MINISTRY OF TRADE AND INDUSTRY SINGAPORE

ECONOMIC SURVEY OF SINGAPORE

SECOND QUARTER 2023

August 2023

Ministry of Trade and Industry
Republic of Singapore

website: **www.mti.gov.sg**
email: **mti_email@mti.gov.sg**

CONTENTS

MAIN INDICATORS OF THE SINGAPORE ECONOMY

OVERALL ECONOMY

	1Q23	2Q23
Real Gross Domestic Product (YoY Growth)	+0.4%	+0.5%
Gross Domestic Product at Current Market Prices	$159.1 billion	$163.0 billion

PRICES

	1Q23	2Q23
Consumer Price Index — All Items (YoY Growth)	+6.1%	+5.1%
Domestic Supply Price Index (YoY Growth)	-6.0%	-13.7%

LABOUR MARKET

	1Q23	2Q23
Change in Employment (QoQ Change)	+38.6 thousand	+26.1 thousand

	Mar23	Jun23
Overall Unemployment Rate	1.8%	1.9%

	1Q23	2Q23
Value-Added per Actual Hour Worked (YoY Growth)	-6.6%	-4.7%

COSTS

	1Q23	2Q23
Unit Labour Cost of Overall Economy (YoY Growth)	+10.1%	+10.2%
Unit Business Cost of Manufacturing (YoY Growth)	+8.8%	+6.9%
Unit Labour Cost of Manufacturing (YoY Growth)	+15.8%	+15.8%

MERCHANDISE TRADE

	1Q23	2Q23
Merchandise Exports	$158,902 million -6.5% YoY Growth	$153,202 million -16.9% YoY Growth
Merchandise Imports	$138,782 million -9.3% YoY Growth	$137,641 million -20.6% YoY Growth

SERVICES TRADE

	1Q23	2Q23
Services Exports	$96,786 million +0.2% YoY Growth	$98,508 million -2.5% YoY Growth
Services Imports	$89,570 million +3.8% YoY Growth	$88,969 million -1.1% YoY Growth

CHAPTER 1

THE SINGAPORE ECONOMY

Chapter 1

THE SINGAPORE ECONOMY

ECONOMIC PERFORMANCE

Real GDP grew by

0.5% in 2Q23

Main Drivers of Growth in 2Q23

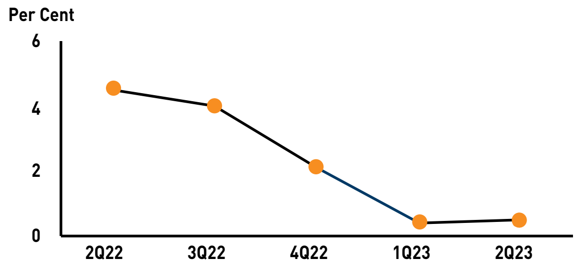
Transportation & Storage

0.4%-point contribution

Other Services Industries

0.3%-point contribution

Quarterly Growth (YoY)



LABOUR MARKET

Resident Unemployment Rate

2.7% in June 23

Employment (QoQ Change)

+26,100 employed in 2Q23

Sectors with the Highest Employment Growth in 2Q23

Construction	Other Services Industries	Finance & Insurance
+10,500 employed	+7,300 employed	+1,900 employed

PRODUCTIVITY

(YoY Growth)

Value-Added per Actual Hour Worked decreased by

4.7% in 2Q23

Sectors with the Highest Growth in Value-Added per Actual Hour Worked in 2Q23

Real Estate	Administrative & Support Services	Transportation & Storage
13.2%	8.9%	3.3%

COSTS
(YoY Growth)

Overall Unit Labour Cost increased by

10.2% in 2Q23

Within the Manufacturing Sector

6.9%
Unit Business Cost

15.8%
Unit Labour Cost

PRICES
(YoY Growth)

The Consumer Price Index (CPI) rose by

5.1% in 2Q23

Categories with Price Increases

6.6%
Food

6.5%
Recreation & Culture

6.4%
Transport

INTERNATIONAL TRADE
(YoY Growth)

Total Merchandise Exports decreased by

16.9% in 2Q23

EXPORTS

-13.4%
Non-Oil Domestic Exports

-14.5%
Re-Exports

-28.1%
Oil Domestic Exports

Total Services Exports decreased by

2.5% in 2Q23

Services Exports decline was led by...

-8.8%-pt
Transport

-0.1%-pt
Telecommunication, Computer and Information

OVERVIEW

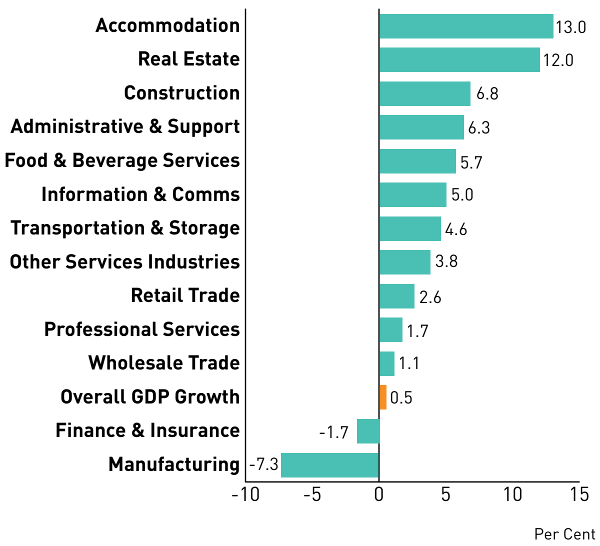
In the second quarter of 2023,

- The Singapore economy expanded by 0.5 per cent on a year-on-year basis. The sectors that contributed the most to GDP growth during the quarter were the transportation & storage, other services and real estate sectors.
- The seasonally-adjusted unemployment rate rose marginally at the overall level, and for residents and citizens, notwithstanding a decline in the number of retrenchments over the quarter.
- Total employment rose by 26,100 on a quarter-on-quarter basis, extending the gains in the preceding quarter. Excluding Migrant Domestic Workers (MDWs), total employment increased by 23,700, driven by employment gains for non-residents.
- The Consumer Price Index-All Items (CPI-All Items) rose by 5.1 per cent on a year-on-year basis, moderating from the 6.1 per cent increase in the preceding quarter.

OVERALL PERFORMANCE

The Singapore economy grew by 0.5 per cent on a year-on-year basis in the second quarter of 2023, extending the 0.4 per cent growth in the previous quarter (Exhibit 1.1). On a quarter-on-quarter seasonally-adjusted basis, the economy expanded marginally by 0.1 per cent, a reversal from the 0.4 per cent contraction in the preceding quarter.

Exhibit 1.1: GDP and Sectoral Growth Rates in 2Q 2023



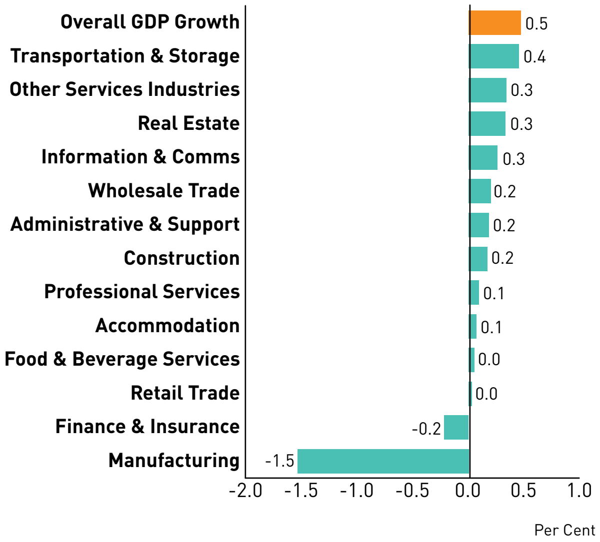
The manufacturing sector shrank by 7.3 per cent year-on-year, worse than the 5.4 per cent contraction in the previous quarter. The weak performance of the sector was due to output declines across all clusters except for the transport engineering cluster, which surged by 18.3 per cent. Among the clusters that contracted, electronics (-12.1 per cent) and precision engineering (-8.6 per cent) saw the largest declines.

The services producing industries grew by 2.6 per cent year-on-year, moderating from the 1.9 per cent growth registered in the previous quarter. Growth was supported by expansions in all services sectors except for the finance & insurance sector, which contracted by 1.7 per cent. Among the services sectors that expanded, accommodation (13.0 per cent), real estate (12.0 per cent) and administrative & support services (6.3 per cent) saw the fastest expansions.

The construction sector grew by 6.8 per cent year-on-year, similar to the 6.9 per cent growth in the preceding quarter. Both public and private sector construction output increased during the quarter.

The top three positive contributors to GDP growth in the second quarter were the transportation & storage, other services and real estate sectors (Exhibit 1.2).

Exhibit 1.2: Percentage-Point Contribution to Growth in Real GDP in 2Q 2023 (By Sector)



SOURCES OF GROWTH

Total demand decreased by 1.8 per cent year-on-year in the second quarter of 2023, a reversal from the 1.2 per cent increase in the previous quarter (Exhibit 1.3). The decline in total demand during the quarter was due to decreases in both domestic and external demand.

External demand fell by 0.6 per cent year-on-year, a pullback from the 1.9 per cent growth in the previous quarter. Meanwhile, domestic demand contracted by 5.6 per cent year-on-year, following the 0.8 per cent decline in the preceding quarter.

Within domestic demand, consumption expenditure rose by 0.7 per cent year-on-year, slowing from the 6.6 per cent increase in the preceding quarter. The increase in consumption expenditure was due to higher private consumption expenditure (2.4 per cent), which offset the decrease in public consumption expenditure (-4.7 per cent).

Meanwhile, gross fixed capital formation (GFCF) decreased by 3.2 per cent year-on-year, worsening from the 0.5 per cent decline in the previous quarter. The decrease in GFCF during the quarter was due to the decline in private sector GFCF (-4.6 per cent), which outweighed the increase in public sector GFCF (4.4 per cent). Public sector GFCF rose due to higher investments in public construction & works, transport equipment, machinery & equipment and intellectual property products. Meanwhile, private sector GFCF fell on the back of lower investments in private construction & works, transport equipment, machinery & equipment, which more than offset the higher investments in private intellectual property products.

Exhibit 1.3: Changes in Total Demand*

	2022			2023	
	II	III	IV	I	II
Total Demand	2.4	3.1	-4.1	1.2	**-1.8**
External Demand	0.7	3.2	-7.0	1.9	**-0.6**
Total Domestic Demand	7.5	2.8	4.6	-0.8	**-5.6**
Consumption Expenditure	10.1	7.9	6.7	6.6	**0.7**
Public	-0.1	-3.6	-1.5	4.8	**-4.7**
Private	13.4	12.0	9.5	7.2	**2.4**
Gross Fixed Capital Formation	2.1	3.4	-1.2	-0.5	**-3.2**
Changes in Inventories	0.3	-2.1	0.4	-3.1	**-3.1**

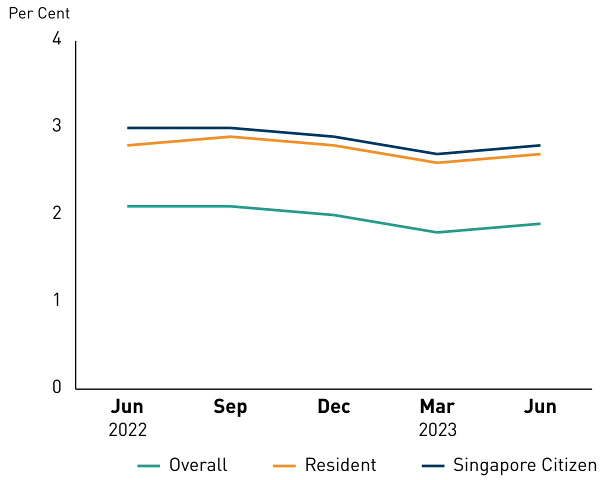
** For inventories, this refers to the contribution to GDP growth.*

LABOUR MARKET

Unemployment and Retrenchment[1]

Compared to March 2023, the seasonally-adjusted unemployment rate in June 2023 increased marginally at the overall level (from 1.8 per cent to 1.9 per cent), and for residents (from 2.6 per cent to 2.7 per cent) and citizens (2.7 per cent to 2.8 per cent) (Exhibit 1.4). As of June 2023, all three unemployment rates remained below their respective pre-pandemic levels.[2]

Exhibit 1.4: Unemployment Rate (Seasonally-Adjusted)

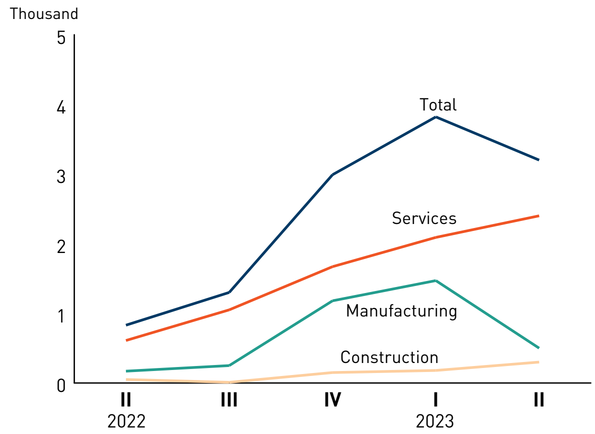


1 *Retrenchment figures pertain to private sector establishments with at least 25 employees and the public sector.*
2 *The average pre-pandemic (i.e., 2018 and 2019) overall, resident and citizen unemployment rates were 2.2 per cent, 3.0 per cent and 3.2 per cent respectively.*

In June 2023, an estimated 64,600 residents, including 56,800 Singapore citizens, were unemployed. These were slightly higher than the number of unemployed residents (62,200) and citizens (55,700) in March 2023.[3]

Total retrenchments fell to 3,200 in the second quarter of 2023, from 3,820 in the preceding quarter (Exhibit 1.5). Over the quarter, retrenchments increased in the services (from 2,090 to 2,400) and construction (from 180 to 300) sectors. On the other hand, retrenchments fell in the manufacturing sector (from 1,470 to 500) over the quarter.

Exhibit 1.5: Retrenchments



Employment[4]

Total employment increased by 26,100 on a quarter-on-quarter basis in the second quarter of 2023, moderating from the gains recorded in the preceding quarter (38,600) (Exhibit 1.6). Excluding MDWs, total employment rose by 23,700, on the back of non-resident employment growth. Resident employment contracted over the same period due to seasonal declines in the food & beverage services and retail sectors.

Total employment growth was partly driven by the services sector (+14,900; or +12,400 excluding MDWs), supported by employment gains in the other services (+7,300), finance & insurance services (+1,900), and transportation & storage (+1,600) sectors (Exhibit 1.7). Over the same period, employment in the construction and manufacturing sectors rose by 10,500 and 1,200, respectively.

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

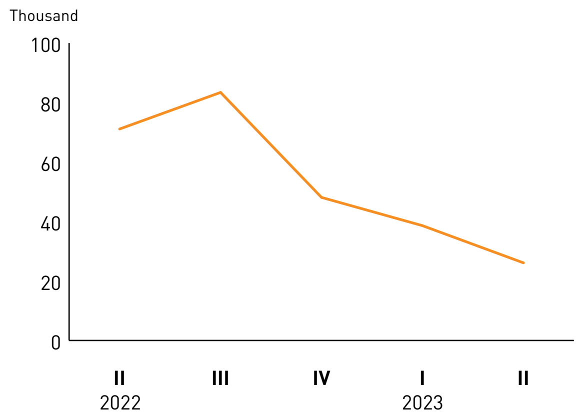
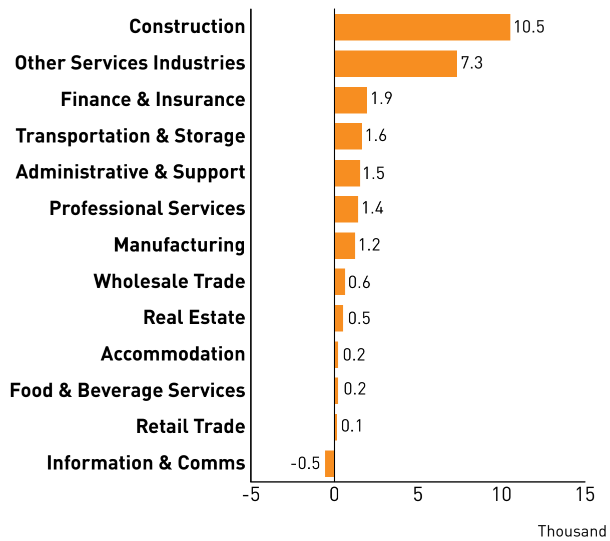


Exhibit 1.7: Changes in Employment by Sector in 2Q 2023



3 *Based on seasonally-adjusted data on the number of unemployed persons.*
4 *Based on preliminary estimates.*

Hiring Expectations

According to the Economic Development Board's (EDB) latest Business Expectations Survey for the Manufacturing Sector, hiring expectations in the sector were positive. Specifically, a net weighted balance of 4 per cent of manufacturers expect to increase hiring in the third quarter of 2023 as compared to the second quarter. Firms in the marine & offshore engineering segment of the transport engineering cluster were the most optimistic, with a net weighted balance of 41 per cent of firms expecting to increase hiring in the third quarter. By contrast, firms in the computer peripherals & data storage segment of the electronics cluster were the most pessimistic, with a net weighted balance of 48 per cent of firms expecting a lower level of hiring in the third quarter.

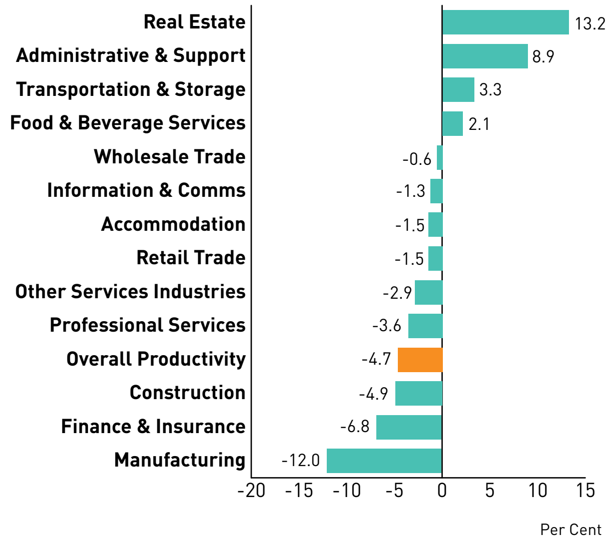
Hiring expectations for services firms remain positive. According to the Singapore Department of Statistics' (DOS) latest Business Expectations Survey for the Services Sector, a net weighted balance of 9 per cent of services firms expect to increase hiring in the third quarter of 2023 as compared to the second quarter. Among the services sectors, firms in the accommodation sector had the strongest hiring sentiments, with a net weighted balance of 41 per cent of firms expecting to increase hiring in the third quarter. On the other hand, firms in the wholesale trade sector were the most pessimistic, with a net weighted balance of 1 per cent of firms expecting to hire fewer workers in the third quarter.

COMPETITIVENESS

Productivity

Overall labour productivity, as measured by real value-added per actual hour worked, fell by 4.7 per cent year-on-year in the second quarter of 2023, moderating from the 6.6 per cent decline in the previous quarter (Exhibit 1.8).[5]

Exhibit 1.8: Changes in Value-Added per Actual Hour Worked for the Overall Economy and Sectors in 2Q 2023



Among the sectors, the real estate (13.2 per cent) and administrative & support services (8.9 per cent) sectors recorded the strongest productivity gains in the second quarter. The transportation & storage (3.3 per cent) and food & beverage services (2.1 per cent) sectors also saw productivity improvements. By contrast, productivity declines were observed in the manufacturing (-12.0 per cent), finance & insurance (-6.8 per cent), construction (-4.9 per cent), professional services (-3.6 per cent), other services (-2.9 per cent), retail trade (-1.5 per cent), accommodation (-1.5 per cent), information & communications (-1.3 per cent) and wholesale trade (-0.6 per cent) sectors.

In the second quarter, the productivity of outward-oriented sectors as a whole fell by 5.1 per cent year-on-year, moderating from the 7.1 per cent decline in the previous quarter.[6] Meanwhile, the productivity of domestically-oriented sectors as a whole fell by 0.5 per cent year-on-year, moderating from the 2.0 per cent decline in the preceding quarter.

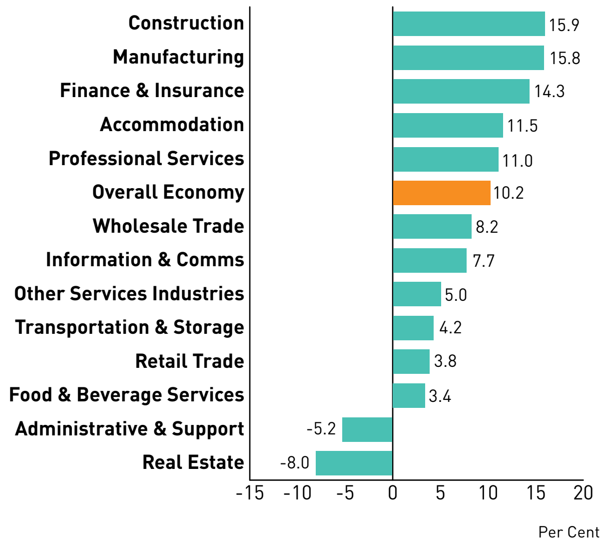
5 *Similarly, overall labour productivity as measured by real value-added per worker, fell by 4.9 per cent in the second quarter of 2023, moderating from the 5.9 per cent decline in the preceding quarter.*

6 *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.*

Unit Labour Cost and Unit Business Cost

Overall unit labour cost (ULC) for the economy rose by 10.2 per cent year-on-year in the second quarter of 2023 (Exhibit 1.9), extending the 10.1 per cent increase in the preceding quarter. The rise in overall ULC during the quarter was due to an increase in total labour cost per worker, along with a fall in labour productivity as measured by real value-added per worker.

Exhibit 1.9: Changes in Unit Labour Cost in 2Q 2023



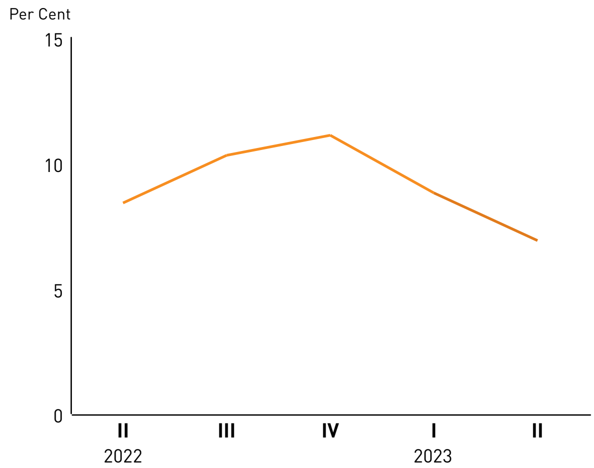
By sectors, the ULC for the construction sector was 15.9 per cent higher year-on-year in the second quarter as a fall in labour productivity was accompanied by an increase in total labour cost per worker.

The ULC for services producing industries rose by 7.4 per cent year-on-year. Among the services sectors, ULC increased the most in the finance & insurance sector (14.3 per cent), reflecting a pickup in total labour cost per worker alongside a decline in productivity. Meanwhile, ULC fell in the real estate (-8.0 per cent) and administrative & support services (-5.2 per cent) sectors. In these sectors, productivity gains surpassed the increase in total labour cost per worker.

Over the same period, the ULC for the manufacturing sector picked up by 15.8 per cent year-on-year. The rise in the sector's ULC was due to a fall in labour productivity while total labour cost per worker rose.

Unit business cost (UBC) for the manufacturing sector rose by 6.9 per cent year-on-year in the second quarter of 2023, moderating from the 8.8 per cent increase in the previous quarter (Exhibit 1.10). The rise in UBC during the quarter was due to the increase in manufacturing ULC (15.8 per cent), unit services costs (4.3 per cent) and unit non-labour production taxes (14.7 per cent).

Exhibit 1.10: Changes in the Manufacturing Unit Business Cost

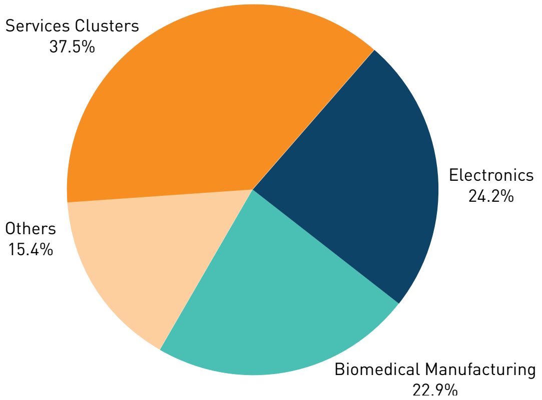


Investment Commitments

Investment commitments garnered by EDB in terms of Fixed Asset Investments (FAI) and Total Business Expenditure (TBE) amounted to $1.6 billion and $3.6 billion respectively in the second quarter of 2023 (Exhibit 1.11 and Exhibit 1.12).

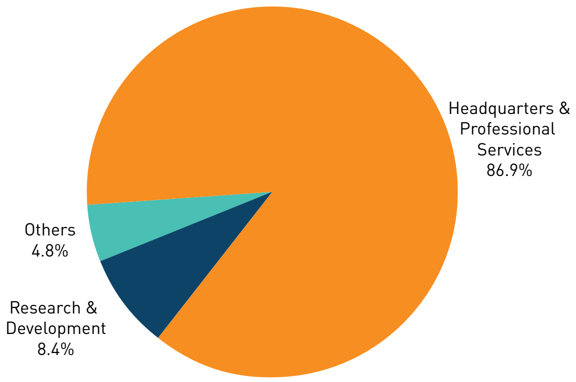
For FAI, the largest contribution came from the manufacturing sector, which attracted $979 million worth of commitments. Within the manufacturing sector, the electronics and biomedical manufacturing clusters garnered the largest amounts of commitments, at $379 million and $359 million respectively. Within the services sector, the engineering & environmental services cluster attracted the most FAI commitments at $473 million. Local investors contributed the most to total FAI, at $493 million (31.5 per cent).

Exhibit 1.11: Fixed Asset Investments by Industry Cluster in 2Q 2023



For TBE, the services sector attracted the highest amount of commitments, at $3.4 billion. Within the sector, the headquarters & professional services and research & development clusters garnered the most TBE commitments, at $3.1 billion and $299 million respectively. Among the manufacturing clusters, the electronics and transport engineering clusters attracted the largest amounts of TBE commitments, at $70.2 million and $46.3 million respectively. Local investors were the largest source of TBE commitments, with commitments of $2.4 billion (67.5 per cent).

Exhibit 1.12: Total Business Expenditure by Industry Cluster in 2Q 2023



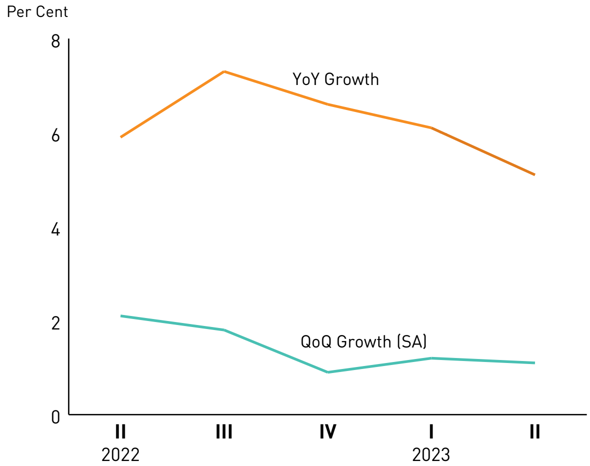
When these projects are fully implemented in the coming years, they are expected to generate $4.5 billion of value-added and create more than 4,500 jobs.

PRICES

Consumer Price Index

Consumer Price Index-All Items (CPI-All Items) rose by 5.1 per cent on a year-on-year basis in the second quarter of 2023, moderating from the 6.1 per cent increase in the preceding quarter (Exhibit 1.13). On a quarter-on-quarter seasonally-adjusted basis, CPI-All Items inflation came in at 1.1 per cent, following the 1.2 per cent recorded in the previous quarter.

Exhibit 1.13: Changes in CPI



All CPI categories saw price increases on a year-on-year basis, thus contributing positively to CPI-All Items inflation in the second quarter (Exhibit 1.14). Food prices rose by 6.6 per cent on the back of increases in the costs of food servicing services like hawker food and restaurant meals, as well as non-cooked food items such as meat, bread & cereals and fish & seafood. Clothing & footwear prices picked up by 4.5 per cent, mainly driven by more expensive footwear and ready-made garments. Housing & utilities costs increased by 4.4 per cent because of a rise in the costs of accommodation and electricity. Prices of household durables & services edged up by 1.9 per cent as the prices of household durables and domestic & household services increased. Healthcare costs rose by 4.6 per cent on account of the higher costs of outpatient services, hospital services, and health insurance. Transport costs climbed by 6.4 per cent due to an increase in the cost of cars, as well as higher road tax and bus & train fares. Communication costs picked up by 2.7 per cent on the back of a rise in the prices of telecommunication services. Recreation & culture prices increased by 6.5 per cent as a result of the higher costs of holiday travel, as well as recreational & cultural services. Education costs rose by 2.7 per cent due to higher fees at commercial institutions and universities. Prices of miscellaneous goods & services went up by 3.6 per cent on account of a rise in the costs of personal care items and alcoholic drinks & tobacco.

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

Per Cent

	2022			2023	
	II	III	IV	I	II
All items	5.9	7.3	6.6	6.1	**5.1**
Food	4.7	6.5	7.3	8.0	**6.6**
Clothing & Footwear	2.8	7.1	5.2	6.8	**4.5**
Housing & Utilities	5.1	6.0	5.7	5.3	**4.4**
Housing Durables & Services	2.1	2.1	2.3	2.6	**1.9**
Healthcare	1.6	2.7	2.8	4.0	**4.6**
Transport	16.6	19.4	14.3	9.2	**6.4**
Communication	-0.9	-0.8	-0.5	2.1	**2.7**
Recreation & Culture	3.8	5.6	6.3	6.8	**6.5**
Education	2.2	2.2	2.0	3.0	**2.7**
Miscellaneous Goods & Services	0.2	0.5	1.1	2.6	**3.6**

INTERNATIONAL TRADE

Merchandise Trade

Singapore's total merchandise trade contracted by 18.7 per cent year-on-year in the second quarter, following the 7.8 per cent decrease in the preceding quarter (Exhibit 1.15). The decline in total merchandise trade was due to decreases in both non-oil trade (-15.3 per cent) and oil trade (-30.9 per cent).

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

Per Cent

	2022				2023	
	II	III	IV	ANN	I	II
Merchandise Trade	28.0	25.7	-1.0	17.7	-7.8	**-18.7**
Merchandise Exports	24.9	23.4	-2.3	15.6	-6.5	**-16.9**
Domestic Exports	28.5	27.9	-2.1	18.2	-7.9	**-19.5**
Oil	72.9	75.2	21.6	52.4	8.5	**-28.1**
Non-Oil	8.9	7.1	-14.0	3.0	-16.1	**-13.4**
Re-Exports	21.7	19.8	-2.4	13.5	-5.3	**-14.5**
Merchandise Imports	31.6	28.1	0.5	20.1	-9.3	**-20.6**
Oil	66.7	58.8	8.2	43.9	-7.4	**-34.4**
Non-Oil	23.5	21.2	-1.4	14.6	-9.8	**-16.3**

Total merchandise exports shrank by 16.9 per cent year-on-year in the second quarter, following the 6.5 per cent decrease in the preceding quarter. This was due to decreases in both domestic exports (-19.5 per cent) and re-exports (-14.5 per cent).

The decline in domestic exports was due to decreases in both oil domestic exports (-28.1 per cent) and non-oil domestic exports (NODX) (-13.4 per cent). In volume terms, oil domestic exports grew by 8.9 per cent.

Meanwhile, NODX decreased by 13.4 per cent in the second quarter, following the 16.1 per cent contraction in the previous quarter. The decline in NODX was due to decreases in both electronics and non-electronics domestic exports.

Total merchandise imports fell by 20.6 per cent in the second quarter, following the 9.3 per cent contraction in the previous quarter. The decline in imports was due to decreases in both oil and non-oil imports. Specifically, oil imports contracted by 34.4 per cent, while non-oil imports declined by 16.3 per cent on account of lower electronics and non-electronics imports.

Services Trade

Total services trade decreased by 1.9 per cent year-on-year in the second quarter, a reversal from the 1.9 per cent increase in the previous quarter (Exhibit 1.16). Both the exports and imports of services saw negative year-on-year growth during the quarter.

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

Per Cent

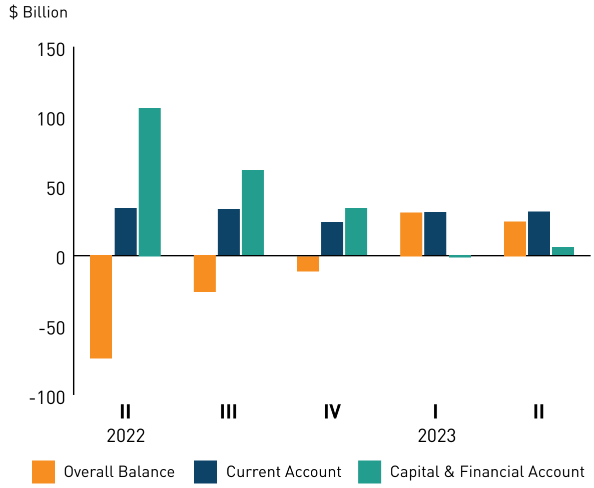
	2022				2023	
	II	III	IV	ANN	I	II
Total Services Trade	13.1	12.5	7.0	10.8	1.9	**-1.9**
Services Exports	14.3	14.1	8.2	12.1	0.2	**-2.5**
Services Imports	11.8	10.6	5.7	9.3	3.8	**-1.1**

Services exports fell by 2.5 per cent in the second quarter, a turnaround from the 0.2 per cent increase in the preceding quarter. The decrease in services exports was largely attributable to the fall in the exports of transport services, which more than offset increases in the exports of travel services, financial services and other business services. Meanwhile, services imports contracted by 1.1 per cent, a pullback from the 3.8 per cent increase in the previous quarter. The fall in services imports was mainly due to the decrease in the imports of transport services, which outweighed increases in the imports of travel services, other business services and telecommunications, computer and information services.

BALANCE OF PAYMENTS

Singapore recorded an overall balance of payments surplus of $25.1 billion in the second quarter of 2023, narrower than the surplus of $31.3 billion in the preceding quarter (Exhibit 1.17).

Exhibit 1.17: Balance of Payments



Current Account

The current account surplus widened marginally to $31.0 billion in the second quarter of 2023, from $30.6 billion in the previous quarter. This was due to increases in both the goods and services trade surpluses, which offset higher primary and secondary income deficits.

The surplus in the goods balance increased by $8.8 billion to $53.6 billion in the second quarter, as goods exports rose while goods imports declined.

The surplus in the services balance rose by $2.3 billion to $9.5 billion in the second quarter. Other business services recorded net receipts, a reversal from net payments in the previous quarter, while net receipts for maintenance and repair services, as well as financial services increased. These more than offset the increase in net payments for manufacturing services on physical inputs, as well as the decrease in net receipts for personal, cultural and recreational services.

At the same time, the primary income deficit increased by $10.3 billion to $30.2 billion in the second quarter, as primary income receipts declined more than the fall in payments.

The secondary income deficit widened by $0.4 billion to $1.9 billion as secondary income payments rose while receipts declined.

Capital and Financial Account[7]

The capital and financial account registered a net outflow of $5.7 billion in the second quarter of 2023, a reversal from a net inflow of $1.7 billion in the preceding quarter. This was due to increased net outflows of "other investment" and portfolio investment, as well as financial derivatives recording net outflows compared to net inflows in the previous quarter. These more than offset the higher net inflows of direct investment.

"Other investment" recorded net outflows of $5.0 billion in the second quarter, larger than the $0.8 billion in the previous quarter. This was driven by the non-bank private sector switching from a net inflow to a net outflow position, which more than offset the shift of resident deposit-taking corporations from a net outflow to a net inflow position.

Net outflows of portfolio investment increased to $27.7 billion in the second quarter, from $26.0 billion in the first quarter. This was driven in part by the increase in net outflows recorded by resident deposit-taking corporations.

Meanwhile, financial derivatives recorded net outflows of $3.0 billion in the second quarter, a reversal from the net inflows of $0.7 billion in the first quarter.

In comparison, net inflows of direct investment rose to $30.1 billion in the second quarter, from $27.8 billion in the preceding quarter, as the increase in foreign direct investments into Singapore exceeded the rise in residents' direct investments abroad.

7 *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".*

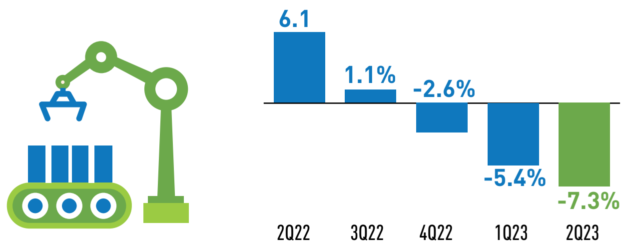
CHAPTER 2

SECTORAL PERFORMANCE

Chapter 2

SECTORAL PERFORMANCE

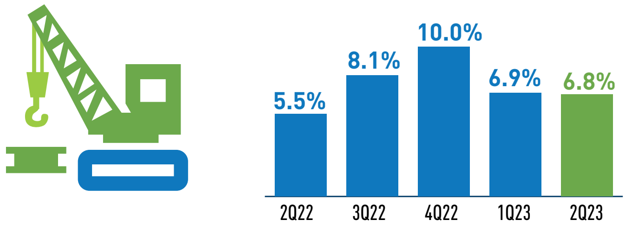
MANUFACTURING
(YoY Growth)



CLUSTERS IN MANUFACTURING SECTOR

- 18.3% Transport Engineering
- -1.5% Biomedical Manufacturing
- -6.1% General Manufacturing Industries
- -8.0% Chemicals
- -8.6% Precision Engineering
- -12.1% Electronics

CONSTRUCTION
(YoY Growth)



CERTIFIED PAYMENTS
(% Share)

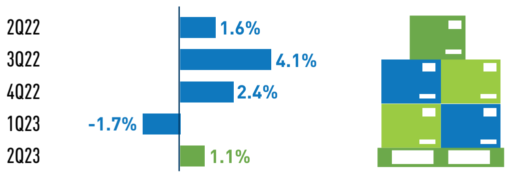
49.6% Public

50.4% Private

CONTRACTS AWARDED
(YoY Growth)

201.5%	9.8%	-5.1%	-39.0%	-76.4%
Industrial	Residential	Commercial	Institutional & Others	Civil Engineering

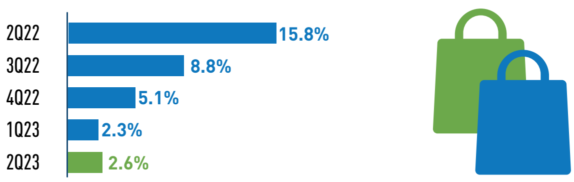
WHOLESALE TRADE
(YoY Growth)



Real NODX — Real Non-Oil Domestic Exports Growth -6.7%

Real NORX — Real Non-Oil Re-Exports Growth -14.3%

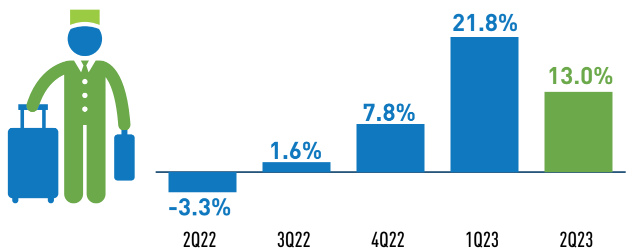
RETAIL TRADE
(YoY Growth)



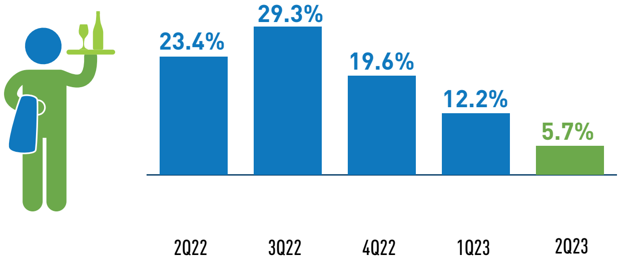
Retail Sales Index Growth (Non-Motor Vehicles) 1.6%

Retail Sales Index Growth (Motor Vehicles) -3.9%

ACCOMMODATION
(YoY Growth)



FOOD & BEVERAGE SERVICES
(YoY Growth)



OCCUPANCY RATES OF HOTELS
(YoY Change)

Luxury
3.0%-pt

Upscale
9.6%-pt

Mid-Tier
4.0%-pt

Economy
8.5%-pt

FOOD & BEVERAGE SALES INDEX GROWTH
(YoY Growth)

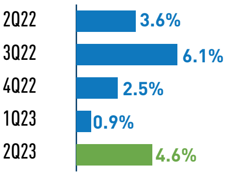
Food Caterers
37.5%

Fast Food Outlets
4.1%

Others
2.5%

Restaurants
-2.8%

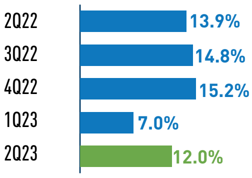
TRANSPORTATION & STORAGE
(YoY Growth)



Total Sea Cargo Handled Growth 3.1%

Air Passengers Handled Growth 98.6%

REAL ESTATE
(YoY Growth)

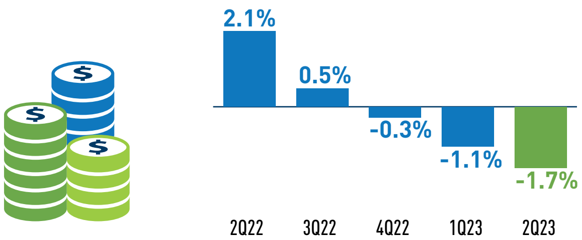


PRIVATE RESIDENTIAL REAL ESTATE

Units Transacted (YoY Growth) -20.9%

Price Index (QoQ Growth) -0.2%

FINANCE & INSURANCE
(YoY Growth)



OVERVIEW

In the second quarter of 2023,

- The manufacturing sector contracted by 7.3 per cent year-on-year, following the 5.4 per cent decline in the preceding quarter. All clusters saw a fall in output except for the transport engineering cluster.
- The construction sector expanded by 6.8 per cent year-on-year, extending the 6.9 per cent expansion in the previous quarter.
- The wholesale trade sector expanded by 1.1 per cent year-on-year, reversing the 1.7 per cent contraction recorded in the preceding quarter.
- The retail trade sector expanded by 2.6 per cent year-on-year, following the 2.3 per cent recorded in the first quarter of 2023.
- The transportation & storage sector posted growth of 4.6 per cent year-on-year, accelerating from the 0.9 per cent growth recorded in the previous quarter.
- The accommodation sector expanded by 13.0 per cent year-on-year, extending the 21.8 per cent growth in the preceding quarter.
- Growth in the food & beverage services sector moderated to 5.7 per cent year-on-year, from the 12.2 per cent in the first quarter of 2023.
- The finance & insurance sector contracted by 1.7 per cent year-on-year, extending the 1.1 per cent decline in the preceding quarter.
- The real estate sector expanded by 12.0 per cent year-on-year, accelerating from the 7.0 per cent growth in the previous quarter.
- The professional services sector expanded by 1.7 per cent year-on-year, extending the 3.7 per cent expansion in the preceding quarter.

MANUFACTURING

The manufacturing sector contracted by 7.3 per cent on a year-on-year basis in the second quarter of 2023, following the 5.4 per cent decline in the previous quarter (Exhibit 2.1). The decline in the second quarter of 2023 was due to output contractions in all clusters except the transport engineering cluster (Exhibit 2.2).

Exhibit 2.1: Manufacturing Sector's Growth Rate

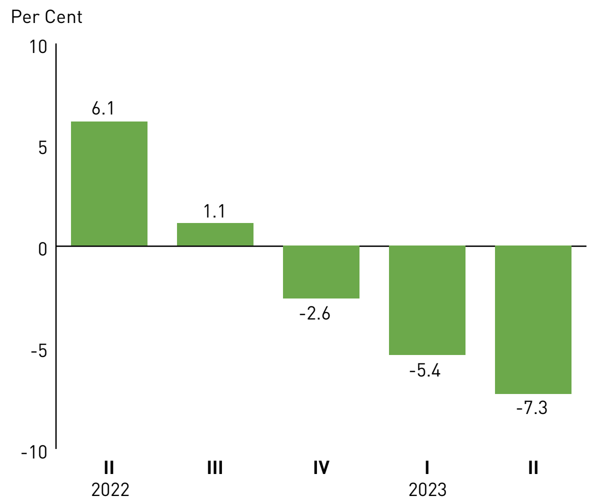
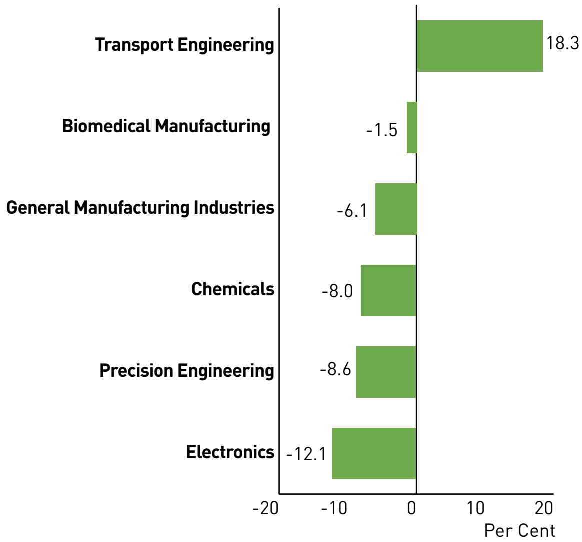


Exhibit 2.2: Manufacturing Clusters' Growth Rates in 2Q 2023



Output in the transport engineering cluster rose by 18.3 per cent year-on-year in the second quarter on account of expansions in the marine & offshore engineering (M&OE) and aerospace segments. The M&OE segment grew by 21.0 per cent, supported by a higher level of activity in the shipyards as well as increased production of oilfield & gasfield equipment. In the aerospace segment, output grew by 22.4 per cent on account of a higher demand for aircraft parts and more maintenance, repair and overhaul (MRO) jobs from commercial airlines, on the back of increased global air traffic. By contrast, the land segment contracted by 1.5 per cent.

The biomedical manufacturing cluster contracted by 1.5 per cent year-on-year mainly due to the medical technology segment, which declined 6.7 per cent on the back of lower export demand for medical devices. On the other hand, output in the pharmaceuticals segment rose by 2.4 per cent due to a different mix of active pharmaceutical ingredients (APIs) being produced as compared to a year ago.

The general manufacturing cluster contracted by 6.1 per cent year-on-year, with output contractions across all segments. The miscellaneous industries and printing segments declined by 11.3 per cent and 11.1 per cent respectively, with the former recording a lower production of batteries and structural metal products. Meanwhile, the food, beverages & tobacco segment shrank by 1.9 per cent due to a lower level of output of beverage products.

Output in the chemicals cluster shrank by 8.0 per cent year-on-year, driven by the fall in output in the petrochemicals (-11.5 per cent), petroleum (-5.4 per cent) and specialty chemicals (-4.4 per cent) segments. The petrochemicals segment recorded a lower level of production amidst plant maintenance shutdowns and weak market demand, while the specialty chemicals segment recorded a lower level of production of mineral oil and food additives. Meanwhile, the output of the other chemicals segment grew by 0.7 per cent with an increased production of fragrances.

Output in the precision engineering cluster fell by 8.6 per cent year-on-year, on the back of a 19.4 per cent decline in the precision modules & components (PMC) segment due to a lower level of production of optical instruments, plastic and metal precision components and dies, moulds, tools, jigs and fixtures. The machinery & systems (M&S) segment contracted by 4.3 per cent on account of a lower output of back-end semiconductor equipment and refrigeration & air-conditioning compressors.

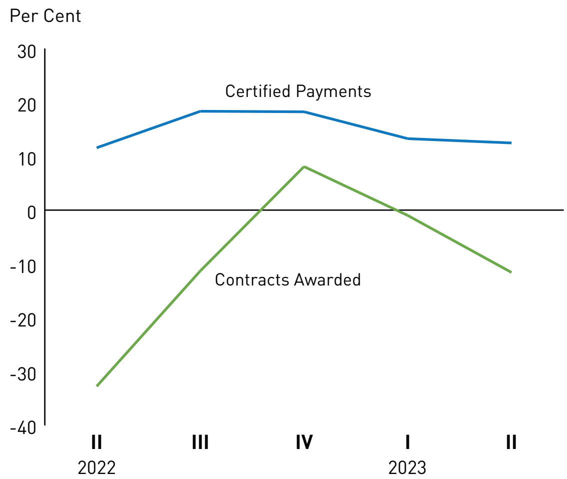
The electronics cluster shrank by 12.1 per cent year-on-year, with output declines across all segments on the back of weak external demand. Output of the computer peripherals & data storage, semiconductors, other electronic modules & components and infocomms & consumer electronics segments declined by 28.1 per cent, 11.6 per cent, 8.3 per cent and 7.4 per cent respectively.

CONSTRUCTION

The construction sector grew by 6.8 per cent year-on-year in the second quarter of 2023, extending the 6.9 per cent expansion in the previous quarter.

In the second quarter, nominal certified progress payments, a proxy for construction output, rose by 12.5 per cent year-on-year, extending the 13.3 per cent increase recorded in the previous quarter (Exhibit 2.3). Higher certified progress payments were seen in both the public (13.2 per cent) and private (11.9 per cent) sectors. The growth in public certified progress payments was largely driven by higher outturns in public residential (16.9 per cent) and institutional & others (29.2 per cent) building works. Meanwhile, the increase in private certified progress payments was led by expansions in private residential (11.9 per cent) and commercial (47.8 per cent) building works.

Exhibit 2.3: Changes in Contracts Awarded and Certified Payments



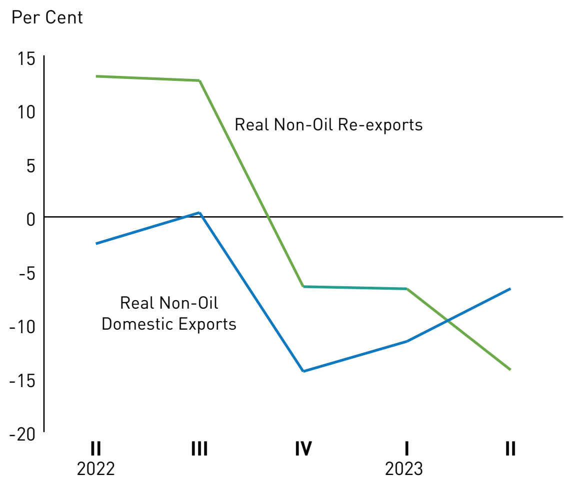
On the other hand, construction demand in terms of contracts awarded fell by 11.6 per cent year-on-year in the second quarter, deteriorating from the 1.0 per cent contraction in the previous quarter (Exhibit 2.3). The fall in contracts awarded during the quarter was on account of lower public sector construction demand (-25.4 per cent), which outweighed an increase in private sector construction demand (3.9 per cent). The former was led by a fall in contracts awarded for public civil engineering (-68.7 per cent) and institutional & others building (-29.8 per cent) works, while the latter was driven by an increase in contracts awarded for private industrial (165 per cent) and commercial (4.7 per cent) building works.

WHOLESALE TRADE

The wholesale trade sector expanded by 1.1 per cent year-on-year in the second quarter of 2023, reversing the 1.7 per cent contraction in the previous quarter.

Growth in the sector was weighed down by declines in non-oil domestic export (NODX) and non-oil re-export (NORX) volumes during the quarter. Specifically, NODX volumes declined by 6.7 per cent year-on-year in the second quarter, improving from the 11.6 per cent contraction in the previous quarter (Exhibit 2.4). This was led by a contraction in domestic exports of machinery & equipment. Meanwhile, NORX volumes fell by 14.3 per cent, worsening from the 6.7 per cent decline in the first quarter. The fall in NORX volumes was primarily due to declines in the re-exports of machinery & equipment.

Exhibit 2.4: Changes in Real Non-Oil Domestic Exports and Real Non-Oil Re-Exports



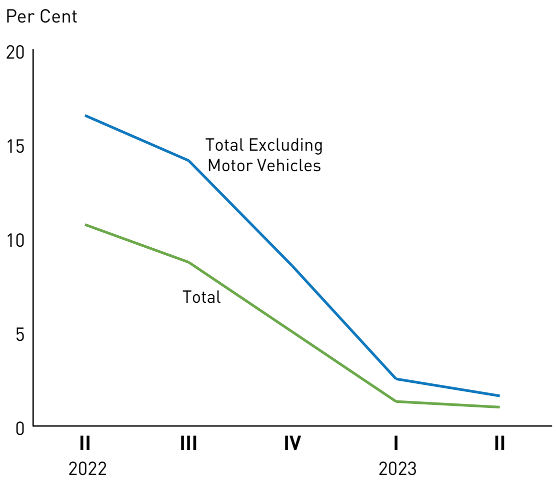
RETAIL TRADE

The retail trade sector posted growth of 2.6 per cent year-on-year in the second quarter of 2023, extending the 2.3 per cent expansion in the previous quarter.

In the second quarter, overall retail sales volume increased by 1.0 per cent year-on-year, following the 1.3 per cent growth in the preceding quarter (Exhibit 2.5). Growth in overall retail sales volume in the second quarter of 2023 was due to non-motor vehicular sales (1.6 per cent), as motor vehicular sales saw a decline (3.9 per cent) due to a reduction in Certificate of Entitlement (COE) quotas.

Among the non-motor vehicle segments, the sales volumes of food & alcohol (20.4 per cent), cosmetics, toiletries & medical goods (10.2 per cent), optical goods & books (7.2 per cent), computer & telecommunications equipment (6.9 per cent) and wearing apparel & footwear (3.9 per cent) rose. By contrast, the sales volumes of petrol service stations (-6.9 per cent), recreational goods (-6.3 per cent) and supermarkets & hypermarkets (-4.5 per cent) fell.

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

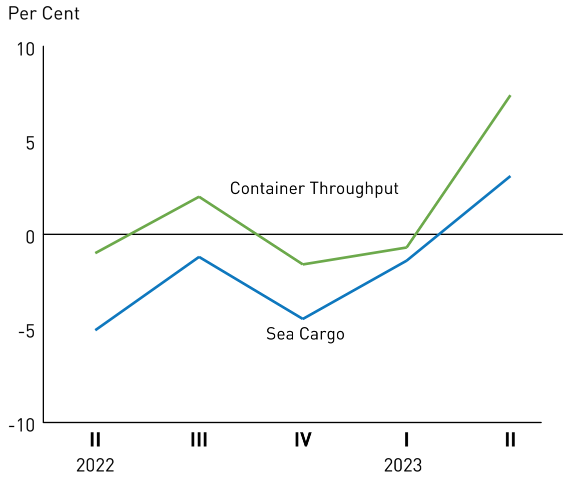


TRANSPORTATION & STORAGE

The transportation & storage sector expanded by 4.6 per cent year-on-year in the second quarter of 2023, accelerating from the 0.9 per cent growth posted in the previous quarter. The water transport, air transport and land transport segments expanded during the quarter.

In the water transport segment, the volume of sea cargo handled grew by 3.1 per cent year-on-year in the second quarter, reversing the 1.4 per cent decline in the previous quarter (Exhibit 2.6). The expansion in sea cargo volume handled was due to the increase in general cargo (3.1 per cent), bulk cargo (3.0 per cent) and oil-in-bulk cargo volumes (1.6 per cent). At the same time, container throughput grew by 7.4 per cent during the quarter.

Exhibit 2.6: Changes in Container Throughput and Sea Cargo Handled

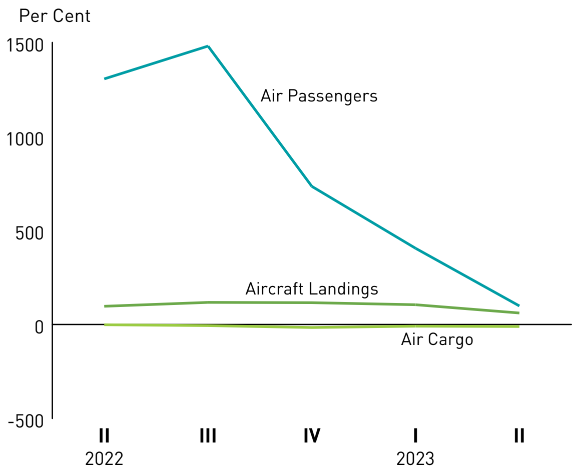


Meanwhile, the air transport segment saw robust growth in the second quarter. In particular, the volume of air passenger traffic (less transit) handled at Changi Airport surged by 98.6 per cent year-on-year in the second quarter, following the 405 per cent increase in the previous quarter (Exhibit 2.7). The high growth rates in both quarters were due to the low bases in the first and second quarter of 2022, when the volume of air passenger traffic was weak as countries were in the early stages of reopening their borders[1]. While air passenger traffic volume continued to recover in the second quarter, it remained 13.2 per cent below its pre-COVID level (i.e., second quarter of 2019) in absolute terms.

1 *For instance, the volume of air passenger traffic in the first and second quarter of 2022 was 84.3 and 56.3 per cent below their pre-COVID levels (i.e., the first and second quarter of 2019) respectively. The Vaccinated Travel Framework was only rolled out in the second quarter of 2022 (i.e., from 1 April 2022).*

Reflecting the recovery in air travel, the number of aircraft landings climbed by 61.1 per cent year-on-year to reach 40,694 in the second quarter of 2023, extending the 105 per cent increase in the preceding quarter. On the other hand, total air cargo shipments handled at Changi Airport declined by 10.8 per cent year-on-year in the second quarter, extending the 9.0 per cent contraction in the previous quarter.

Exhibit 2.7: Changes in Air Transport

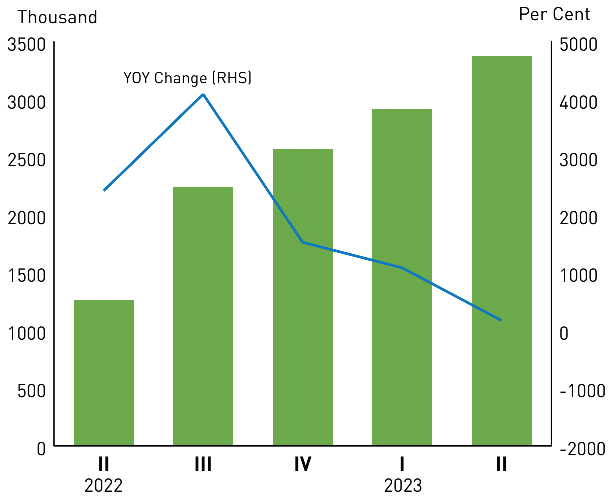


ACCOMMODATION

The accommodation sector expanded robustly by 13.0 per cent year-on-year in the second quarter of 2023, extending the 21.8 per cent growth in the preceding quarter.

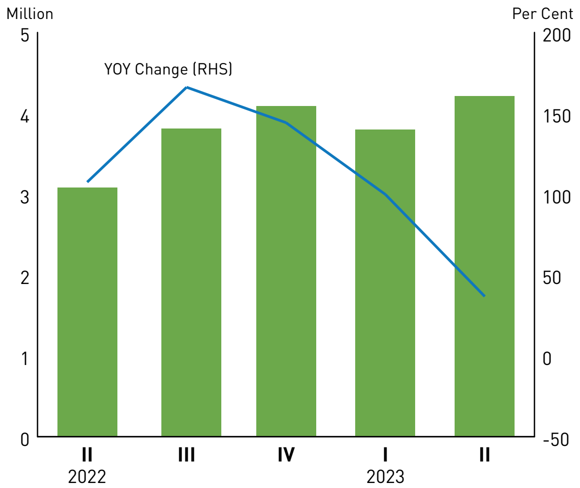
In the second quarter, total visitor arrivals surged by 168 per cent year-on-year, slowing from the 1,082 per cent growth in the previous quarter (Exhibit 2.8). The strong growth in both quarters was on account of low base effects in the corresponding quarters in 2022. In level terms, the number of visitor arrivals in the second quarter of 2023 was around 3.4 million, reaching 72.7 per cent of the 4.6 million visitor arrivals recorded in the second quarter of 2019 (i.e., pre-COVID level).

Exhibit 2.8: Visitor Arrivals



Reflecting the recovery in visitor arrivals, gross lettings at gazetted hotels climbed by 36.7 per cent year-on-year in the second quarter, a moderation from the 99.8 per cent increase in the previous quarter (Exhibit 2.9). At the same time, the average occupancy rate of gazetted hotels rose by 6.4 percentage-points year-on-year to reach 79.1 per cent in the second quarter of 2023. This was also an improvement over the 77.7 per cent recorded in the previous quarter.

Exhibit 2.9: Gross Lettings at Gazetted Hotels

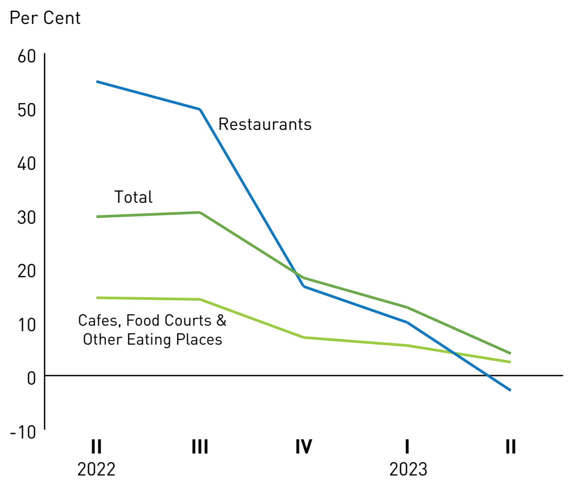


FOOD & BEVERAGE SERVICES

The food & beverage services sector expanded by 5.7 per cent year-on-year in the second quarter of 2023, extending the 12.2 per cent growth in the previous quarter.

Overall food & beverage sales volume rose by 4.1 per cent year-on-year in the second quarter, extending the 12.7 per cent growth in the previous quarter (Exhibit 2.10). The increase in food & beverage sales volume was led by food caterers (37.5 per cent), followed by fast food outlets (4.1 per cent) and cafes, food courts & other eating places (2.5 per cent). On the other hand, the sales volume for restaurants fell (-2.8 per cent).

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



FINANCE & INSURANCE

The finance & insurance sector contracted by 1.7 per cent year-on-year in the second quarter of 2023, extending the 1.1 per cent decline in the preceding quarter. The weak performance was led by the insurance segment, driven by a sharp decline in the sales of single-premium life insurance products.

Similarly, the banks segment remained lacklustre, amidst a continued fall in net fees & commissions and lending activity. Non-bank loans to residents fell by 5.0 per cent year-on-year in the second quarter, led by corporate loans, as general commerce and manufacturing activities remained weak (Exhibit 2.11). Similarly, loans to non-residents fell by 5.1 per cent, weighed down by manufacturing loans to East Asia and the Americas amidst the ongoing manufacturing downturn (Exhibit 2.12).

Meanwhile, the fund management and security dealing segments continued to expand, alongside the improved sentiment in global equities in recent months. The other auxiliary activities segment (comprising mainly payments processing players) also grew as card fees continued to pick up on the back of recovering tourism demand.

Exhibit 2.11: Growth of Bank Loans & Advances to Non-Bank Residents by Industry in 2Q 2023

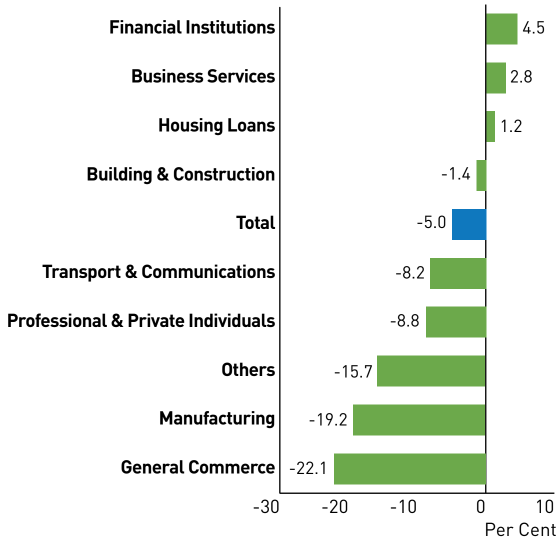
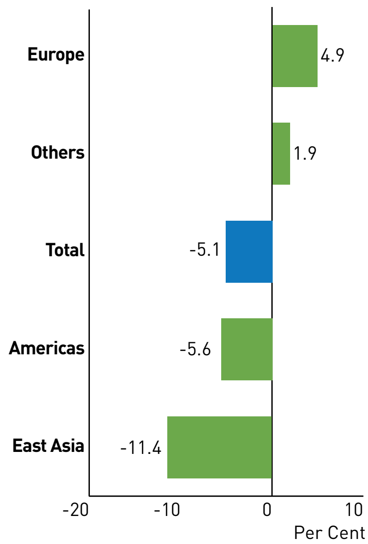


Exhibit 2.12: Growth of Bank Loans & Advances to Non-Bank Non-Residents by Region in 2Q 2023

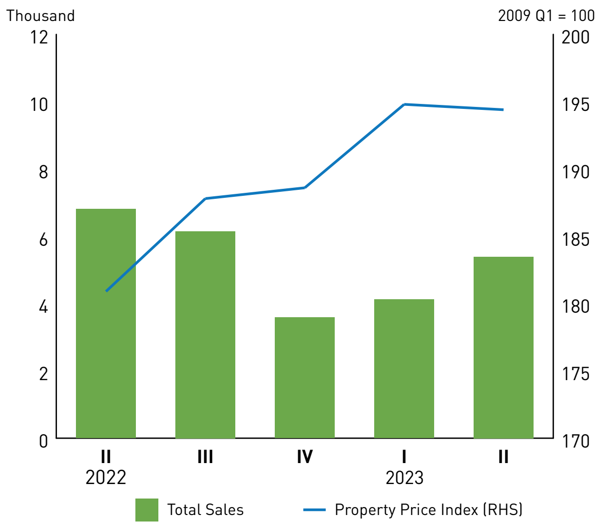


REAL ESTATE

The real estate sector expanded by 12.0 per cent year-on-year in the second quarter of 2023, accelerating from the 7.0 per cent growth in the preceding quarter. The growth of the sector was due to the commercial office and industrial property segments, which saw increases in rental rates of 15.4 per cent and 9.4 per cent respectively.

Within the sector, the number of private residential property sales transactions fell by 20.9 per cent year-on-year in the second quarter, extending the 22.9 per cent decrease in the previous quarter. Meanwhile, private residential property prices fell by 0.2 per cent on a quarter-on-quarter basis, reversing the 3.3 per cent increase seen in the previous quarter (Exhibit 2.13).

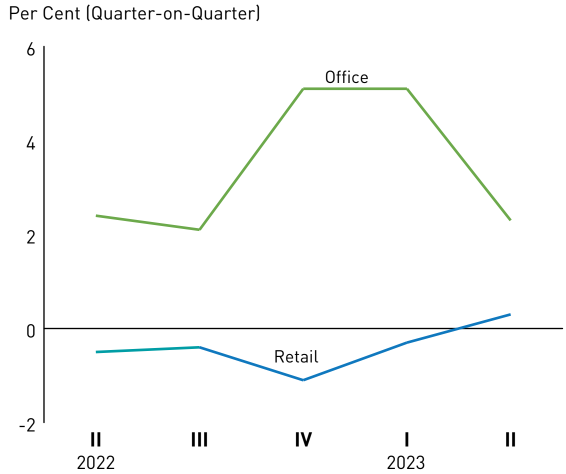
Exhibit 2.13: Total Sales Transactions for Private Residential Units and Private Residential Property Price Index



In the private retail space market, rentals rose by 0.3 per cent on a quarter-on-quarter basis in the second quarter of 2023, reversing the 0.3 per cent decline in the previous quarter (Exhibit 2.14). The average occupancy rate of private retail space came in at 91.7 per cent during the quarter, higher than the 91.5 per cent registered in the preceding quarter.

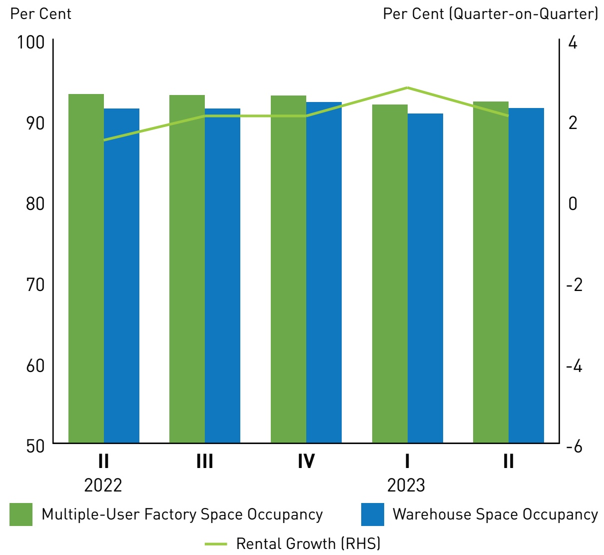
In the same vein, rentals for private office space rose by 2.3 per cent on a quarter-on-quarter basis in the second quarter, extending the 5.1 per cent increase in the preceding quarter. The average occupancy rate of private office space rose to 88.7 per cent, higher than the 88.1 per cent recorded in the first quarter.

Exhibit 2.14: Changes in Rentals of Private Sector Office and Retail Spaces



Similarly, private industrial rentals rose by 2.1 per cent on a quarter-on-quarter basis in the second quarter, following the 2.8 per cent increase in the preceding quarter. The occupancy rates of private sector multiple-user factory and warehouse spaces stood at 92.3 per cent and 91.5 per cent respectively, rising from that seen in the previous quarter (91.9 per cent and 90.8 per cent respectively) (Exhibit 2.15).

Exhibit 2.15: Occupancy Rate and Rental Growth of Private Sector Industrial Space



PROFESSIONAL SERVICES

In the second quarter of 2023, the professional services sector grew by 1.7 per cent year-on-year, following the 3.7 per cent growth in the previous quarter. Growth of the sector was mainly driven by expansions in the architectural & engineering, technical testing & analysis and the other professional, scientific & technical services segments, which outweighed contractions in the legal, head offices & business representative offices and business & management consultancy segments.

Box Article 2.1

SINGAPORE'S WHOLESALE TRADE SECTOR

The wholesale trade sector is the largest services sector in Singapore, accounting for 18.6 per cent of Singapore's nominal value-added (VA) in 2022.[1] This article examines recent trends in the performance of the wholesale trade sector,[2] as well as its near-term outlook.

Activities in the wholesale trade sector range from the buying and selling of goods to storage and warehousing, as well as marketing

Wholesalers purchase goods in bulk from domestic or foreign manufacturers or other suppliers. They may then store these goods in warehouses, thereby reducing the storage and inventory management burden of manufacturers. To sell the goods purchased, wholesalers leverage their network of existing and past clients, as well as engage in marketing to attract new ones.[3] Once the goods have been sold, wholesalers fulfil the orders through a distribution system. Wholesalers may also offer other services to their clients such as marketing support, training, post-sales services and financing.[4]

In Singapore, a large proportion of wholesale sales are to overseas buyers

Singapore-based (i.e., local) wholesalers perform transactions with both local and overseas buyers. Transactions between local wholesalers and local buyers are categorised as domestic wholesale trade, while those between local wholesalers and overseas buyers are categorised as foreign wholesale trade. Foreign wholesale trade activities account for the bulk of the revenue generated (91.0 per cent in 2021) in the wholesale trade sector (Exhibit 1).

Exhibit 1: Wholesale trade activities are categorised as domestic or foreign

Segment	Revenue Share (2021, Per Cent)	Description
Domestic Wholesale Trade	9.0	Refers to the sale of imported or locally manufactured goods to local buyers
Foreign Wholesale Trade	91.0	Refers to the sale of imported or locally manufactured goods to foreign buyers

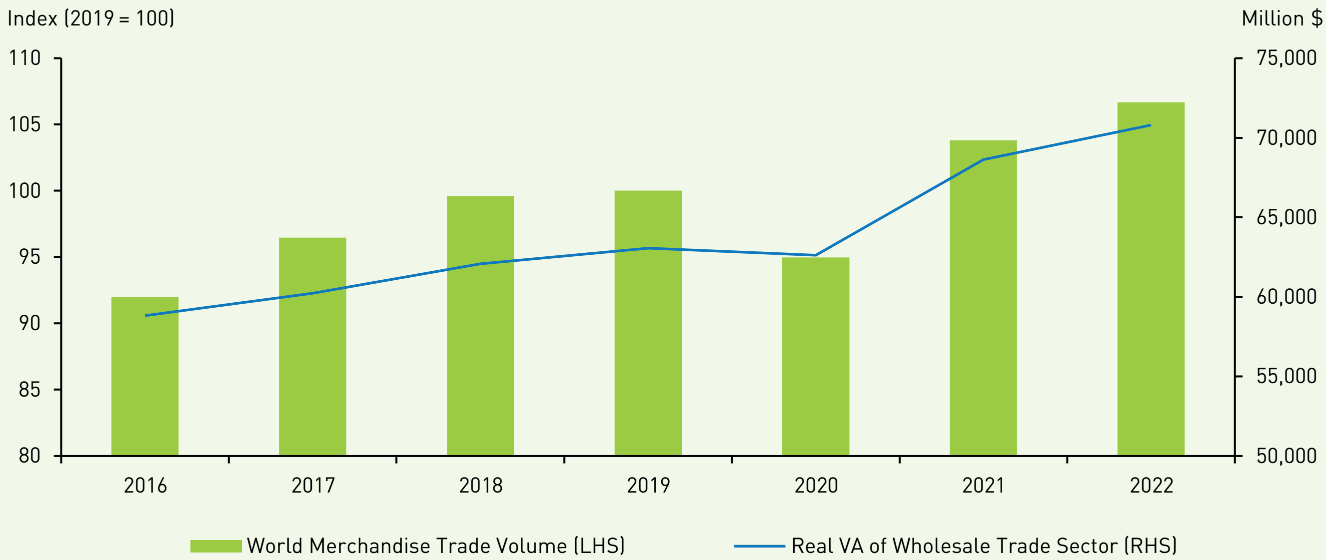
Source: Singapore Department of Statistics

The performance of Singapore's wholesale trade sector is highly dependent on the global macroeconomic environment

Given the dominance of foreign wholesale trade activities undertaken by firms in the wholesale trade sector in Singapore, the performance of the sector is highly dependent on the global macroeconomic environment. Mirroring the growth in world merchandise trade volume, the real VA of the wholesale trade sector has risen steadily over the years (Exhibit 2). Between 2016 and 2019, world merchandise trade volume and the real VA of the wholesale trade sector rose by 2.8 per cent per annum (p.a.) and 2.4 per cent p.a. respectively. While both world merchandise trade volume and the real VA of the wholesale trade sector took a hit in 2020 as a result of the COVID-19 pandemic, they posted strong rebounds of 6.0 per cent p.a. and 6.3 per cent p.a. respectively from 2020 to 2022 to exceed their pre-pandemic levels.

1 *The sector's nominal VA share is second only to the manufacturing sector (21.6 per cent of Singapore's nominal VA in 2022).*
2 *See Tee (2008) and Yeow and Tan (2011) for previous overviews of the wholesale trade sector.*
3 *Clients can include retailers, other wholesalers and industrial, commercial or institutional customers.*
4 *Akerman (2018) indicates that wholesalers are able to sell goods overseas at a lower cost than producers by spreading the fixed costs of exporting goods (e.g., establishing an international distribution network) across multiple goods, thus benefiting from economies of scope.*

Exhibit 2: World merchandise trade volume and the real VA of Singapore's wholesale trade sector have recovered to above pre-COVID levels



Source: World Trade Organisation, Singapore Department of Statistics

For a better understanding of the drivers of the wholesale trade sector in recent years, the next two sections analyse the performance of the sector by the types of buyers (i.e., foreign versus domestic wholesale trade) and the types of products traded.

Over the years, foreign wholesale sales volume has grown more robustly than domestic wholesale sales volume

Prior to the pandemic, the sales volume of foreign wholesale trade, as measured by the foreign wholesale trade index (WTI),[5] increased at a compounded annual growth rate (CAGR) of 1.3 per cent between 2016 and 2019, while that of domestic wholesale trade declined at a CAGR of 0.3 per cent over the same period (Exhibit 3). The key drivers of foreign wholesale sales volume over this period were growth in the sales of telecommunications & computers and petroleum & petroleum products, whereas domestic wholesale sales volume was weighed down by declines in the sales of electronic components.

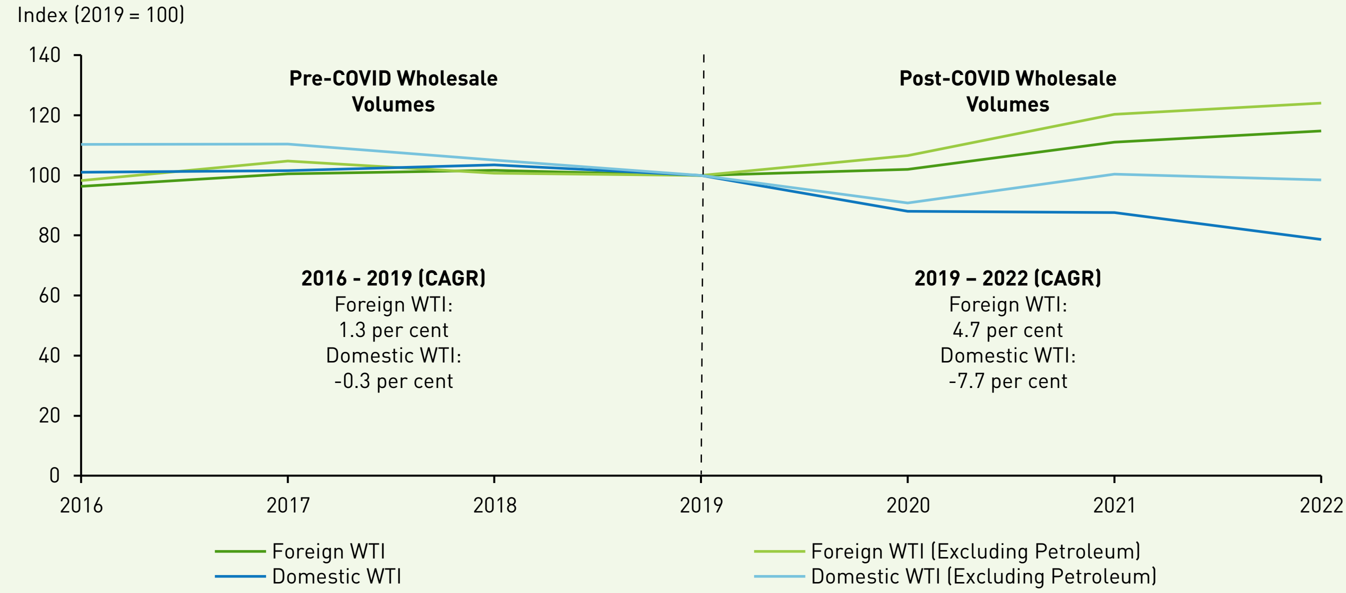
Over the subsequent pandemic and post-pandemic recovery period of 2019 to 2022, foreign wholesale sales volume expanded at a faster pace of 4.7 per cent p.a. on the back of robust growth in the foreign wholesale sales of electronic components and telecommunications & computers. This could in turn be attributed to a spike in global demand for PCs (e.g., desktops, laptops and high-performance workstations) as consumers worldwide spent more time working and learning from home as a result of social restriction measures. In particular, worldwide shipments of PCs surged by 31.3 per cent between 2019 and 2021, and even though shipments fell by 16.5 per cent in 2022, they remained well above pre-pandemic levels.[6]

On the other hand, domestic wholesale sales volume fell by 7.7 per cent p.a. between 2019 and 2022. Domestic wholesale sales volume was weighed down by a decline in the sales of petroleum & petroleum products as the reduced consumption of fuel by aircraft and private vehicles amidst travel restrictions during the pandemic led to a fall in domestic oil demand.

5 *The Department of Statistics (DOS) compiles the quarterly Wholesale Trade Index (WTI) to measure the short-term performance of the wholesale trade sector. The index consists of the Domestic WTI and Foreign WTI, and is based on data from DOS' Quarterly Survey of Services (QSS) and other administrative sources.*

6 *According to the International Data Corporation (IDC) Worldwide Quarterly Personal Computing Device Tracker, worldwide PC shipments reached 350.1 million units in 2021, the highest level of shipments recorded since 2012. Despite falling to 292.3 million units in 2022, worldwide PC shipments remained above the 266.7 million units posted in 2019.*

Exhibit 3: Between 2019 and 2022, the foreign wholesale trade index (WTI) rose at a quicker pace compared to the pre-pandemic period, while domestic WTI further contracted



Source: Singapore Department of Statistics

In terms of the types of products traded, the wholesaling of fuels & chemicals was the fastest growing segment prior to the pandemic...

Pre-pandemic, the wholesaling of fuels & chemicals (F&C) represented the fastest growing segment in the wholesale trade sector (Exhibit 4). Between 2016 and 2019, the real VA of the F&C segment grew at a CAGR of 7.5 per cent on account of the robust expansion of the wholesale sales of petroleum & petroleum products (including fuel oil, liquefied petroleum gases and lubricating oils).

Meanwhile, the real VA from the wholesale sales of machinery, equipment & supplies (MES) increased by 1.5 per cent p.a. over the same period, driven by growth in the wholesaling of electronic components (e.g., capacitors, semiconductor devices and microchips), as well as telecommunications equipment & computers (e.g., handphones and peripheral equipment, smart watches and tablets).

On the other hand, the others[7] segment contracted marginally by 0.1 per cent p.a. due to a decline in general wholesale trade.

...but the machinery, equipment & supplies segment became the fastest growing segment in more recent years

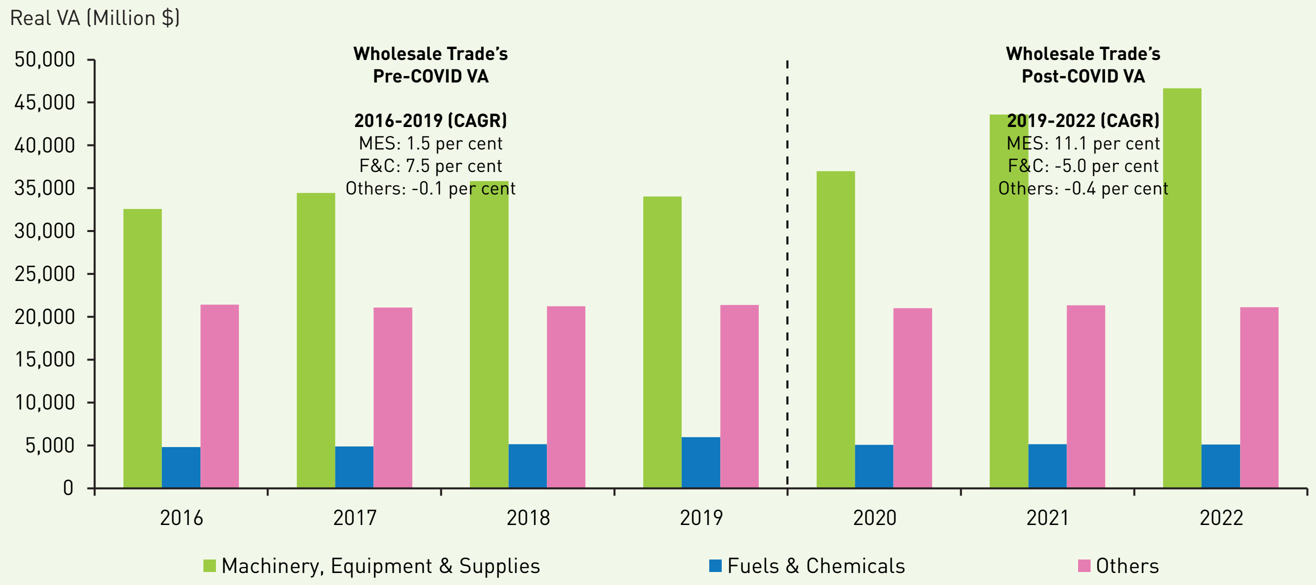
Over the more recent period of 2019 to 2022, the MES segment outperformed the F&C segment, with the real VA of the MES segment increasing at a CAGR of 11.1 per cent even as that of the F&C segment contracted by 5.0 per cent p.a.. At the same time, the others segment continued to decline by 0.4 per cent p.a. over this period.

The robust growth of the MES segment between 2019 and 2022 was driven by strong expansions in the wholesaling of electronic components (e.g., semiconductors) and telecommunications & computers on the back of sustained demand for automotive and consumer electronics, with the latter partly arising from more prevalent work-from-home practices during and after the pandemic. By contrast, the decline in the real VA of the F&C segment was driven by a contraction in the wholesale sales of petroleum & petroleum products due to a fall in jet fuel demand as international travel was badly hit by the pandemic.

7 *The others segment comprises a diverse range of products including metals, timber & construction materials, household equipment & furniture as well as food, beverages & tobacco, among others.*

By 2022, the MES segment's share of the nominal VA of the wholesale trade sector had risen to 49.7 per cent, from its 2019 share of 43.5 per cent. On the other hand, the F&C segment's share had fallen to 21.4 per cent, from 26.6 per cent, over the same period. The others segment accounted for the remaining 28.9 per cent of the sector's nominal VA in 2022.

Exhibit 4: While growth of the fuels & chemicals segment outpaced that of the machinery, equipment & supplies segment prior to the pandemic, the trend reversed in more recent years



Source: Singapore Department of Statistics

Looking ahead, global economic headwinds have dampened the outlook of the wholesale trade sector

With the slowdown in the global economy, the wholesale trade sector contracted in the first quarter of 2023 (-1.7 per cent year-on-year), the first quarterly decline since the onset of the COVID-19 pandemic in 2020. The contraction was due to a decline in wholesaling activity in the others segment on the back of a fall in the wholesale sales of metals, timber & construction materials, even as the performance of the MES segment remained lacklustre on account of the electronics downcycle. While the sector returned to growth in the second quarter (1.1 per cent year-on-year) due to expansions in the MES (specifically, the wholesale sales of telecommunications & computers) and F&C segments, the sector's near-term outlook remains weak given continued global economic headwinds.

Notably, the global economic outlook for the rest of the year remains tepid. Growth in the advanced economies such as the US and Eurozone is expected to weaken in the second half of the year as the cumulative effects of tighter monetary policy weigh on demand. Meanwhile, China's growth is projected to moderate in the second half as the post-pandemic recovery in its services activity slows in line with waning consumer confidence, even as its property sector remains weak and subdued external demand continues to weigh on its industrial activity. At the same time, the global electronics downturn is likely to be protracted, with a gradual recovery expected towards the end of the year at the earliest. Against this backdrop, the International Monetary Fund (IMF) has projected that global trade growth will moderate to 2.0 per cent in 2023, below the 2016 to 2019 average of 3.2 per cent.

Given the external economic headwinds, full-year growth in Singapore's wholesale trade sector is expected to moderate in 2023 from that in 2022 (3.2 per cent). Nonetheless, the longer-term outlook for the sector remains bright given that Singapore is poised to remain as a dynamic advanced manufacturing and global trade hub under our Manufacturing 2030[8] and Trade 2030[9] strategies.

8 *For example, under Manufacturing 2030, Singapore is aiming to grow a vibrant core of innovative Singapore global manufacturers that can deliver distinctive offerings, thereby enhancing the competitiveness of our local wholesalers in the supply chain.*

9 *For example, one of the strategies under Trade 2030 is to grow Singapore's trading volume and widen the types of trading activities that take place here, such as by attracting leading global traders to Singapore.*

Contributed by:

Ms Ngoh Jia Hui
Economist
Economics Division
Ministry of Trade and Industry

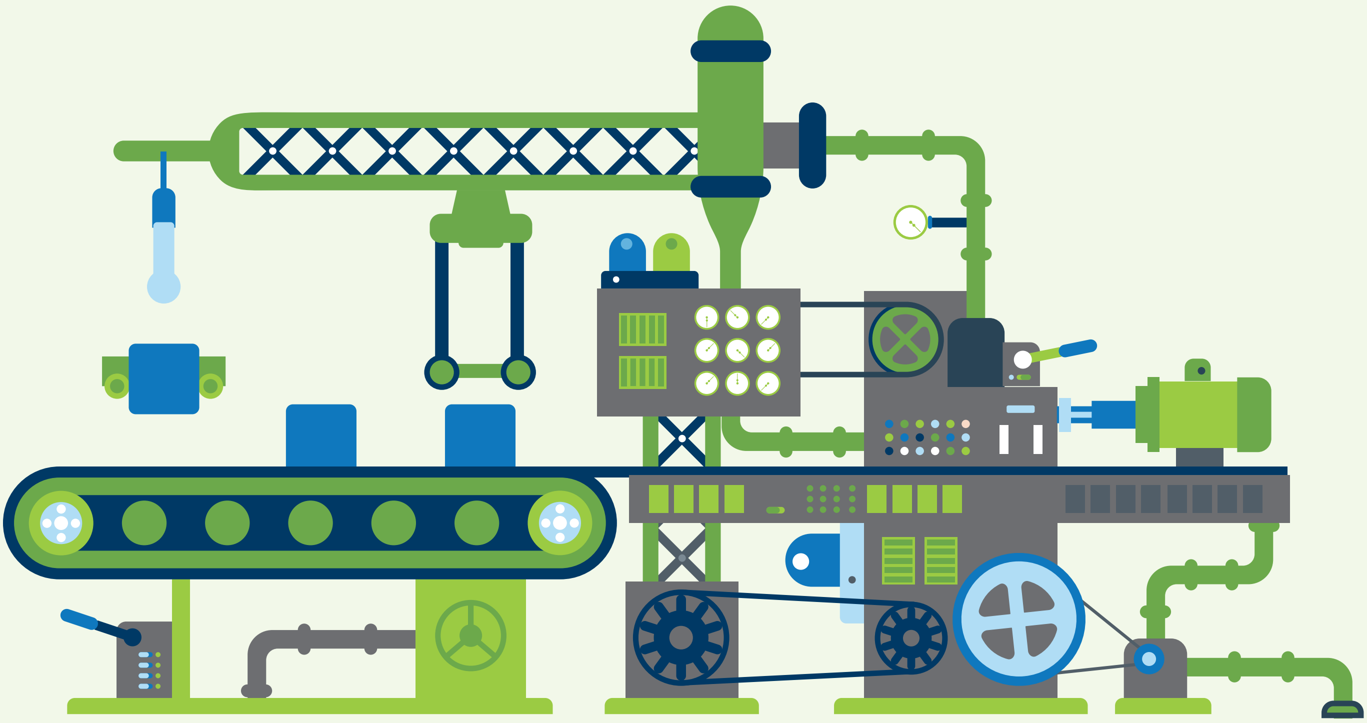
References

Anders, Akerman. 2018. "A theory on the role of wholesalers in international trade based on economies of scope", Canadian Journal of Economics, 51(1), pp. 156-185.

International Monetary Fund. 2023. World Economic Outlook Update.

Koon Hui, Tee. 2008. "Overview of Singapore's Wholesale Trade Sector", Economic Survey of Singapore First Quarter 2008, pp. 51-56.

Yeow, Kenneth, and Tan, Adrian. 2011. "Overview of Singapore's Wholesale Trade Sector", Economic Survey of Singapore First Quarter 2011, pp. 12-18.



CHAPTER
3

ECONOMIC OUTLOOK

Chapter 3

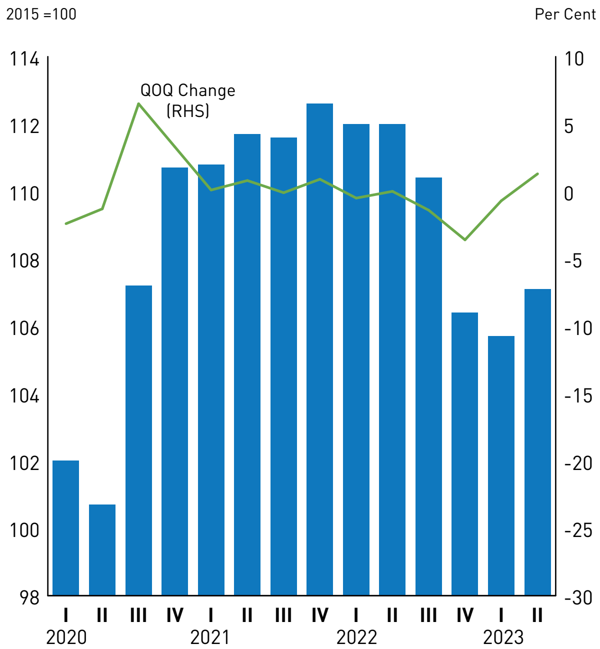
ECONOMIC OUTLOOK

LEADING INDICATORS

On a quarter-on-quarter basis, the composite leading index (CLI) rose by 1.3 per cent in the second quarter of 2023, a reversal from the 0.7 per cent decline in the previous quarter (Exhibit 3.1).

Of the nine components of the CLI, four components fell on a quarter-on-quarter basis, namely the US Purchasing Managers' Index, stock price, wholesale trade and domestic liquidity. By contrast, the stock of finished goods, non-oil retained imports, non-oil sea cargo handled and money supply increased, while new companies formed remained unchanged from the previous quarter.

Exhibit 3.1: Composite Leading Index Levels and Growth Rate



OUTLOOK FOR 2023

Since the Economic Survey of Singapore released in May, the performance of advanced economies such as the US and Eurozone has continued to be resilient, although their growth is expected to weaken in the second half of the year. In particular, US' GDP growth is projected to slow more significantly in the remaining quarters of the year as elevated interest rates and a cooling labour market weigh on personal consumption growth. Similarly, GDP growth in the Eurozone is forecast to remain subdued for the rest of the year due to sluggish external demand and the effects of tight financial conditions on domestic demand.

In Asia, China's GDP growth is expected to moderate in the second half of the year as the post-pandemic recovery in its services activity slows in tandem with deteriorating consumer confidence. Sustained weakness in its property sector, alongside subdued external demand, will also continue to weigh on its growth. Meanwhile, Southeast Asian economies such as Malaysia, Indonesia and Thailand are projected to remain resilient in the second half of the year on account of the continued recovery in domestic and tourism demand.

Overall, MTI's assessment is that Singapore's external demand outlook for the rest of the year remains weak. Apart from the expected slowdown in Singapore's key external demand markets, the global electronics downturn is also likely to be protracted, with a gradual recovery expected towards the end of the year at the earliest.

At the same time, downside risks in the global economy remain. First, more persistent-than-expected inflation in the advanced economies could induce tighter global financial conditions, which could then lead to a sharper retraction in global spending and exacerbate the ongoing manufacturing downturn. Second, escalations in the war in Ukraine and geopolitical tensions among major global powers could lead to renewed supply disruptions, dampen consumer and business confidence, as well as weigh on global trade.

Against this backdrop, the growth outlook for the manufacturing sector in Singapore remains weak for the rest of the year. In particular, manufacturing output is expected to be weighed down largely by output contractions in the electronics and precision engineering clusters amidst the global electronics downturn. Similarly, growth in the finance & insurance sector is likely to be subdued as a result of continued weakness in the external economic environment and restrictive financial conditions.

On the other hand, the growth outlook for aviation- and tourism-related sectors such as air transport and accommodation remains positive given the ongoing recovery in international air travel and inbound tourism. Meanwhile, consumer-facing sectors such as retail trade and food & beverage services are expected to continue to expand, supported by resilient labour market conditions and the recovery in inbound tourism.

Taking into account the performance of the Singapore economy in the first half of 2023,[1] as well as the latest global and domestic economic developments, MTI has narrowed the GDP growth forecast for 2023 to "**0.5 to 1.5 per cent**", from "0.5 to 2.5 per cent".

1 *In the first half of 2023, Singapore's GDP growth averaged 0.4 per cent on a year-on-year basis.*

FEATURE ARTICLE

MONITORING CORPORATE HEALTH IN SINGAPORE USING A MACHINE-LEARNING MODELLING APPROACH

MONITORING CORPORATE HEALTH IN SINGAPORE USING A MACHINE LEARNING MODELLING APPROACH

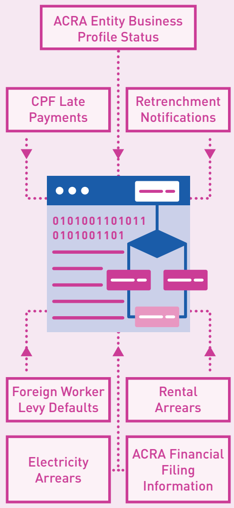
OVERVIEW

As part of macroeconomic surveillance, it is important to monitor the corporate health of firms in the economy on a timely basis. This feature article (i) describes the development of a Corporate Health Index (CHI) to monitor the health of firms in Singapore by applying predictive machine-learning approaches to high-frequency firm-level data; and (ii) examines recent trends of the corporate health for the overall economy and for selected sectors.

METHODOLOGY

Our study draws on datasets from five government agencies to construct our CHI model. Our main target variable is the proportion of firms in distress, which we use as a measure of corporate health for a particular sector or type of firms. In addition, we make use of several high-frequency, firm-level indicators that capture information on firms' cashflow situation as input variables. These indicators are: (i) CPF Late Payments, (ii) Retrenchment Notifications, (iii) FWL Defaults, (iv) JTC Rental Arrears and (v) Electricity Arrears. Another data series that we make use of as an input variable for our model is the annual financial filing information from ACRA records, which includes the firm's revenue, total assets, share capital, and various cashflows.

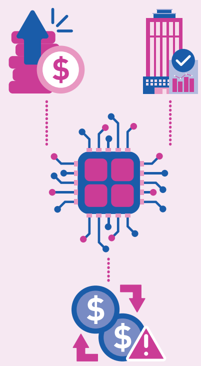
We bring together these various data sources and train our CHI model to extract the relationship between firms' entity status and their various indicators of financial health and abilities to meet their cashflow demands. Using our CHI model, we can calculate a distress score for each firm, which is the predicted probability of each firm in our dataset to be in distress within a three-month period. We then aggregate these individual firm-level distress scores, by taking a weighted mean (weighted by the employment size of each firm) across firms to derive the CHI in a particular sector.



FINDINGS

In terms of variable importance, total non-current assets, net profit after taxes, and total liabilities have the highest variable importance scores — this indicates that they carry the highest informational value for our ensemble model when they predict for the target variable. Among the high-frequency firm-level indicators, CPF Late Payments and Retrenchment Notifications have comparatively much higher variable importance scores than FWL Defaults, JTC Rental Arrears and Electricity Arrears.

Using our CHI model, we find that the overall CHI for June 2023 remains stable, suggesting corporate health is likely to remain stable in the near term. However, for firms in the food & beverage services, retail trade and wholesale trade sectors, corporate health could weaken slightly, reflecting the effect of higher business costs and weaker global demand.



EXECUTIVE SUMMARY

- In this study, we develop a Corporate Health Index (CHI) to monitor corporate health in Singapore on a more timely and forward-looking basis by applying predictive machine learning approaches on a range of firm-level indicators, including higher-frequency indicators that capture information on firms' ability to meet their cashflow obligations.
- We find that corporate health in Singapore is affected by macroeconomic developments, such as the tightening and loosening of pandemic-era restrictions, as well as global interest rate hikes. We also find that the corporate health of small- and medium-sized enterprises (SMEs) is systematically weaker than that of non-SMEs.
- Looking ahead, the CHI suggests that overall corporate health in Singapore is likely to remain stable in the near term. We will continue to monitor the CHI closely in the coming months given the prevailing economic headwinds.

INTRODUCTION

As part of macroeconomic surveillance, it is important to monitor corporate health[1] on a timely basis, as firms are the main drivers of output and employment in an economy. In Singapore, indicators such as non-performing loan ratios and firm cessation are regularly used to monitor corporate health. However, these indicators either come with a lag or are not granular enough to enable the economic surveillance of specific sectors or firm types.

To overcome these limitations, we develop a Corporate Health Index (CHI) to monitor corporate health in Singapore on a more timely and forward-looking basis by applying predictive machine learning approaches on firm-level indicators, including higher-frequency indicators that capture information on firms' ability to meet their cashflow obligations. We use the CHI to provide an assessment of corporate health at the overall economy and sectoral levels, as well as for specific firm types.

LITERATURE REVIEW

The surveillance of corporate health has traditionally relied on financial ratios or estimates from regression analysis. For example, Altman (1968)'s Z-score is widely regarded as an industry benchmark for predicting corporate financial distress (Liang et al., 2020). In recent years, many academics have found that predictions of firms in distress can be significantly improved with models that use more sophisticated machine learning techniques such as support vector machines (Barboza et al., 2017; Tsai et al., 2014), tree-based algorithms (Barboza et al., 2017; Olson et al., 2012; Sun et al., 2017) and neural networks (Tsai et al., 2014). Furthermore, ensemble methods, which combine the predictions of multiple models, have been shown to outperform single model classification techniques (Graczyk et al., 2010; Liang et al., 2018; Tsai, 2014).

DATA

Our CHI model uses indicators from firms' financial statements filed annually with the Accounting and Corporate Regulatory Authority (ACRA) and monthly data from various administrative sources that reflect firms' ability to meet their cashflow obligations [Exhibit 1].

Our main variable of interest is the proportion of firms in distress, which we use as a measure of corporate health for the overall economy or a particular sector or firm type. To construct the target variable (i.e., firms in distress), we tap on ACRA's data on firms' entity status which captures the official operational status of firms across time. We identify a firm as being in distress if it takes on an entity status that indicates that the firm may be facing operational

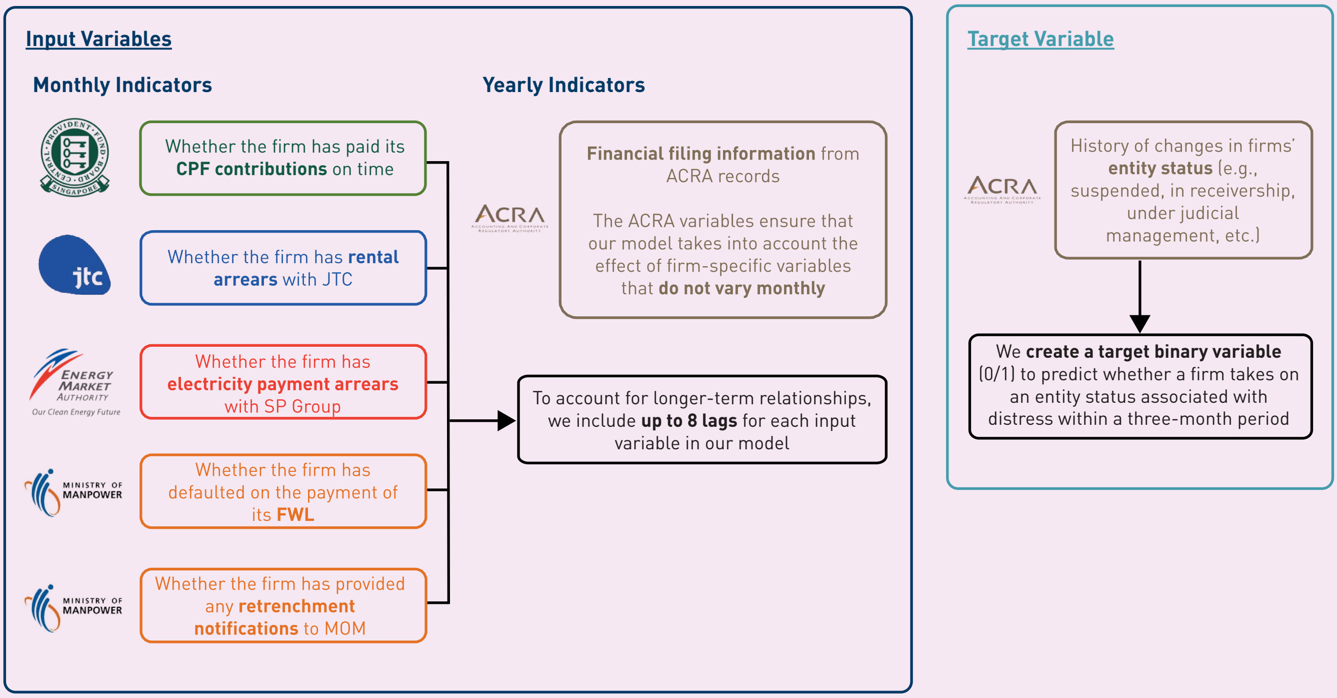
1 In this article, corporate health refers to the ability of firms to meet their cashflow obligations and remain operational. If firms show signs of cashflow strains, they are more likely to have poorer corporate health.

troubles or nearing cessation (e.g., "suspended", "in receivership" or "under judicial management").[2] Our objective is to predict for each firm in our dataset whether the firm will take on an entity status associated with distress within a three-month period. With these predictions for all the firms in our dataset, we can calculate the proportion of firms likely to be in distress, thereby providing a forward-looking measure of corporate health in the economy at various levels of aggregation (e.g., overall economy, sectors or firm types).

For the input variables into the model, we make use of two sets of data. The first set comprises high-frequency, firm-level indicators that capture information on firms' cashflow situation. These indicators are: (i) "CPF Late Payments" which shows whether a firm has paid its Central Provident Fund (CPF) contributions for its employees on time; (ii) "Retrenchment Notifications" which shows whether a firm has provided any retrenchment notifications to the Ministry of Manpower (MOM); (iii) "FWL Defaults" which shows whether a firm has defaulted on the payment of its Foreign Worker Levy (FWL); (iv) "JTC Rental Arrears" which shows whether a firm has rental arrears with the JTC Corporation; and (v) "Electricity Arrears" which shows whether a firm has electricity payment arrears with the Singapore Power (SP) Group.

The second set of input variables comprises the annual financial information that firms file with ACRA, including the firm's revenue, total assets, share capital and various cashflow ratios. These variables are incorporated into our model to account for firm-specific information which changes less frequently but could still affect the probability of firms falling into distress.

Exhibit 1: Types of Data Used in the CHI Model



MODEL DEVELOPMENT

We develop and deploy our CHI model using a four-stage process [Exhibit 2]. First, we assemble the input variables and carry out two standard pre-processing steps before ingesting them into our model. The first pre-processing step is to impute missing "0"s in our input data, as the coverage of firms is incomplete across the different datasets. For example, a firm could show up in the CPF Late Payments data, but not in the JTC Rental Arrears data for that month. To circumvent this issue, we impute missing variables with a "0" for numeric variables, and a "missing" category for categorical variables. For each input variable, we also generate a corresponding "missingness" variable to indicate whether the input variable was missing in our data before imputation. This first pre-processing step is important as it maximises the universe of firms and information from which our model can learn about the relationship between the input variables and the target variable.

2 *The list of entity statuses in our dataset is as follows: "Ceased registration", "Cancelled", "Terminated", "Struck off", "Dissolved", "Gazetted", "Suspended", "Under judicial management", "In liquidation", "In receivership", "Amalgamated" and "Live". All these statuses, except for "Amalgamated" and "Live", are taken as statuses of distress in our model.*

The second pre-processing step is to carry out SMOTE, or Synthetic Minority Oversampling Technique, on the target variable (i.e., firms in distress).[3] As firms in distress typically form the minority of all firms in an economy, our model may not have sufficient information to learn about the relationship between the input variables and the target variable. SMOTE rectifies this issue by generating additional synthetic data points on firms in distress, thereby increasing the pool of firms in distress from which the model can learn. This in turn improves the ability of the model to predict the occurrence of such firms.

Second, with the pre-processed data, we train four machine learning models (i.e., Random Forest, XGBoost, Adaptive Boosting, Light Gradient Boosting) to extract the relationship between the input variables and the target variable. Such machine learning models tend to perform better than traditional models[4] as they do not assume any restrictions in the functional form of the relationship between the input and target variables, and are thus better able to capture non-linearities in the relationship. We also train an ensemble model which mean-pools[5] across the four models. This ensemble model constitutes our CHI model.

Third, using our CHI model, we calculate a distress score for each firm in our dataset. The distress score is the predicted probability of the firm being in distress within a three-month period. We then aggregate these individual firm-level distress scores, by taking a weighted mean (weighted by the employment size of each firm) across firms to derive the proportion of firms in distress in the overall economy or for a particular sector. Besides a sectoral perspective, we can also compute the CHI for specific types of firms, such as small- and medium-sized enterprises (SMEs).

Exhibit 2: CHI Model Development and Deployment

1. Assemble our input data

- Bring together high-frequency firm-level indicators
- Supplement with ACRA financial filing information
- Generate additional lags and carry out pre-processing (impute missing "0"s, SMOTE)

2. Train our machine learning models

- Tune machine learning models on our input data
- Train tuned models on a randomised train-test split of firms
- Generate an ensemble model by mean-pooling across our trained models

3. Calculate a distress score for each firm

- For each firm in each month, calculate a distress score using our ensemble model
- This is the predicted probability of the firm being in distress within a three-month period

4. Calculate overall economy & sectoral CHIs

- For each month, calculate the average of the distress scores across firms in the overall economy or a sector, weighted by the number of employees in each firm
- CHI can also be computed for specific types of firms of interest (e.g., SMEs)

MODEL RESULTS

The results of our CHI model correlate well with the actual percentage of firms in distress based on their entity status in ACRA's data computed within a three-month forward-rolling window[6] [Exhibit 3]. In particular, the Pearson correlation coefficient between the CHI and actual percentage of firms in distress within a three-month forward-rolling window is moderately high at 0.57, indicating that our model is able to capture the broad trends of distressed firms over time. Importantly too, the movements in the CHI over time match our intuition as to how macroeconomic developments would affect the health of firms in the Singapore economy (e.g., the CHI rose when pandemic-related restrictions were imposed and fell when the restrictions were relaxed).

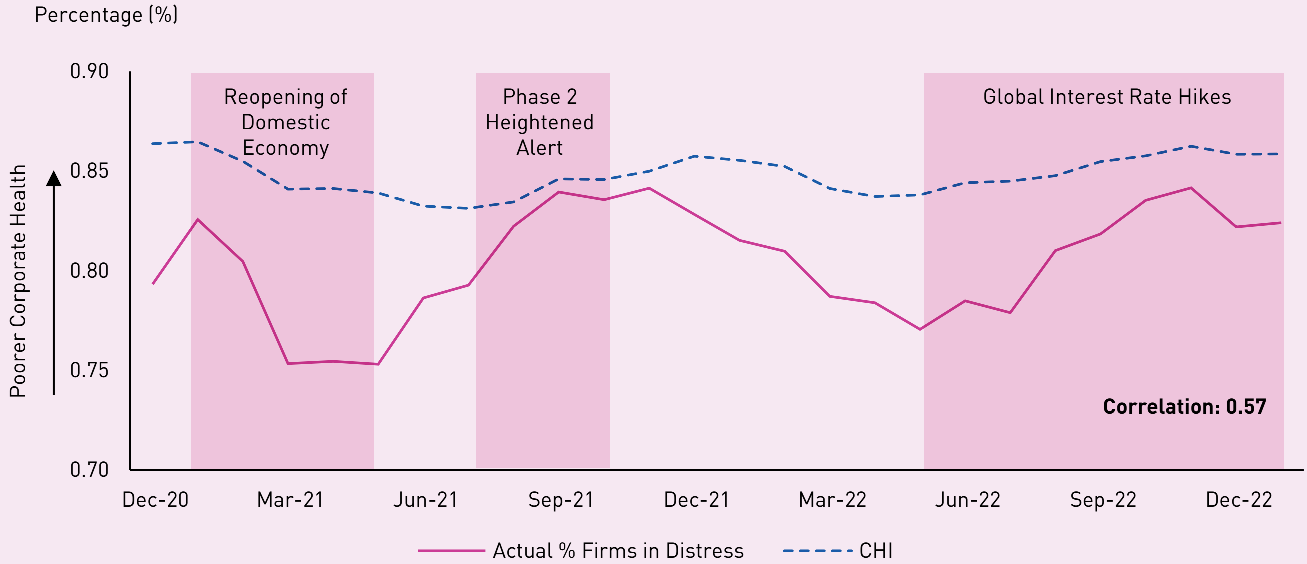
3 *For technical details on the SMOTE methodology, refer to Chawla et al. (2002).*

4 *Examples of traditional models are Linear Probability Models, and Logistic and Probit Regressions.*

5 *We use the F1 scores of the four individual constituent models as weights when mean-pooling for the ensemble model. The F1 score is a standard measure of a model's performance in machine learning.*

6 *As the CHI predicts the proportion of firms in distress within a three-month period, using a similar three-month forward-rolling window to compute the actual proportion of firms in distress (using ACRA data) will allow the latter to 'match' the time period captured by the CHI. For example, doing so allows us to compare the CHI reading for January 2023 (i.e., the predicted proportion of firms in distress from January 2023 to March 2023) with the actual proportion of firms in distress from January 2023 to March 2023 (i.e., a three-month forward-rolling window from January 2023).*

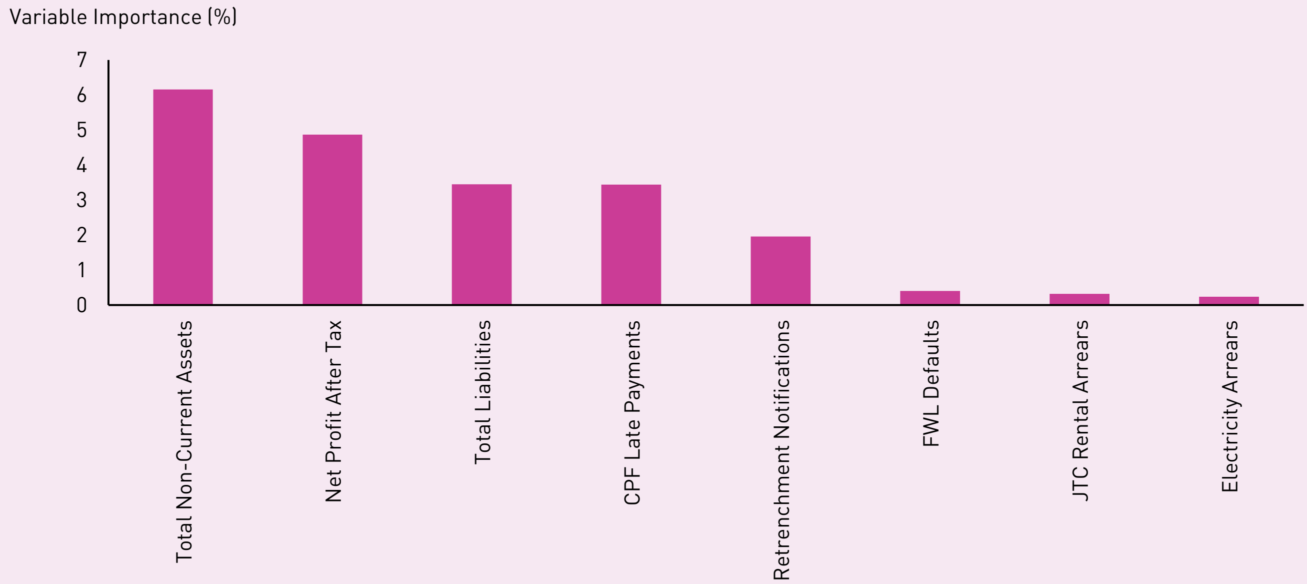
Exhibit 3: Comparison of Actual Percentage of Firms in Distress* and CHI^, Overall Economy



Notes: * The actual percentage of firms in distress is defined as the share of firms with an entity status that is associated with distress (see footnote 2) in ACRA's data, and is calculated based on a three-month forward-rolling window. For example, the data point for January 2023 shows the actual percentage of firms in distress in the months of January, February and March 2023.
^ The CHI shown for each month represents the predicted probability of firms being in distress within a three-month period. For example, the CHI for January 2023 represents the predicted probability of firms being in distress in the months of January, February and March 2023.

In terms of variable importance[7], total non-current assets, net profit after taxes and total liabilities have the highest variable importance scores. In other words, these variables have been found to carry the most informational value for our ensemble model in predicting the distress status of firms. Among the high-frequency firm-level indicators, CPF Late Payments and Retrenchment Notifications have higher variable importance scores than FWL Defaults, JTC Rental Arrears and Electricity Arrears [Exhibit 4]. This suggests that labour costs are a more significant component of business costs for firms in most sectors of the economy, relative to other costs such as utilities and rent.[8] As such, firms that are unable to meet their obligations to their workers are more likely to be in distress.

Exhibit 4: Variable Importance of Selected Variables for the Ensemble Model



7 *Variable importance scores measure the salience of each input variable to the model when predicting the target variable for each observation. For technical details on the calculation of variable importance, refer to Zhu et al. (2015).*
8 *For more information on business cost conditions in Singapore, see Tan (2022).*

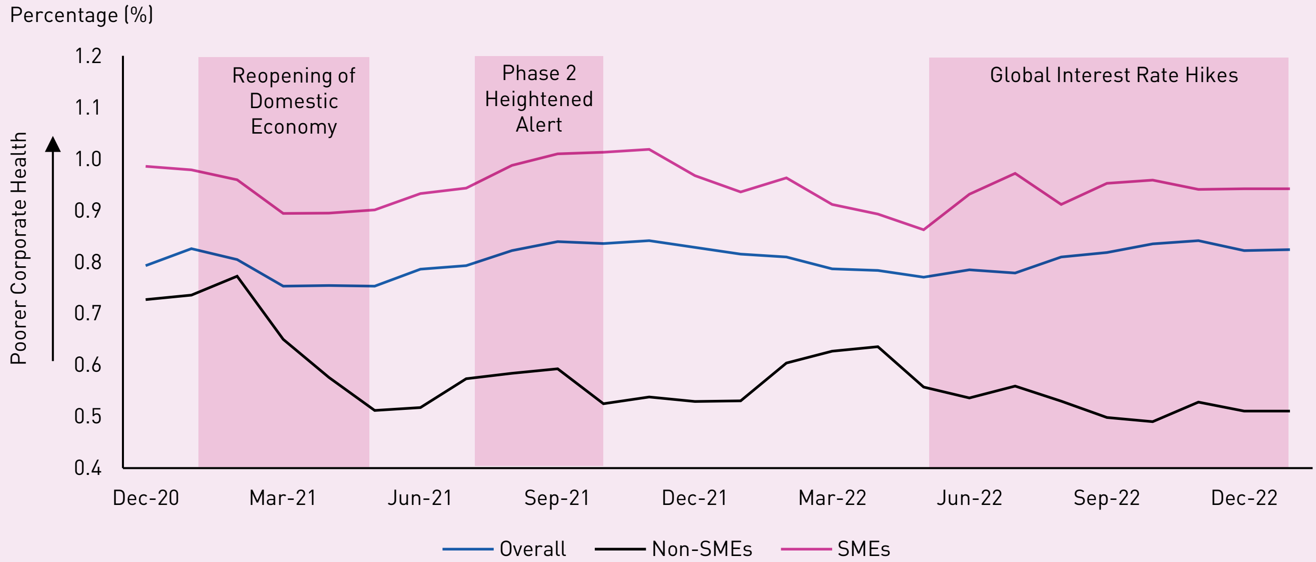
TRENDS IN CORPORATE HEALTH AND CHI

Based on ACRA's data, we observe that corporate health in Singapore, as measured by the proportion of firms in distress within a three-month forward-rolling window, is affected by macroeconomic developments [Exhibit 5].

For example, the proportion of firms in distress fell from 0.83% at the start of 2021 to 0.75% in March 2021, in line with the lifting of social restrictions and reopening of the domestic economy in Phase 3 of the COVID pandemic era. However, the institution of Phase 2 Heightened Alert measures in July 2021 led to a steady increase in the proportion of firms in distress, eventually reaching a peak of 0.84% in November 2021, one month after the transition to Stabilisation Phase. As the economy subsequently transitioned to a more relaxed social restriction profile, the proportion of firms in distress fell to 0.77% by May 2022. Thereafter, global events such as the hike in global interest rates led by the US Federal Reserve resulted in a reversal of trends, with the proportion of firms in distress rising to reach 0.82% in January 2023.

Breaking down by firm types, we observe that the proportion of firms in distress among SMEs is systematically higher than that among non-SMEs. The hike in global interest rates in the second half of 2022 also had a greater impact on SMEs than on non-SMEs, although its impact appeared to have tapered off in early 2023.

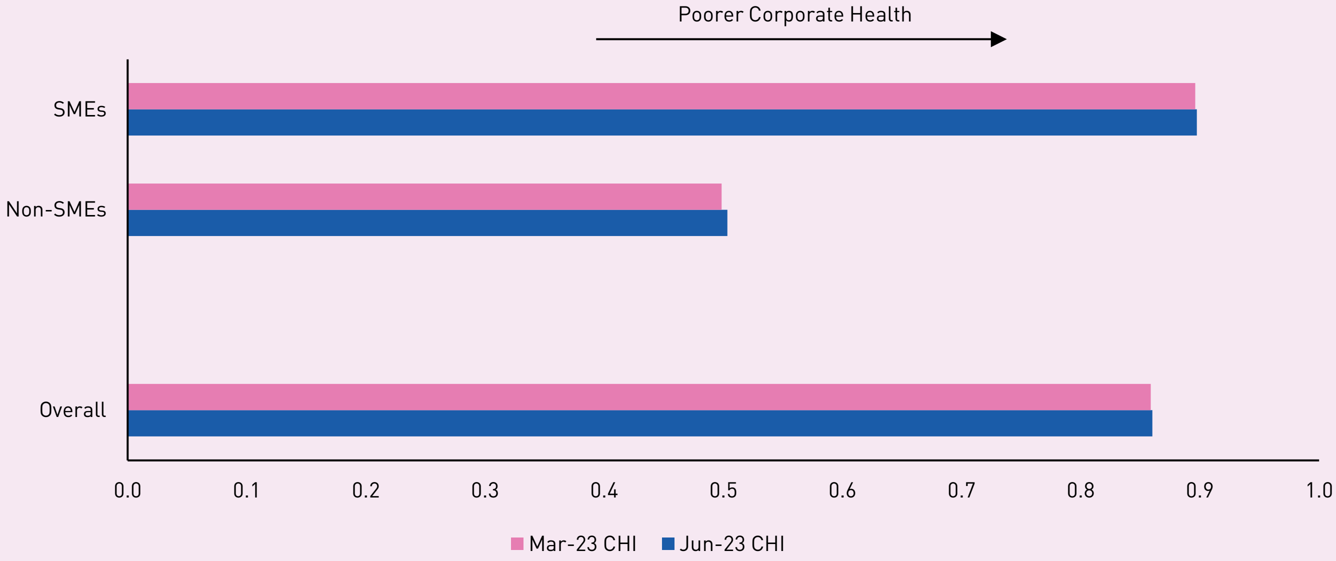
Exhibit 5: Percentage of Firms in Distress in the Overall Economy and by Firm Size, Actualised Data



Note: The actual percentage of firms in distress (based on entity status information from ACRA) is computed within a three-month forward-rolling window. For example, the data point for January 2023 shows the actual percentage of firms in distress in the months of January to March 2023.

Leveraging on the CHI model to obtain a forward-looking assessment of corporate health in Singapore, we observe that the latest reading of the CHI for the overall economy in June 2023 (i.e., for the three-month period of June to August 2023) remains stable, suggesting that overall corporate health is likely to be stable in the near term [Exhibit 6]. Similar to the overall economy, the CHI readings for SMEs and non-SMEs in June 2023 also suggest that their corporate health is likely to remain resilient in the near term.

Exhibit 6: Recent Trends in the CHI by Firm Size

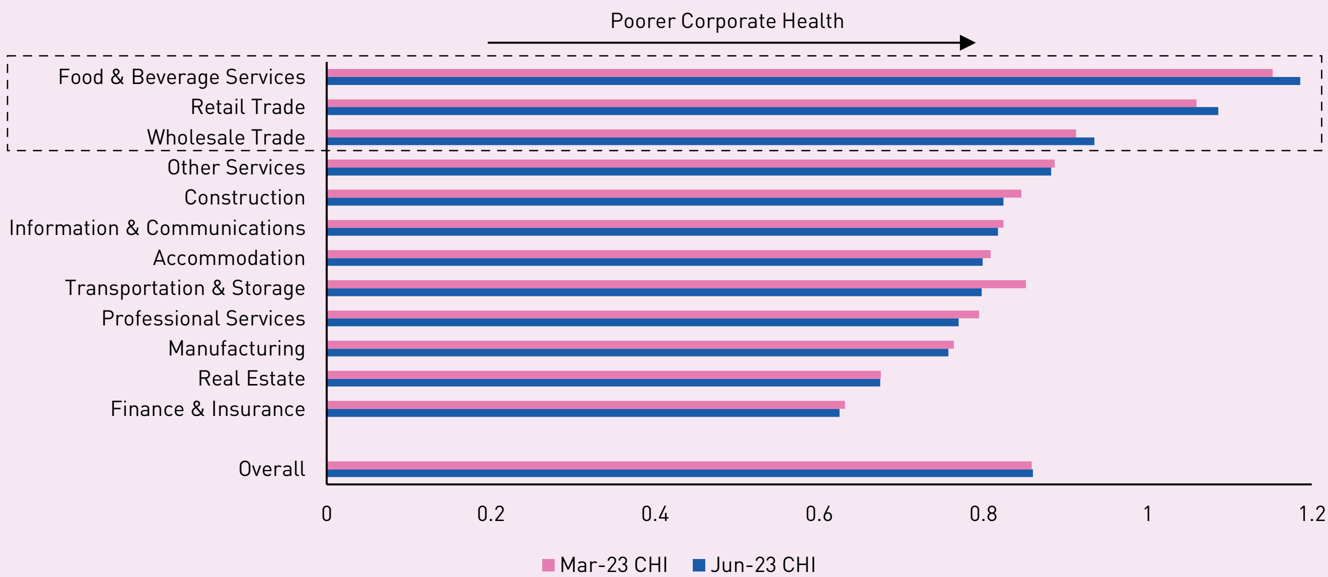


Note: TThe CHI shown for each month represents the predicted probability of firms being in distress within a three-month period. For example, the CHI for June 2023 represents the predicted probability of firms being in distress in the months of June, July and August 2023.

Breaking down by sectors, we find that the latest June 2023 CHI readings for most sectors have either remained similar or are lower than the readings in March 2023 [Exhibit 7]. Among the domestically-oriented sectors, the only exceptions are the food & beverage services and retail trade sectors. Notably, their respective June 2023 CHI readings ticked up to 1.2% and 1.1% from their March 2023 CHI readings, suggesting that corporate health in these sectors could weaken slightly in the near term. This in turn may reflect the effect of higher business costs on SMEs in the sectors. Nonetheless, the corporate health situation in these sectors is likely to be better as compared to the years before the COVID-19 pandemic, when the actual proportion of firms in distress in the food & beverage services and retail trade sectors averaged 1.6% and 1.5% respectively in 2015-2019.[9]

Among the outward-oriented sectors, there was a slight increase in the June 2023 CHI reading for the wholesale trade sector to 0.9% compared to its reading in March 2023. While this likely reflects the impact of external headwinds faced by firms in this sector arising from weak global demand, the June 2023 CHI reading remained lower than the actual proportion of firms in distress in the wholesale trade sector in 2015-2019, which averaged 1.3%.[9]

Exhibit 7: Recent Trends in the CHI by Sectors



Note: The CHI shown for each month represents the predicted probability of firms being in distress within a three-month period. For example, the CHI for June 2023 represents the predicted probability of firms being in distress in the months of June, July and August 2023.

9 *The actual proportion of firms in distress for each sector over the period of 2015-2019 is computed as follows. First, for each month across the years of 2015 to 2019, compute the actual proportion of firms in distress in the sector over a three-month forward-rolling window. Second, average the computed proportions over all the months in the five-year period of 2015-2019.*

CONCLUSION

In this study, we have constructed a model to measure corporate health using predictive machine learning techniques (i.e., the CHI model), to facilitate the timely surveillance of corporate health at the overall economy level, as well as by sectors and firm types. Indicators that provide high informational value include ACRA financial variables such as total non-current assets, net profit after tax and total liabilities, as well as high-frequency firm-level indicators such as CPF Late Payments and Retrenchment Notifications.

Looking ahead, our CHI model suggests that overall corporate health in Singapore is likely to remain stable in the near term. While the risk of distress has edged up for firms in selected sectors such as food & beverage services and wholesale trade, possibly due to higher business costs and weak global demand respectively, their latest CHI readings remain low compared to the proportion of firms in distress in the years before the COVID-19 pandemic COVID period. We will continue to monitor the trends in CHI closely in the coming months given the prevailing economic headwinds.

Contributed by:

Mr Ong Chong An
Senior Economist
Economics Division
Ministry of Trade and Industry

Mr Rafi Kamsani
Economist
Economics Division
Ministry of Trade and Industry

REFERENCES

Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The journal of finance 23 (4)*, 589 - 609.

Barboza, F., Kimura, H., & Altman, E. (2017). Machine learning models and bankruptcy prediction.*Expert Systems with Applications 83* , 405 - 417.

Chawla, N. V., Bowyer, K. W., Hall, L. O., Kegelmeyer, W. P. (2002). SMOTE: Synthetic Minority Over-sampling Technique. *Journal of Artificial Intelligence Research*, 16, 321-357.

Graczyk, M., Lasota , T., Trawiński , B., & Trawiński , K. (2010). Comparison of bagging, boosting and stacking ensembles applied to real estate appraisal. *In Intelligent Information and Database Systems: Second International Conference, ACIIDS*, Hue City, Vietnam, March 24 26, 2010. Proceedings, Part II 2 (pp. 340 - 350). Springer Berlin Heidelberg.

Liang, D., Tsai, C. F., Dai, A. J., & Eberle, W. (2018). A novel classifier ensemble approach for financial distress prediction. *Knowledge and Information Systems 54* , 437 - 462.

Liang, D., Tsai, C. F., Lu, H. Y. R., & Chang, L. S. (2020). Combining corporate governance indicators with stacking ensembles for financial distress prediction. *Journal of Business Research 120* , 137 - 146.

Olson, D. L., Delen , D., & Meng, Y. (2012). Comparative analysis of data mining methods for bankruptcy *Decision Support Systems 52 (2)*, 464 - 473.

Sun, J., Fujita, H., Chen, P., & Li, H. (2017). Dynamic financial distress prediction with concept drift based on time weighting combined with Adaboost support vector machine ensemble. *Knowledge Based Systems 120* , 4 - 14.

Tan, Y. L. (2022). Business Cost Conditions in Singapore's Manufacturing and Services Sectors. *Economic Survey of Singapore 2022*, 27 - 34.

Tsai, C. F., Hsu, Y. F., & Yen, D. C. (2014). A comparative study of classifier ensembles for bankruptcy prediction. *Applied Soft Computing 24* , 977 - 984.

Tsai, C. F. (2014). Combining cluster analysis with classifier ensembles to predict financial distress. *Information Fusion 16* , 46 - 58.

Zhu, R., Zeng, D., Kosorok, M. R. (2015). Reinforcement Learning Trees, *Journal of the American Statistical Association*. 110 (512), 1770-1784.

MINISTRY OF TRADE AND INDUSTRY
100 High Street, #09-01 The Treasury
Singapore 179434

ISSN 2382-6541