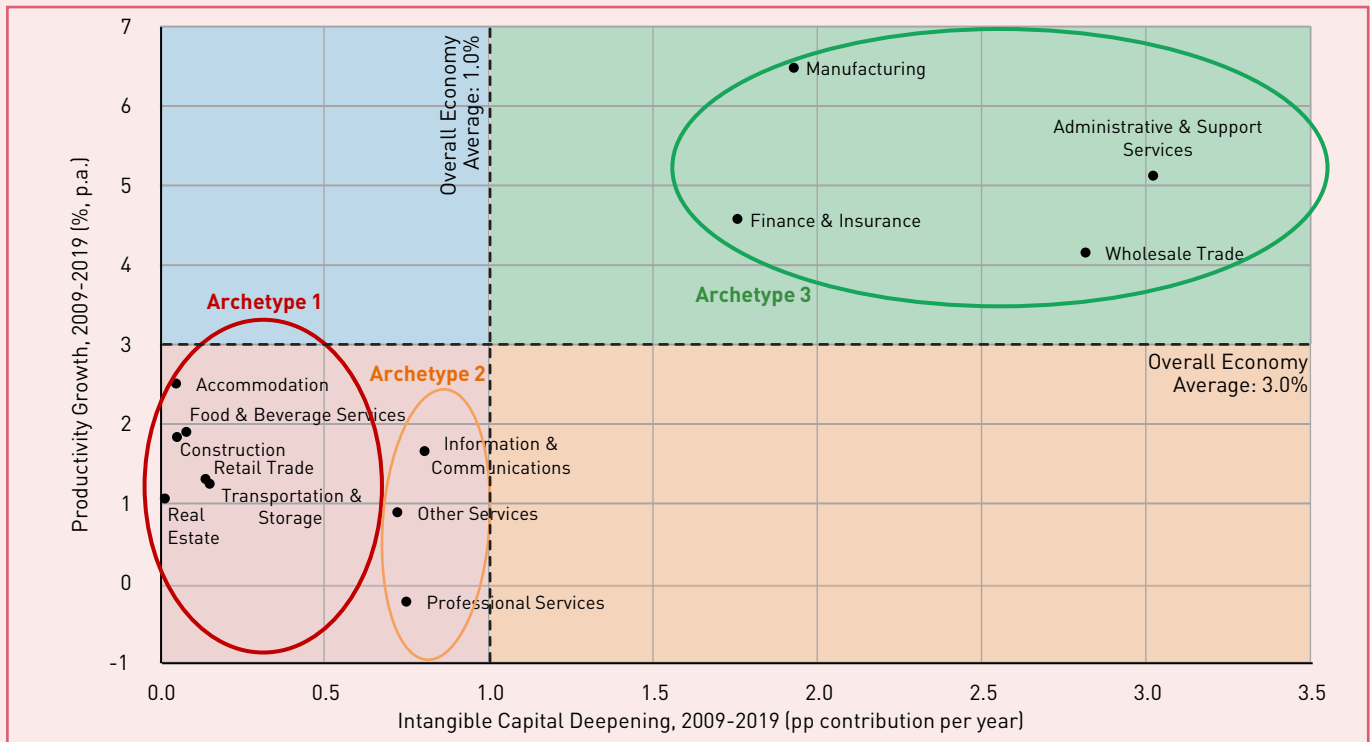
Examining the relationship between intangible capital deepening and labour productivity growth for the period of 2009 to 2019, the various sectors are observed to fall into either the bottom-left (i.e., low intangible capital deepening and low labour productivity growth) or the top-right (high intangible capital deepening and high labour productivity growth) quadrants of Exhibit 11 below. Broadly, they can be classified into three archetypes:

- The first archetype comprises physical capital-intensive sectors (i.e., Real Estate, Accommodation, Food & Beverage Services, Construction, Retail Trade, Transportation & Storage) with low productivity growth, and have seen almost no contribution of intangible capital deepening to productivity growth. For these sectors, physical capital deepening, particularly in land, building & structure, dominated productivity dynamics.
- The second archetype refers to services sectors (i.e., Information & Communications, Professional Services and Other Services) that have seen some intangible capital deepening and hold potential for further intangible capital deepening to boost productivity.

<sup>14</sup> In the Other Services sector, intangibles (primarily R&D) accounted for more than half of its net capital stock in 2019, supported by public expenditure on R&D by Public Research Institutes, Institutes of Higher Learning and the Government.

- The third archetype includes sectors with strong productivity growth and above-average contributions of intangible capital deepening, such as the outward-oriented Wholesale Trade, Manufacturing and Finance & Insurance sectors, and the domestically-oriented Administrative & Support Services sector (which includes firms involved in the leasing of non-financial intangible assets such as patents). The intangibles-intensive Manufacturing and Wholesale Trade sectors also saw sizeable contributions of physical capital deepening to productivity growth, suggesting possible complementarities between intangible (e.g., R&D) and physical (e.g., machinery & equipment; and land, building & structure) inputs in these sectors.

**Exhibit 11: Contribution of Intangible Capital Intensity to Labour Productivity Growth by Sectors, 2009-2019**

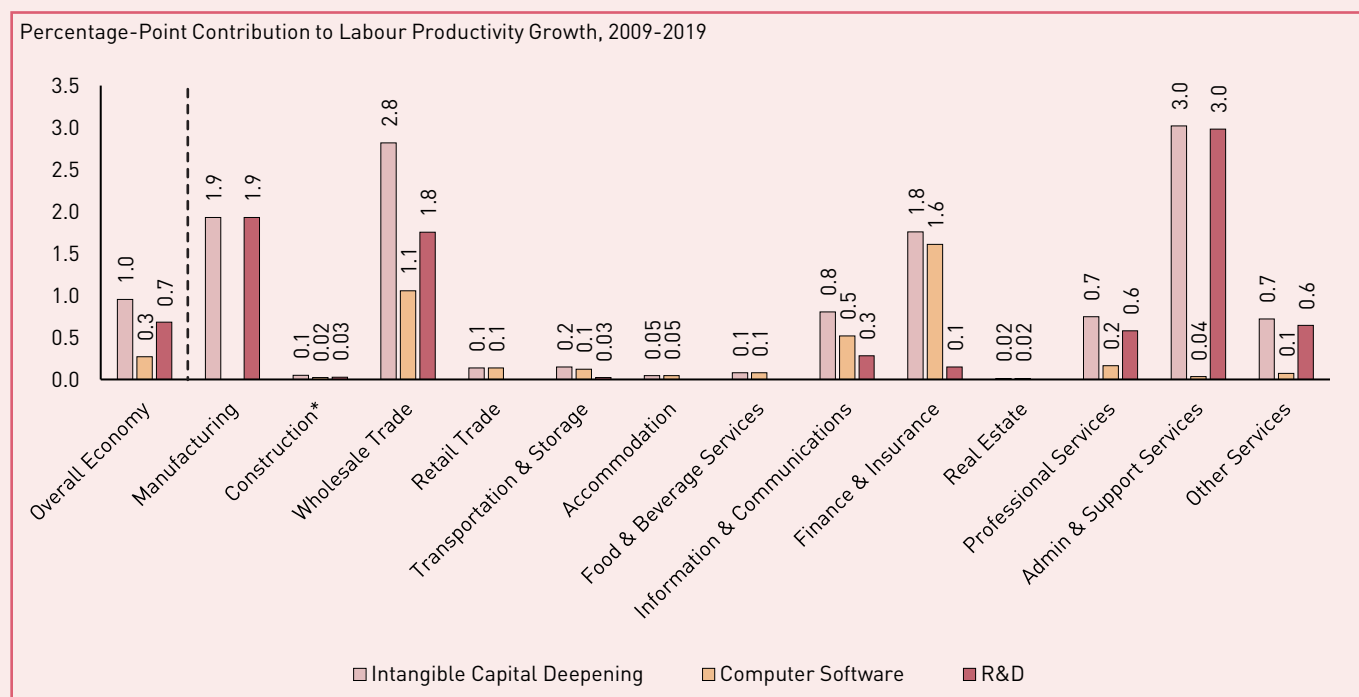


Source: MTI Staff Estimates

Note: As net capital stock for the Construction sector was unavailable for 2009, the growth accounting decomposition for the Construction sector was undertaken for the period of 2010-2019.

Across the sectors, there were differences in the productivity contributions of investments in different intangible inputs (i.e., R&D and computer software) (Exhibit 12). For example, for outward-oriented sectors in the third archetype, productivity growth in the Manufacturing sector was driven primarily by investments in R&D, while that in the Finance & Insurance sector was driven largely by investments in computer software. By contrast, productivity growth in the Wholesale Trade sector benefitted from investments in both intangible capital types.

Between R&D and computer software, investments in the former tended to be the more dominant contributor to labour productivity growth for most sectors over the decade. The key exceptions were the Information & Communications and Finance & Insurance sectors, where the converse was the case.

**Exhibit 12: Contribution of Capital Deepening in R&D and Computer Software to Labour Productivity Growth by Sectors, 2009-2019**

Source: MTI Staff Estimates

\*: As net capital stock for the Construction sector was unavailable for 2009, the growth accounting decomposition for the Construction sector was undertaken for the period of 2010-2019.

## CONCLUSION

The share of intangible assets in Singapore's economy has risen steadily over time, reflecting the growing importance of intangible capital such as R&D and computer software in the economy. The increasing importance of intangible capital is also reflected in its contribution to overall labour productivity growth in Singapore. Between 2009 and 2019, intangible capital deepening (1.0pp p.a.) was a key contributor to labour productivity growth (3.0 per cent p.a.), supported by investments in R&D (0.7pp p.a.) and computer software (0.3pp p.a.). At the sectoral level, intangible capital deepening was a strong contributor to labour productivity growth in the outward-oriented Wholesale Trade, Manufacturing and Finance & Insurance sectors, as well as the domestically-oriented Administrative & Support Services sector, although the relative contributions of investments in R&D and computer software differed across the sectors.

With the COVID-19 pandemic accelerating digital transformation and catalysing the shift from physical to intangible assets, firms can increasingly leverage new tools to innovate and create new technologies. To remain competitive, it is imperative for firms to press on with their transformation and restructuring efforts. In particular, investments in, and the utilisation of, intangible assets in their production processes will allow them to overcome their physical constraints and tap on the global marketplace. Under the Singapore IP Strategy (SIPS) 2030<sup>15</sup>, the Government will continue to strengthen our position as a global hub for intangible assets (including IP), and support firms in the adoption of these assets for growth. The Government will also complement these efforts by raising the relevant capabilities of our workforce.

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<sup>15</sup> The SIPS is a national strategy that aims to (i) strengthen Singapore's position as a global hub for intangible assets (including IP), (ii) attract and grow innovative enterprises using intangible assets (including IP), and (iii) develop good jobs and valuable skills in intangible assets (including IP) (see Intellectual Property Office of Singapore, 2021).

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