ECONOMIC SURVEY OF SINGAPORE

Second Quarter 2021

MTI MINISTRY OF TRADE AND INDUSTRY SINGAPORE

August 2021

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

	1Q21	2Q21
Real GDP (Year-on-Year-Growth)	+1.5%	+14.7%
GDP at Current Market Price	$125.9 billion	$127.1 billion

PRICES

	1Q21	2Q21
Consumer Price Index — All Items (Year-on-Year Growth)	+0.8%	+2.3%
Domestic Supply Price Index (Year-on-Year Growth)	+1.3%	+17.5%

LABOUR MARKET

	1Q21	2Q21
Change in Employment (Quarter-on-Quarter)	+14.0 thousand	-19.3 thousand
Overall Unemployment Rate	2.9%	2.7%
Value-Added per Actual Hour Worked (Year-on-Year Growth)	+7.3%	+1.7%

COSTS

	1Q21	2Q21
Unit Labour Cost of Overall Economy (Year-on-Year Growth)	-6.8%	+18.2%
Unit Business Cost of Manufacturing (Year-on-Year Growth)	-10.8%	-2.6%
Unit Labour Cost of Manufacturing (Year-on-Year Growth)	-19.2%	+21.1%

MERCHANDISE TRADE

	1Q21	2Q21
Merchandise Exports	$143,040 million	$147,622 million
	+6.9% Year-on-Year Growth	+26.1% Year-on-Year Growth
Merchandise Imports	$124,345 million	$131,806 million
	+2.7% Year-on-Year Growth	+28.6% Year-on-Year Growth

SERVICES TRADE

	1Q21	2Q21
Services Exports	$64,305 million	$65,550 million
	-7.4% Year-on-Year Growth	+10.3% Year-on-Year Growth
Services Imports	$59,159 million	$59,013 million
	-12.3% Year-on-Year Growth	+8.2% Year-on-Year Growth

CHAPTER

01

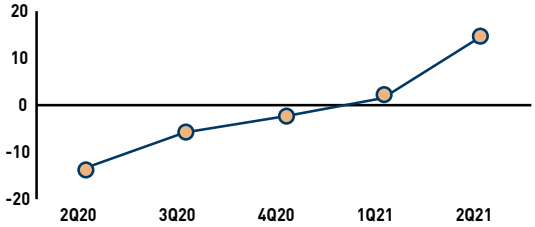
THE SINGAPORE ECONOMY

CHAPTER 1
THE SINGAPORE ECONOMY

ECONOMIC PERFORMANCE

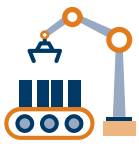
Real GDP grew by
14.7% in 2Q21

Quarterly Growth (Year-on-Year)



Main Drivers of Growth in 2Q21

Manufacturing



3.7%-point
contribution

Other Services Industries

1.6%-point
contribution

LABOUR MARKET

Resident Unemployment Rate

3.7%
in 2Q21

Employment (Q-O-Q Change)

-19,300
employed

Sectors with the Highest Employment Growth in 2Q21

+3,500
employed

Information & Communications

+1,600
employed

Professional Services

+100
employed

Finance & Insurance

PRODUCTIVITY

Value-Added per Actual Hour Worked increased by
1.7% in 2Q21

Sectors with the Highest Growth in Value-Added per Actual Hour Worked in 2Q21

25.9%

Real Estate

21.2%

Accommodation

COSTS

Overall Unit Labour Cost increased by
18.2% in 2Q21

Within the Manufacturing Sector

-2.6%

Unit Business Cost

21.1%

Unit Labour Cost

INTERNATIONAL TRADE

Total Merchandise Exports increased by
26.1% in 2Q21

85.6%

Oil Domestic Exports

26.4%

Re-Exports

10.1%

Non-Oil Domestic Exports

PRICES

The Consumer Price Index (CPI) rose by
2.3% in 2Q21

Categories with Price Increases

10.6%

Transport

1.4%

Household Durables & Services

1.1%

Education

Total Services Exports grew by
10.3% in 2Q21

Services Exports Increase was led by...

5.0%-pt

Other Business Services

1.8%-pt

Transport Services

1.4%-pt

Financial Services

OVERVIEW

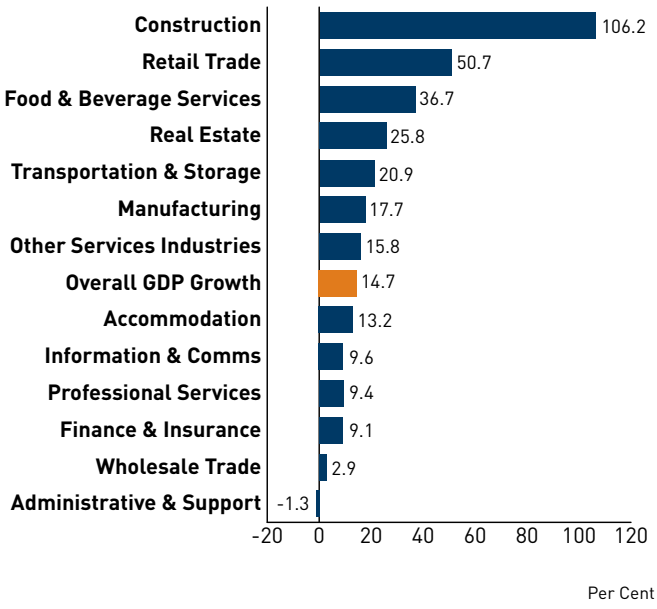
In the second quarter of 2021,

- The Singapore economy grew by 14.7 per cent on a year-on-year basis. The sectors that contributed the most to GDP growth were manufacturing, other services and construction.
- The seasonally-adjusted overall, resident and citizen unemployment rates declined in June 2021 as compared to March 2021, marking the third consecutive quarter of decline. On the other hand, the number of retrenchments rose slightly.
- Total employment fell by 19,300 on a quarter-on-quarter basis, a reversal from the growth registered in the previous quarter. Excluding Migrant Domestic Workers (MDWs), total employment contracted by 15,700, as a continued decline in non-resident employment outweighed a modest increase in resident employment.
- The Consumer Price Index-All Items (CPI-All Items) rose by 2.3 per cent on a year-on-year basis, faster than the 0.8 per cent increase in the previous quarter.

OVERALL PERFORMANCE

The Singapore economy expanded by 14.7 per cent on a year-on-year basis in the second quarter of 2021, faster than the 1.5 per cent growth in the preceding quarter (Exhibit 1.1). On a quarter-on-quarter seasonally-adjusted basis, the economy contracted by 1.8 per cent, a reversal from the 3.3 per cent growth in the previous quarter.

Exhibit 1.1: GDP and Sectoral Growth Rates in 2Q 2021



The strong year-on-year growth in the second quarter was largely due to the low base in the same period last year when GDP fell by 13.3 per cent because of the Circuit Breaker (CB) measures implemented from 7 April to 1 June 2020, as well as the sharp fall in external demand amidst the COVID-19 pandemic. However, when compared to its pre-pandemic level in the corresponding quarter of 2019, GDP remained around 0.6 per cent lower in the second quarter of 2021.

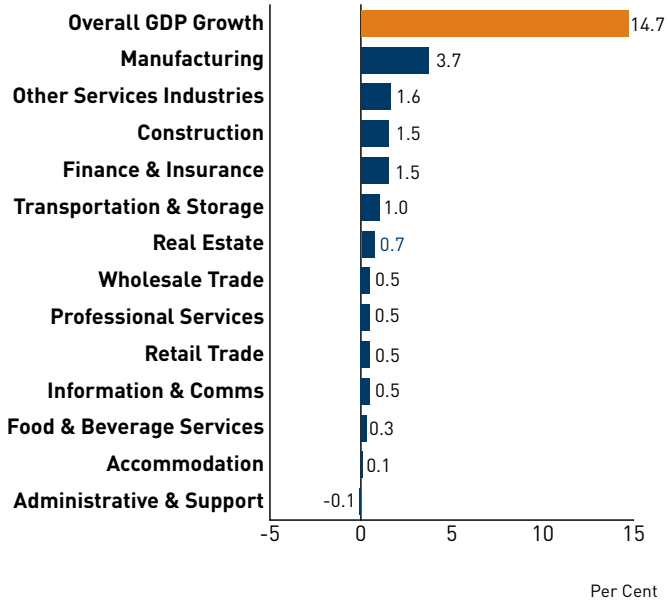
By sectors, the manufacturing sector expanded by 18 per cent year-on-year in the second quarter, extending the 11 per cent growth in the previous quarter. Growth was supported by output expansions in all manufacturing clusters, with the transport engineering (30 per cent) and precision engineering (24 per cent) clusters recording the largest gains.

The services producing industries posted growth of 10 per cent year-on-year in the second quarter, a reversal from the 0.3 per cent contraction recorded in the preceding quarter. All services sectors expanded during the quarter, except for the administrative & support services sector, which contracted by 1.3 per cent.

The construction sector grew by 106 per cent year-on-year in the second quarter, a sharp turnaround from the 23 per cent contraction in the previous quarter, as both public and private sector construction works expanded. The strong growth was due to low base effects as most domestic construction activities were suspended during the CB period last year.

The top three contributors to GDP growth in the second quarter were the manufacturing, other services and construction sectors (Exhibit 1.2).

Exhibit 1.2: Percentage-Point Contribution to Growth in Real GDP in 2Q 2021 (By Industry)



SOURCES OF GROWTH

Total demand increased by 16 per cent year-on-year in the second quarter of 2021, rebounding from the 2.2 per cent decline in the previous quarter (Exhibit 1.3). The strong growth was supported by increases in both external and domestic demand from the low base in the second quarter of last year. Specifically, in the second quarter of last year, key external economies had imposed public health measures that curtailed economic activity in order to contain the spread of COVID-19, which had in turn affected Singapore's external demand. Domestically, the implementation of the CB measures from 7 April to 1 June 2020 adversely affected domestic demand, especially private consumption.

External demand grew by 14 per cent year-on-year, a turnaround from the 1.4 per cent decline in the previous quarter. Similarly, domestic demand increased by 20 per cent year-on-year, reversing the 4.4 per cent contraction in the previous quarter. Both consumption expenditure and gross fixed capital formation (GFCF) recorded notable gains, thereby supporting domestic demand during the quarter.

Within domestic demand, consumption expenditure grew by 17 per cent year-on-year, a reversal from the 3.8 per cent decline in the preceding quarter. This was largely due to a 23 per cent increase in private consumption expenditure, which outpaced a 1.8 per cent increase in public consumption expenditure.

Exhibit 1.3: Changes in Total Demand*

	2020			2021	
	II	III	IV	I	II
Total Demand	-15.3	-7.1	-4.5	-2.2	**15.9**
External Demand	-12.4	-5.0	-3.5	-1.4	**14.4**
Total Domestic Demand	-22.5	-12.5	-7.0	-4.4	**20.4**
Consumption Expenditure	-19.5	-6.7	-6.7	-3.8	**17.0**
Public	19.8	15.8	9.6	6.3	**1.8**
Private	-29.4	-13.0	-11.3	-7.5	**23.5**
Gross Fixed Capital Formation	-27.9	-23.0	-4.7	-5.3	**30.8**
Changes in Inventories	-0.4	-0.3	-0.8	-0.1	**-0.4**

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

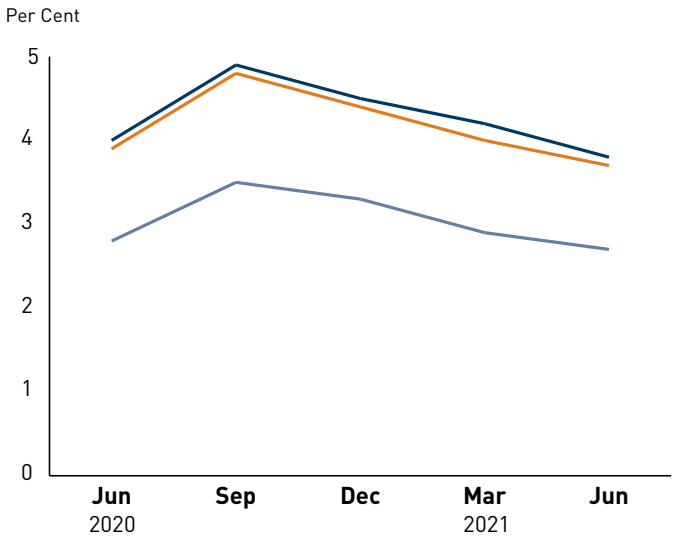
Meanwhile, GFCF expanded by 31 per cent year-on-year, a turnaround from the 5.3 per cent decline in the previous quarter. Overall GFCF was supported by a 60 per cent and 26 per cent increase in public and private sector GFCF respectively, both of which were largely due to increased investments in construction & works from a low base caused by the CB last year.

LABOUR MARKET

Unemployment and Retrenchment[1]

Compared to March 2021, the seasonally-adjusted unemployment rates in June 2021 fell at the overall level (from 2.9 per cent to 2.7 per cent), as well as for residents (from 4.0 per cent to 3.7 per cent) and citizens (from 4.2 per cent to 3.8 per cent) (Exhibit 1.4). Although unemployment rates declined for the third consecutive quarter, they remained elevated compared to pre-pandemic levels.[2]

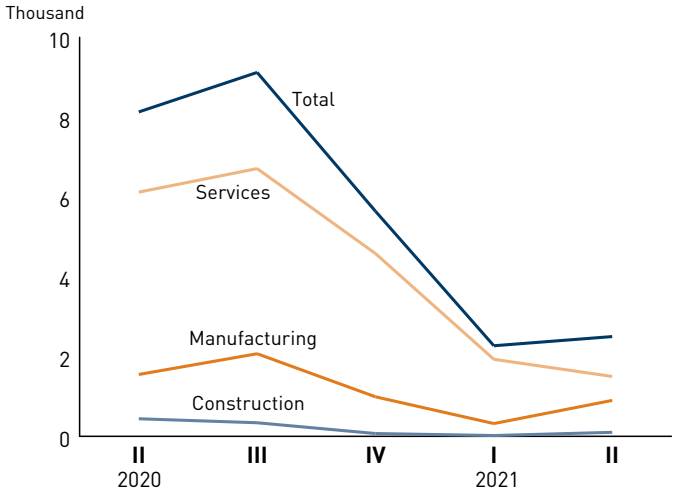
Exhibit 1.4: Unemployment Rate (Seasonally-Adjusted)



In June 2021, an estimated 86,600 residents, including 76,800 Singapore citizens, were unemployed. These were lower than the number of unemployed residents (95,500) and citizens (85,400) in March 2021.[3]

Total retrenchments increased slightly to 2,500 in the second quarter of 2021, from 2,270 in the preceding quarter (Exhibit 1.5). Over the quarter, retrenchments rose in the manufacturing (from 320 to 900) and construction (from 20 to 100) sectors, but fell in the services sector (from 1,930 to 1,500).

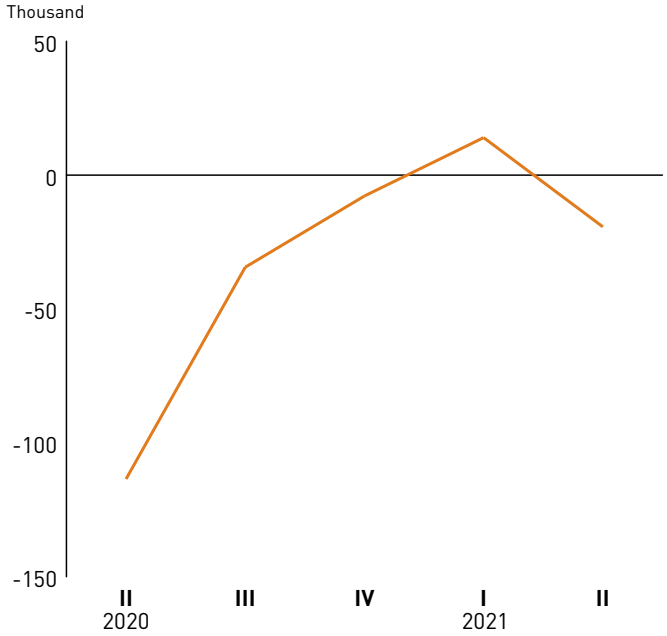
Exhibit 1.5: Retrenchments



Employment[4]

Total employment contracted by 19,300 on a quarter-on-quarter basis in the second quarter of 2021, a reversal from the 14,000 increase registered in the previous quarter (Exhibit 1.6). Excluding MDWs, total employment fell by 15,700, driven by a continued decline in non-resident employment, which outweighed a modest increase in resident employment.

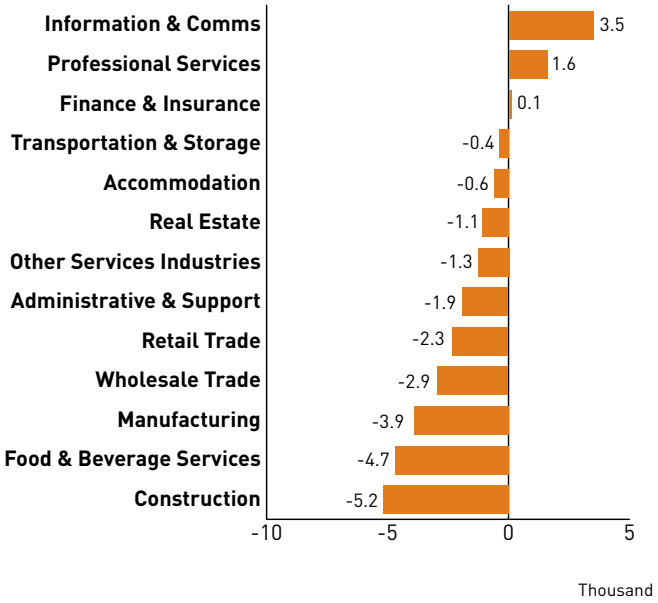
Exhibit 1.6: Change in Total Employment, Quarter-on-Quarter



Employment declines were observed across all broad sectors (i.e., overall manufacturing, services and construction) in the second quarter. Employment in the overall services sector fell by 10,000 (or -6,300 excluding MDWs), led by contractions in the food & beverage services (-4,700), wholesale trade (-2,900) and retail trade (-2,300) sectors (Exhibit 1.7). The construction (-5,200) and manufacturing (-3,900) sectors also saw employment declines over the same period.

1 *Retrenchment figures pertain to private sector establishments with at least 25 employees and the public sector.*
2 *The annual average overall, resident and citizen unemployment rates in 2019 were 2.3 per cent, 3.1 per cent and 3.3 per cent respectively.*
3 *Based on seasonally-adjusted data on the number of unemployed persons.*
4 *Based on preliminary estimates.*

Exhibit 1.7: Changes in Employment by Industry in 2Q 2021



Hiring Expectations

According to EDB's latest Business Expectations Survey for the Manufacturing Sector, hiring expectations in the sector were positive, with a net weighted balance of 8 per cent of manufacturers expecting to increase hiring in the third quarter of 2021 as compared to the second quarter. Firms in the infocomms & consumer electronics segment of the electronics cluster were the most optimistic, with a net weighted balance of 44 per cent of firms expecting to increase hiring in the third quarter. By contrast, firms in the land segment of the transport engineering cluster were the most pessimistic, with a net weighted balance of 20 per cent of firms expecting lower levels of hiring in the third quarter.

Hiring expectations for services firms were also positive. According to DOS' latest Business Expectations Survey for the Services Sector, a net weighted balance of 3 per cent of services firms expected to increase hiring in the third quarter of 2021 as compared to the second quarter. Firms in the wholesale trade sector had the strongest hiring sentiments, with a net weighted balance of 9 per cent of firms expecting to increase hiring in the third quarter. On the other hand, firms in the administrative & support services sector had the weakest hiring sentiments, with a net weighted balance of 4 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, rose by 1.7 per cent year-on-year in the second quarter of 2021, slower than the 7.3 per cent increase recorded 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 2021

Most sectors registered productivity growth in the second quarter, with double-digit gains observed in the real estate (26 per cent), accommodation (21 per cent), transportation & storage (17 per cent), retail trade (14 per cent), food & beverage services (14 per cent) and other services (12 per cent) sectors. The finance & insurance (9.3 per cent), professional services (9.0 per cent), information & communications (4.3 per cent), wholesale trade (3.0 per cent) and manufacturing (2.6 per cent) sectors also posted productivity improvements. By contrast, productivity declines were observed in the construction (-21 per cent) and administrative & support services (-0.1 per cent) sectors.

In the second quarter, the productivity of outward-oriented sectors as a whole rose by 6.1 per cent year-on-year, slowing from the 7.9 per cent increase in the previous quarter.[6] The productivity of domestically-oriented sectors as a whole grew by 1.7 per cent year-on-year, an improvement from the 0.3 per cent increase observed in the preceding quarter.

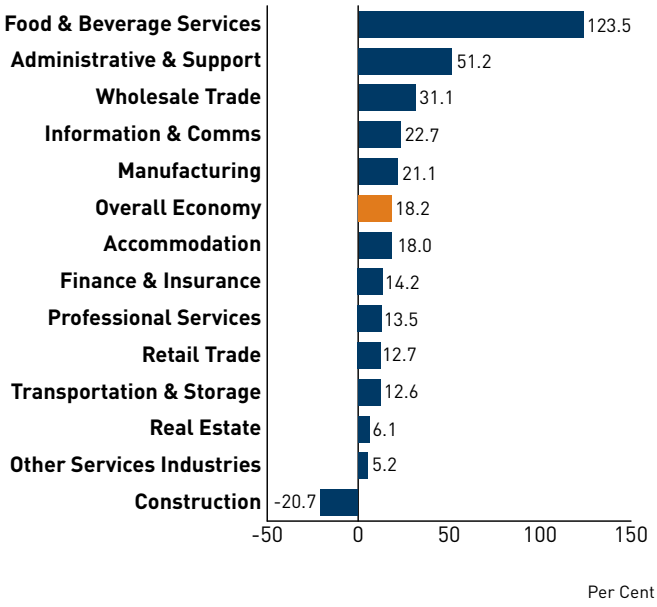
5 *Overall labour productivity, as measured by real value-added per worker, rose by 16.7 per cent in the second quarter as compared to the 6.1 per cent growth in the preceding quarter. The larger increase in real value-added per worker compared to real value-added per actual hour worked (1.7 per cent) in the second quarter was due to a significant increase in the number of actual hours worked per worker as a result of the low base in the second quarter of 2020 when the Circuit Breaker was in force.*

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 18 per cent on a year-on-year basis in the second quarter of 2021, a reversal from the 6.8 per cent decline in the preceding quarter (Exhibit 1.9). The increase in overall ULC was due to a rise in total labour cost per worker that outstripped the growth in labour productivity (as measured by real value-added per worker). In turn, the rise in total labour cost per worker was largely driven by a tapering of the wage subsidies provided by the Government through support measures such as the Jobs Support Scheme and the foreign worker levy waiver and rebate.

Exhibit 1.9: Changes in Unit Labour Cost in 2Q 2021



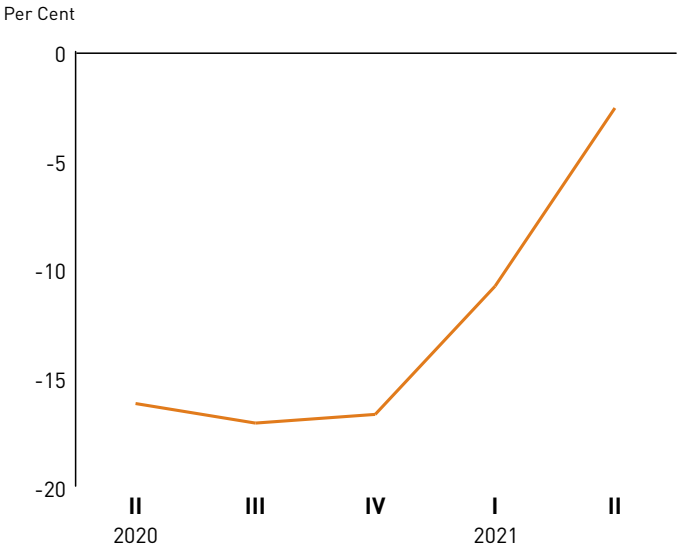
By broad sectors, the ULC for the manufacturing sector increased by 21 per cent year-on-year, a reversal from the 19 per cent decline in the first quarter. The rise was due to higher total labour cost per worker in the sector, which more than offset the gains in labour productivity.

Similarly, the ULC for services producing industries rose by 18 per cent, in contrast to the 3.9 per cent fall recorded in the previous quarter. All services producing industries saw an increase in their ULCs, with the food & beverage services sector registering the largest increase (123 per cent). The latter was due to a significant rise in total labour cost per worker, which surpassed labour productivity growth in the sector.

By contrast, the ULC for the construction sector declined by 21 per cent, a turnaround from the increase of 6.6 per cent in the preceding quarter. The decrease came on the back of strong labour productivity gains that exceeded a rise in total labour cost per worker in the sector.

Unit business cost (UBC) for the manufacturing sector fell by 2.6 per cent year-on-year in the second quarter, moderating from the 11 per cent drop in the previous quarter (Exhibit 1.10). The decline in UBC during the quarter was on account of a fall in the unit services cost (-8.6 per cent), which outweighed the increases in manufacturing ULC (21 per cent) and unit non-labour production taxes (16 per cent).

Exhibit 1.10: Changes in the Manufacturing Unit Business Cost

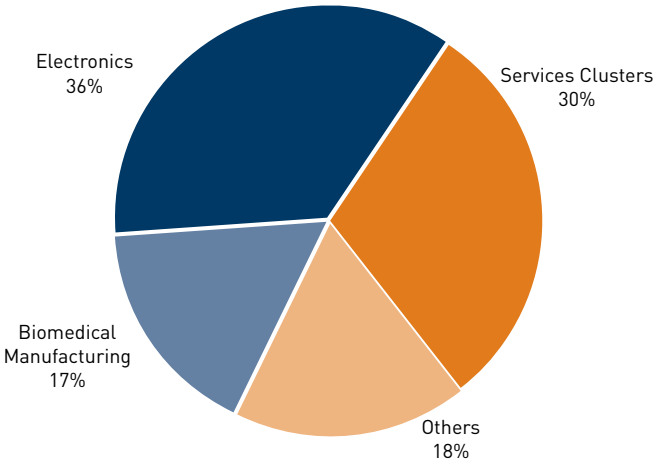


Investment Commitments

Investment commitments garnered by the Economic Development Board (EDB) in terms of Fixed Asset Investments (FAI) and Total Business Expenditure (TBE) amounted to $3.6 billion and $1.4 billion respectively in the second quarter of 2021 (Exhibit 1.11 and Exhibit 1.12).

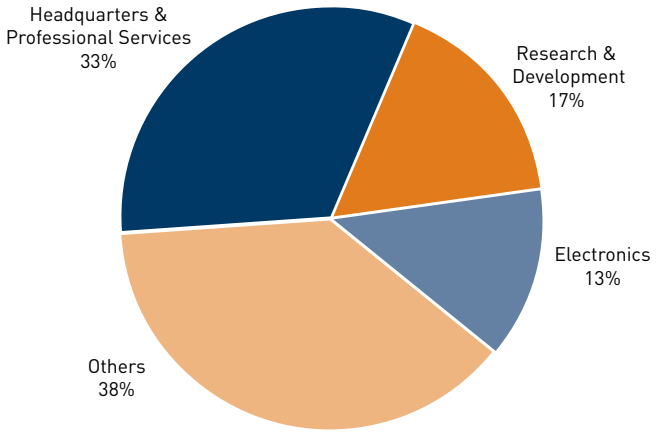
For FAI, the largest contribution came from the manufacturing sector, which attracted $2.5 billion worth of commitments. Within the manufacturing sector, the electronics and biomedical manufacturing clusters garnered the largest amount of commitments, at $1.3 billion and $603 million respectively. Meanwhile, the research & development cluster attracted the most FAI commitments within the services sector, at $594 million. Investors from the United States contributed the most to total FAI, at $2.1 billion (59 per cent).

Exhibit 1.11: Fixed Asset Investments by Industry Cluster in 2Q 2021



For TBE, the services clusters attracted the highest amount of commitments, at $823 million. This was led by the headquarters & professional services and research & development clusters, at $445 million and $227 million respectively. Among the manufacturing clusters, the electronics and biomedical manufacturing clusters garnered the largest amount of TBE commitments, at $178 million and $142 million respectively. Investors from the United States were the largest source of TBE commitments, with commitments of $494 million (36 per cent).

Exhibit 1.12: Total Business Expenditure by Industry Cluster in 2Q 2021



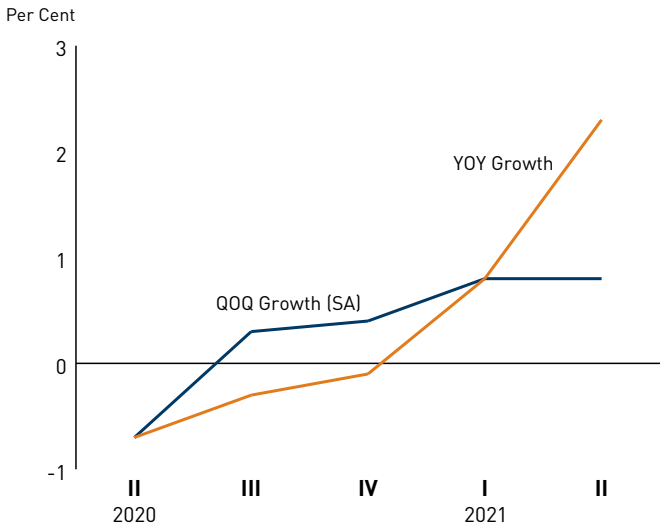
When these projects are fully implemented, they are expected to generate $3.6 billion of value-added and create more than 5,900 jobs in the coming years.

PRICES

Consumer Price Index

The Consumer Price Index-All Items (CPI-All Items) rose by 2.3 per cent on a year-on-year basis in the second quarter of 2021, faster than the 0.8 per cent increase in the previous quarter (Exhibit 1.13). On a quarter-on-quarter seasonally-adjusted basis, the CPI-All Items rose by 0.8 per cent, the same pace of increase as in the previous quarter.

Exhibit 1.13: Changes in CPI



Price increases in the following CPI categories contributed positively to CPI-All Items inflation on a year-on-year basis in the second quarter (Exhibit 1.14). Food prices rose by 1.0 per cent on the back of an increase in the costs of food serving services like hawker food and restaurant meals, as well as non-cooked food items such as vegetables and fruits. Housing & utilities costs increased by 0.6 per cent as higher accommodation costs and gas tariffs more than offset a fall in electricity prices. Prices of household durables & services climbed by 1.4 per cent on account of more expensive domestic & household services and household durables. Healthcare costs edged up by 1.0 per cent as a rise in the costs of hospital services and health insurance outweighed a fall in the prices of medical products. Transport costs went up by 11 per cent due to an increase in the prices of cars and petrol. Communication costs inched up by 0.1 per cent on the back of a rise in telecommunication services costs. Recreation & culture prices picked up by 1.0 per cent as a result of the higher cost of recreational & cultural services. Education costs rose by 1.1 per cent as higher fees at universities and commercial institutions more than offset lower fees at childcare centres.

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

Per Cent

	2020			2021	
	II	III	IV	I	II
All items	-0.7	-0.3	-0.1	0.8	**2.3**
Food	2.2	1.9	1.7	1.5	**1.0**
Clothing & Footwear	-3.6	-4.0	-4.7	-5.3	**-6.0**
Housing & Utilities	0.1	-0.7	-0.3	-0.3	**0.6**
Household Durables & Services	-0.2	0.4	0.5	1.1	**1.4**
Health Care	-1.8	-1.9	-0.9	0.3	**1.0**
Transport	-3.9	-0.8	-0.1	3.1	**10.6**
Communication	-0.3	1.8	0.8	0.9	**0.1**
Recreation & Culture	-2.6	-1.6	-2.0	-0.2	**1.0**
Education	-0.6	-0.5	-0.9	0.9	**1.1**
Miscellaneous Goods & Services	-1.4	-1.7	-1.5	-1.3	**-0.2**

On the other hand, price declines in the following CPI categories contributed negatively to CPI-All Items inflation in the second quarter. Clothing & footwear prices fell by 6.0 per cent due to cheaper ready-made garments and footwear. Prices of miscellaneous goods & services declined by 0.2 per cent on account of a fall in the cost of personal care items.

INTERNATIONAL TRADE

Merchandise Trade

Singapore's total merchandise trade increased by 27 per cent on a year-on-year basis in the second quarter of 2021, a step-up from the 4.9 per cent expansion in the preceding quarter (Exhibit 1.15). The growth in total merchandise trade was due to an increase in both oil (98 per cent) and non-oil trade (19 per cent).

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

Per Cent

	2020				2021	
	II	III	IV	Ann	I	II
Merchandise Trade	-13.9	-4.8	-5.1	-5.2	4.9	**27.3**
Merchandise Exports	-11.4	-2.2	-2.9	-3.2	6.9	**26.1**
Domestic Exports	-16.2	-5.1	-10.3	-6.8	-0.2	**25.8**
Oil	-53.3	-29.1	-30.6	-28.1	-19.3	**85.6**
Non-Oil	5.8	6.5	-0.5	4.3	9.7	**10.1**
Re-Exports	-6.9	0.3	3.4	0.1	13.6	**26.4**
Merchandise Imports	-16.6	-7.6	-7.6	-7.4	2.7	**28.6**
Oil	-57.5	-32.3	-39.2	-34.0	-12.5	**115.4**
Non-Oil	-5.2	-1.5	0.4	-0.3	6.5	**17.7**

Total merchandise exports rose by 26 per cent in the second quarter, extending the 6.9 per cent growth in the preceding quarter. This was due to an increase in both re-exports (26 per cent) and domestic exports (26 per cent).

The expansion in domestic exports was on account of gains in both oil and non-oil domestic exports. In particular, oil domestic exports surged by 86 per cent from a low base, reflecting higher oil prices compared to a year ago. In volume terms, oil domestic exports fell by 3.2 per cent, easing from the 27 per cent decline in the previous quarter.

Non-oil domestic exports (NODX) expanded by 10 per cent in the second quarter, extending the 9.7 per cent growth in the previous quarter. The rise in NODX was supported by an increase in both non-electronics and electronics domestic exports.

Total merchandise imports grew by 29 per cent in the second quarter, accelerating from the 2.7 per cent increase in the previous quarter. The expansion in imports was due to increases in both oil (115 per cent) and non-oil imports (18 per cent). Both non-electronics and electronics imports rose.

Services Trade

Total services trade expanded by 9.3 per cent on a year-on-year basis in the second quarter of 2021, a reversal from the 9.8 per cent decline in the previous quarter (Exhibit 1.16). Both exports and imports of services recorded growth during the quarter.

Services exports rose by 10 per cent, a turnaround from the 7.4 per cent decline in the preceding quarter. The growth in services exports was largely attributable to a rise in the exports of other business services, transport services and financial services. Meanwhile, services imports increased by 8.2 per cent, a reversal from the 12 per cent fall in the previous quarter. The rise in services imports was mainly due to an increase in the imports of other business services, transport services, and telecommunications, computer & information services.
Exhibit 1.16: Growth Rates of Total Services Trade, Services

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

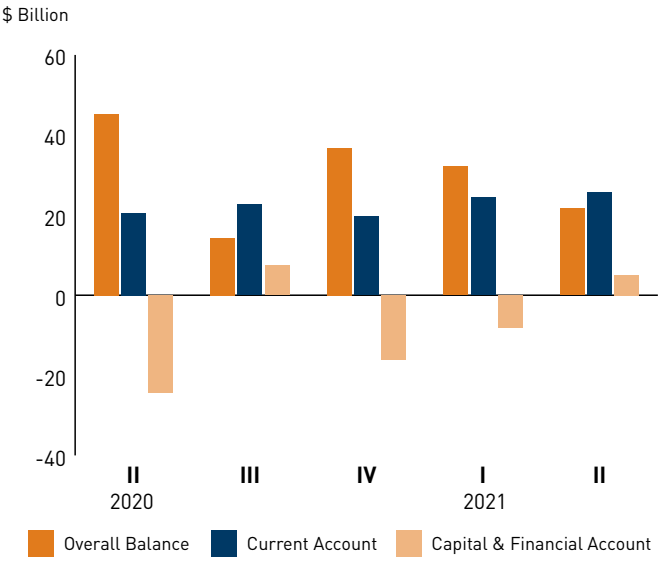
Per Cent

	2020				2021	
	II	III	IV	Ann	I	II
Total Services Trade	-21.4	-16.3	-16.3	-14.3	-9.8	**9.3**
Services Exports	-19.1	-14.1	-13.8	-12.7	-7.4	**10.3**
Services Imports	-23.7	-18.7	-18.9	-16.1	-12.3	**8.2**

BALANCE OF PAYMENTS

The overall balance of payments recorded a smaller surplus of $22 billion in the second quarter of 2021, compared to the surplus of $32 billion in the preceding quarter (Exhibit 1.17).

Exhibit 1.17: Balance of Payments



Current Account

The current account surplus rose to $26 billion in the second quarter, from $24 billion in the first quarter, due to increases in the goods and services trade surpluses, which more than offset larger deficits in the primary and secondary income balances.

The surplus in the goods balance went up to $37 billion in the second quarter, from $31 billion in the previous quarter, as goods exports increased by more than goods imports.

At the same time, the surplus in the services balance climbed to $6.5 billion in the second quarter, from $5.1 billion in the preceding quarter. Although net payments for manufacturing services as well as charges for the use of intellectual property rose and net receipts for financial services fell, these were more than compensated for by a shift from net payments to net receipts for other business services, and higher net receipts for insurance services.

On the other hand, the deficits in the primary and secondary income balances widened by $5.6 billion and $0.2 billion respectively. This was due to a larger fall in primary income receipts compared to payments, while secondary income payments rose more than receipts.

Capital and Financial Account[7]

The capital and financial account registered a net outflow of $5.1 billion in the second quarter, a reversal from the net inflow of $8.0 billion seen in the preceding quarter. This was due to a sharp rise in the net outflows of portfolio investment, followed by a turnaround to a net outflow position from a net inflow position in the "other investment" account and higher net outflows of financial derivatives. These more than offset an increase in the net inflows of direct investment.

Net outflows of portfolio investment rose to $26 billion in the second quarter, from $15 billion in the previous quarter. This was largely due to a shift to a net outflow position for resident deposit-taking corporations from a net inflow position in the preceding quarter, which outweighed a decrease in net outflows from the non-bank private sector.

At the same time, the "other investment" account recorded a net outflow of $0.1 billion in the second quarter, following net inflows of $2.6 billion in the preceding quarter. This was partly attributable to movements in the banking sector as net inflows to resident deposit-taking corporations declined.

In comparison, net inflows of direct investment rose to $26 billion in the second quarter, from $23 billion in the previous quarter, as foreign direct investments into Singapore increased while residents' direct investments abroad fell.

Finally, net outflows of financial derivatives stepped up to $4.9 billion in the second quarter, from $2.5 billion in the preceding quarter.

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".*

Image courtesy of Illumina

CHAPTER

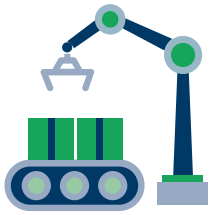
02

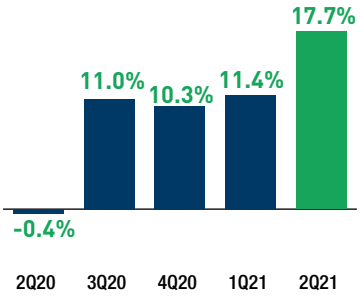
SECTORAL PERFORMANCE

CHAPTER 2
SECTORAL PERFORMANCE

MANUFACTURING

REAL GROWTH





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

29.6% Transport Engineering

24.3% Precision Engineering

20.1% Chemicals

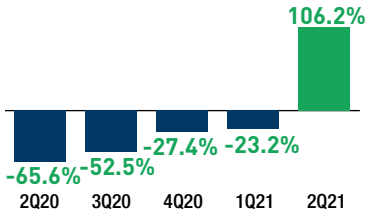
19.6% General Manufacturing Industries

18.3% Electronics

11.4% Biomedical Manufacturing

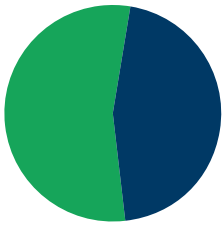
CONSTRUCTION

REAL GROWTH



CERTIFIED PAYMENTS IN 2Q21

54.2% Public



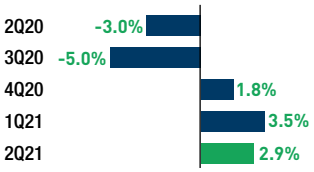
45.8% Private

CONTRACTS AWARDED IN 2Q21 (Y-O-Y CHANGE)

Civil Engineering	Residential	Commercial	Industrial	Institutional & Others
360.4%	76.9%	61.4%	-37.2%	-39.8%

WHOLESALE TRADE

REAL GROWTH

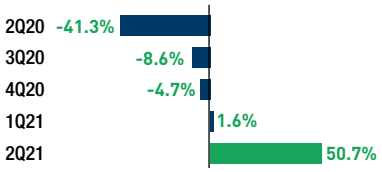


Real Non-Oil Re-exports Growth 29.3%

Real Non-Oil Domestic Exports Growth Growth 6.4%

RETAIL TRADE

REAL GROWTH

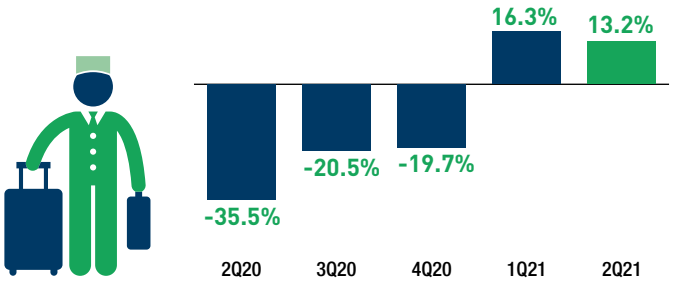


Retail Sales Index Growth (Motor Vehicles) 176.5%

Retail Sales Index Growth (Non-Motor Vehicles) 39.6%

ACCOMMODATION

REAL GROWTH



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

Luxury **24.5%-pt**

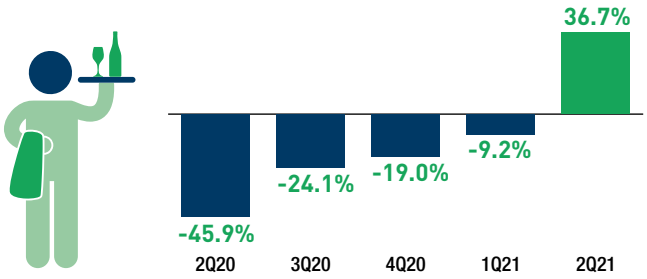
Upscale **6.9%-pt**

Mid-Tier **-9.8%-pt**

Economy **-2.5%-pt**

FOOD & BEVERAGE SERVICES

REAL GROWTH



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

Restaurants **71.5%**

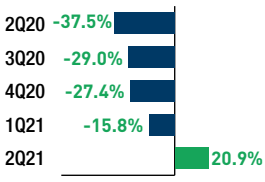
Others **43.4%**

Fast Food Outlets **29.7%**

Food Caterers **-44.3%**

TRANSPORTATION & STORAGE

REAL GROWTH

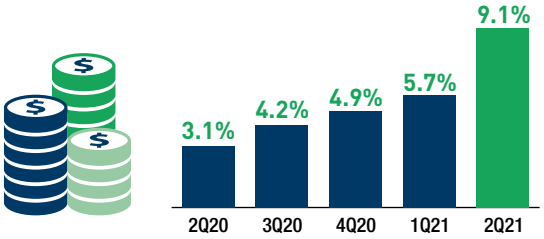


Total Sea Cargo Handled Growth **6.9%**

Air Passengers Handled Growth **440.0%**

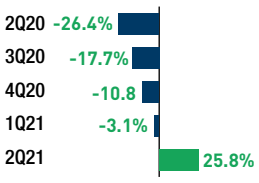
FINANCE & INSURANCE

REAL GROWTH



REAL ESTATE

REAL GROWTH



PRIVATE RESIDENTIAL REAL ESTATE

Units Transacted (Y-O-Y Change) **217.2%**

Price Index (Q-O-Q Change) **0.8%**

GROWTH OF BANK LOANS & ADVANCES TO NON-BANK CUSTOMERS IN 2Q21

Loans to Businesses **2.6%**

Consumer Loans **5.0%**

OVERVIEW

In the second quarter of 2021,

- The manufacturing sector expanded by 18 per cent year-on-year, extending the 11 per cent growth in the previous quarter. Growth in the sector was supported by output expansions across all clusters.
- The construction sector expanded by 106 per cent, a sharp turnaround from the 23 per cent contraction in the preceding quarter. This was mainly due to the low base in the second quarter of 2020 when domestic Circuit Breaker (CB) measures and movement restrictions at migrant worker dormitories had adversely affected the sector.
- The wholesale trade sector grew by 2.9 per cent, moderating from the 3.5 per cent expansion in the previous quarter.
- The retail trade sector expanded by 51 per cent, an improvement from the 1.6 per cent growth in the previous quarter, partly due to low base effects.
- The transportation & storage sector posted growth of 21 per cent, a turnaround from the 16 per cent contraction in the previous quarter. The stronger performance of the sector was driven mainly by the air transport, water transport and land transport segments, in part due to low base effects.
- The accommodation sector grew by 13 per cent, extending the 16 per cent growth in the previous quarter, largely due to low base effects.
- The food & beverage services sector expanded by 37 per cent, reversing the 9.2 per cent contraction in the preceding quarter, largely due to the low base last year.
- Growth in the finance & insurance sector came in at 9.1 per cent, faster than the 5.7 per cent recorded in the previous quarter.
- The real estate sector expanded by 26 per cent, rebounding from the 3.1 per cent contraction in the previous quarter, on account of low base effects.
- The professional services sector grew by 9.4 per cent, reversing the 4.5 per cent contraction in the previous quarter.

MANUFACTURING

The manufacturing sector expanded by 18 per cent on a year-on-year basis in the second quarter of 2021 (Exhibit 2.1). All manufacturing clusters recorded output expansions during the quarter (Exhibit 2.2).

Exhibit 2.1: Manufacturing Sector's Growth Rate

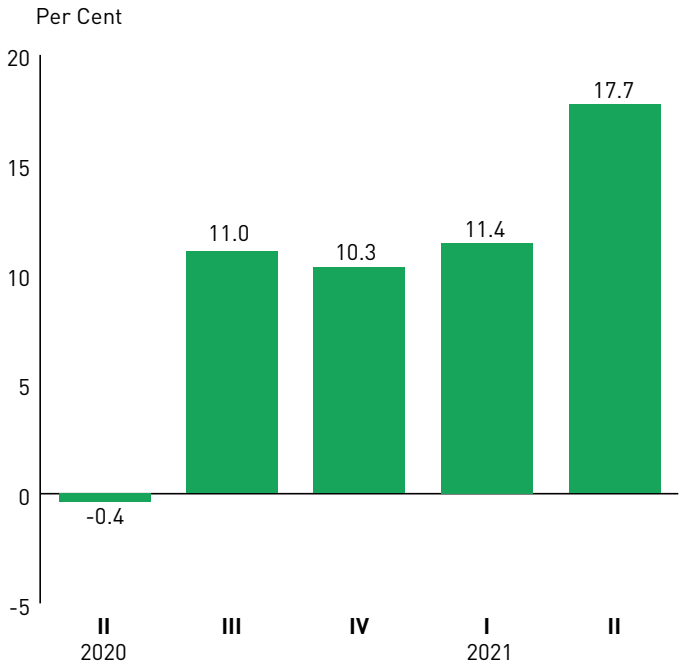
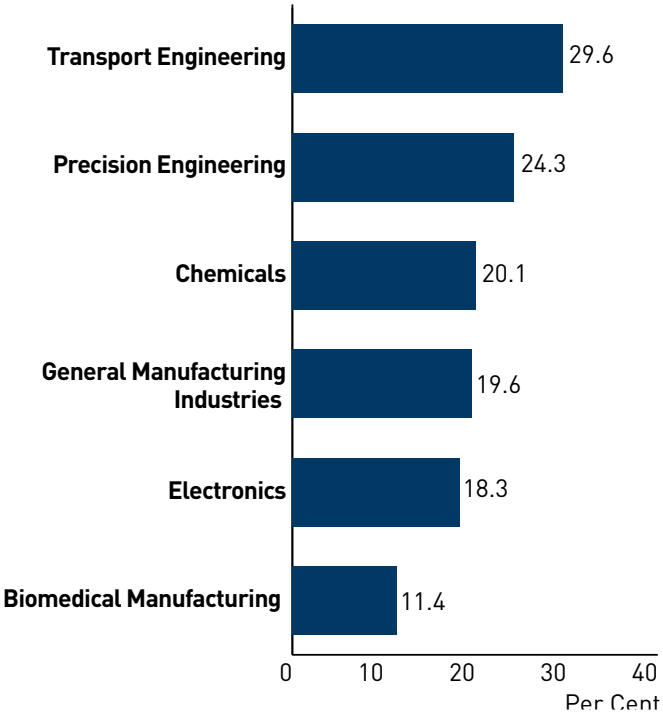


Exhibit 2.2: Manufacturing Clusters' Growth Rates in 2Q 2021



The transport engineering cluster grew by 30 per cent in the second quarter, supported by output expansions in all segments. Output in the land transport segment surged by 73 per cent from a low base last year due to a rise in the production of parts and accessories for motor vehicles and bicycles. Similarly, output in the marine & offshore engineering segment increased by 31 per cent from a low base last year when domestic CB measures and movement restrictions at migrant worker dormitories had adversely affected production. Likewise, the aerospace segment grew by 21 per cent from a low base of maintenance, repair & overhaul activities last year due to the widespread grounding of aircraft amidst COVID-19 travel restrictions.

Output in the precision engineering cluster increased by 24 per cent in the second quarter, supported by expansions in both the machinery & systems (M&S) and precision modules & components (PMC) segments. The M&S segment grew by 29 per cent on account of a higher level of production of semiconductor equipment to meet strong demand as capital investment in the global semiconductor industry continued to rise. Similarly, the PMC segment expanded by 18 per cent, driven by a higher level of output of metal and plastic precision components to support the electronics and medical devices industries.

The chemicals cluster grew by 20 per cent in the second quarter, with all segments recording output expansions from the low base a year ago caused by plant maintenance shutdowns, as well as weak export demand as major economies around the world implemented lockdowns and restrictions to contain the spread of COVID-19. Specifically, the specialty chemicals, petrochemicals, other chemicals and petroleum segments expanded by 29 per cent, 23 per cent, 11 per cent and 5.8 per cent respectively.

Output in the general manufacturing cluster increased by 20 per cent in the second quarter. Growth was largely supported by the miscellaneous industries segment, which expanded by 71 per cent from the low base last year when demand for construction-related materials was adversely affected by the slump in domestic construction activity. Meanwhile, the printing segment grew marginally by 0.1 per cent. On the other hand, output in the food, beverages & tobacco (FBT) segment declined by 3.5 per cent on account of a fall in the production of milk products due to weaker export demand.

The electronics cluster expanded by 18 per cent in the second quarter, bolstered by output expansions in all segments. In particular, the semiconductors segment grew by 19 per cent, supported by robust demand for semiconductor chips from cloud services and the 5G market. Meanwhile, the other electronics modules & components, computer peripherals & data storage and infocomms & consumer electronics segments expanded by 28 per cent, 19 per cent and 0.3 per cent respectively.

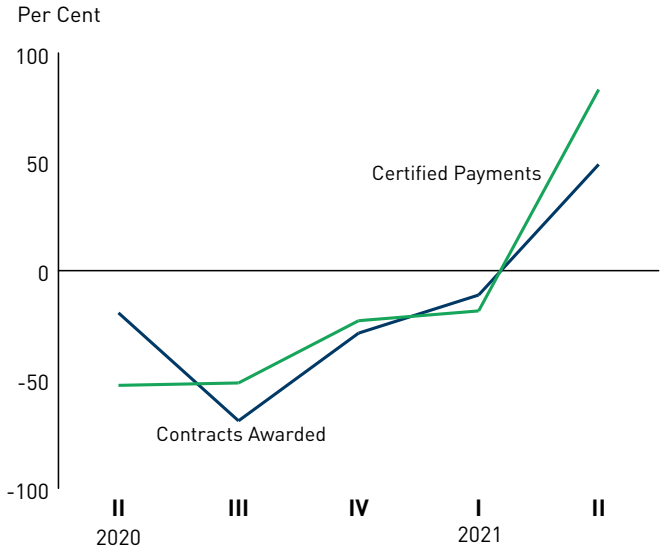
Output in the biomedical manufacturing cluster increased by 11 per cent in the second quarter, supported by growth in both the medical technology and pharmaceuticals segments. The medical technology segment posted growth of 31 per cent on the back of an increase in export demand for medical devices. Meanwhile, the pharmaceuticals segment expanded by 11 per cent, supported by a higher level of production of active pharmaceutical ingredients (APIs) and biological products.

CONSTRUCTION

The construction sector expanded by 106 per cent year-on-year in the second quarter of 2021, a sharp turnaround from the 23 per cent contraction in the previous quarter. This was mainly due to the low base last year when most domestic construction activities were halted as a result of the CB measures and movement restrictions at migrant worker dormitories. However, compared to its pre-pandemic level in the second quarter of 2019, the value-added of the construction sector remained 29 per cent lower in the second quarter of 2021.

In the second quarter of 2021, nominal certified progress payments (a proxy for construction output) rose by 83 per cent, rebounding from the 18 per cent decline recorded in the previous quarter (Exhibit 2.3). Expansions in certified progress payments were seen in both the private (59 per cent) and public (111 per cent) sectors. The growth in private certified progress payments was largely driven by private residential (120 per cent) and industrial (29 per cent) building works. On the other hand, the rise in public certified progress payments was led by public civil engineering (87 per cent) and residential building (309 per cent) works.

Exhibit 2.3: Changes in Contracts Awarded and Certified Payments



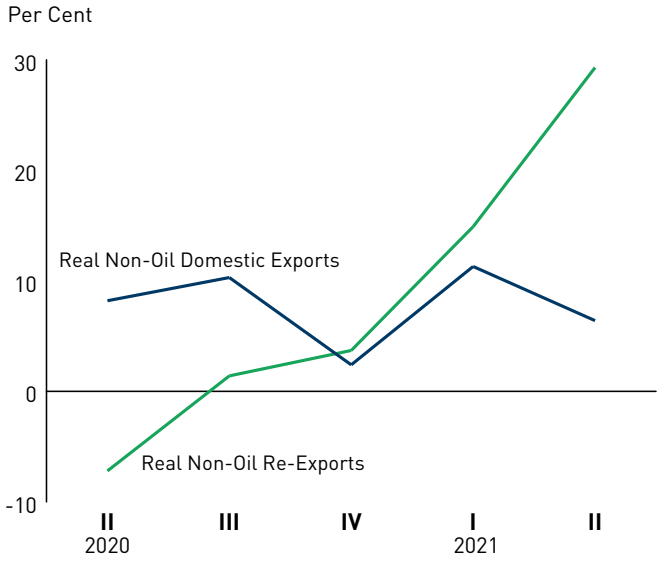
Meanwhile, construction demand in terms of contracts awarded increased by 49 per cent in the second quarter, sharply reversing the 11 per cent decline in the first quarter. This was due to higher demand for both private (52 per cent) and public (47 per cent) sector construction works. The former was driven by a rise in contracts awarded for private sector commercial (186 per cent) and industrial (99 per cent) building works, while the latter was led by an increase in contracts awarded for public civil engineering (462 per cent) and residential building (81 per cent) works.

WHOLESALE TRADE

The wholesale trade sector grew by 2.9 per cent year-on-year in the second quarter of 2021, moderating from the 3.5 per cent expansion in the previous quarter.

Growth in the sector was supported by an increase in non-oil re-export (NORX) and non-oil domestic export (NODX) volumes during the quarter. Specifically, NORX volumes rose by 29 per cent in the second quarter, extending the 15 per cent growth in the preceding quarter (Exhibit 2.4), with the increase primarily driven by the stronger re-exports of machinery & equipment and manufactured goods. NODX volumes also expanded by 6.4 per cent in the second quarter, although this was a moderation from the 11 per cent expansion in the first quarter. The positive NODX performance in the second quarter was mainly driven by growth in the domestic exports of crude materials and manufactured goods.

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

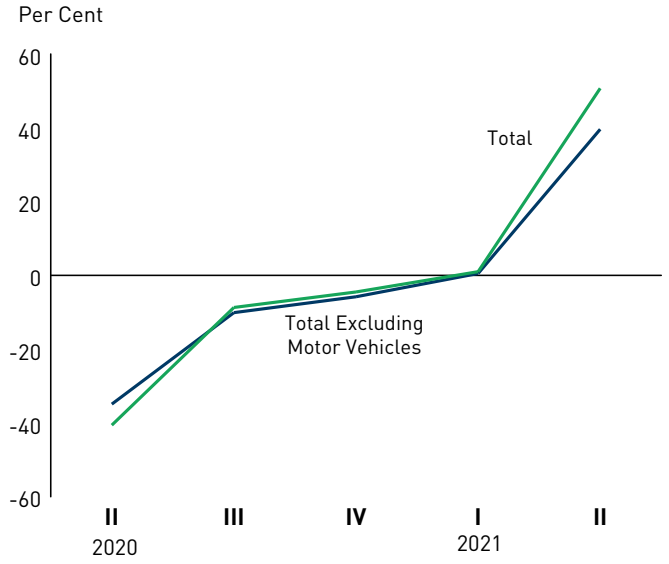


RETAIL TRADE

The retail trade sector expanded by 51 per cent year-on-year in the second quarter of 2021, an improvement from the 1.6 per cent growth in the previous quarter.

Overall retail sales volume increased by 51 per cent year-on-year in the second quarter, accelerating from the 1.0 per cent growth in the first quarter (Exhibit 2.5). The strong growth was partly due to a low base, as the overall retail sales volume shrank by 41 per cent during the CB a year ago.[1] However, overall retail sales volume remained 11 per cent below its pre-pandemic level in the same quarter of 2019.

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



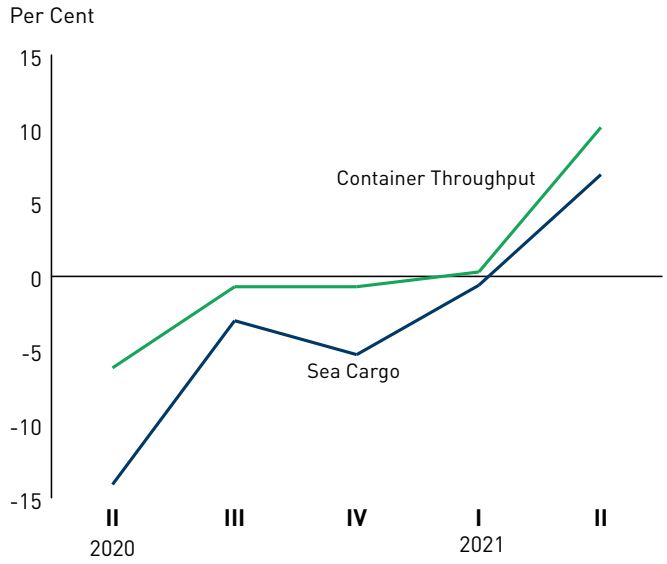
Growth in the retail sales volume in the second quarter of 2021 was supported by both motor vehicular sales (176 per cent) and non-motor vehicular sales (40 per cent). The former was largely due to the low base last year as COE auctions were halted during the CB. The latter saw support from the increased sales of goods such as watches & jewellery (324 per cent), wearing apparel & footwear (231 per cent), goods in department stores (199 per cent) and food & alcohol (29 per cent) on the back of a low base in the second quarter of 2020. In addition, the sales volumes of recreational goods (134 per cent) and furniture & household equipment (71 per cent) rose, supported by low base effects as well as the continued prevalence of work-from-home practices. On the other hand, sales volumes at supermarkets & hypermarkets (-16 per cent), as well as mini-marts & convenience stores (-11 per cent) declined from their high bases in 2020.

TRANSPORTATION & STORAGE

The transportation & storage sector grew by 21 per cent year-on-year in the second quarter of 2021, a turnaround from the 16 per cent contraction in the previous quarter. The stronger performance of the sector was driven mainly by the air transport, water transport and land transport segments, in part due to low base effects.

For the water transport segment, the volume of sea cargo handled increased by 6.9 per cent year-on-year in the second quarter, a reversal from the 0.6 per cent decline recorded in the previous quarter (Exhibit 2.6). The rise in sea cargo volume handled was due to an increase in general cargo volume (11 per cent), which outweighed a fall in oil-in-bulk cargo volume (-2.4 per cent). Container throughput also rose by 10 per cent during the quarter.

Exhibit 2.6: Changes in Container Throughput and Sea Cargo Handled



The air transport segment expanded year-on-year in the second quarter, on account of low base effects as tight global travel restrictions and domestic border controls to contain the spread of COVID-19 led to a sharp fall in air travel in the same period last year. In particular, the volume of air passenger traffic handled at Changi Airport surged by 440 per cent in the second quarter, a sharp reversal from the 96 per cent decline registered in the previous quarter (Exhibit 2.7). Nonetheless, in absolute terms, air passenger traffic volume was only at 3.1 per cent of the volume seen in the second quarter of 2019. Meanwhile, total air cargo shipments handled at Changi Airport rose by 53 per cent in the second quarter of 2021, an improvement from the 5.7 per cent contraction recorded in the previous quarter, similarly from a low base. At the same time, the number of aircraft landings climbed by 96 per cent to reach 12,825 in the second quarter, reversing the 71 per cent decline in the previous quarter.

1 *The measures implemented during the CB and Phase 1 of the re-opening from 7 April 2020 to 18 June 2020 to contain the COVID-19 outbreak had restricted the ability of retail stores to operate on-premises and consequently weighed on retail sales in the second quarter of 2020. Only retail stores providing essential items, such as supermarkets & hypermarkets, as well as mini-marts & convenience stores could operate on-premises.*

Exhibit 2.7: Changes in Air Transport

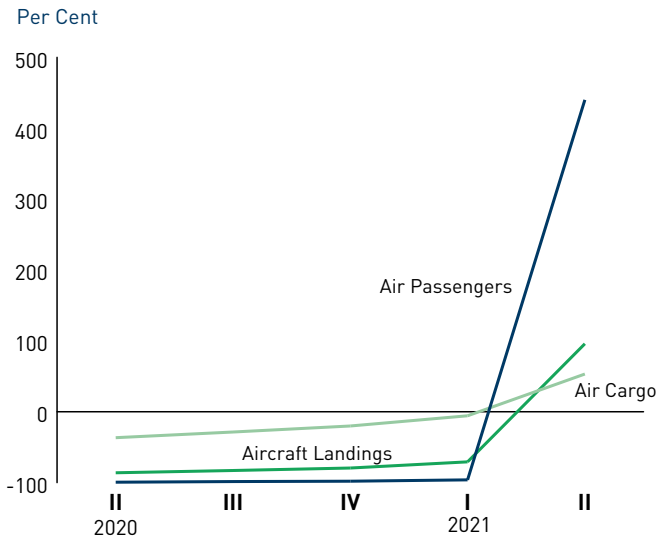
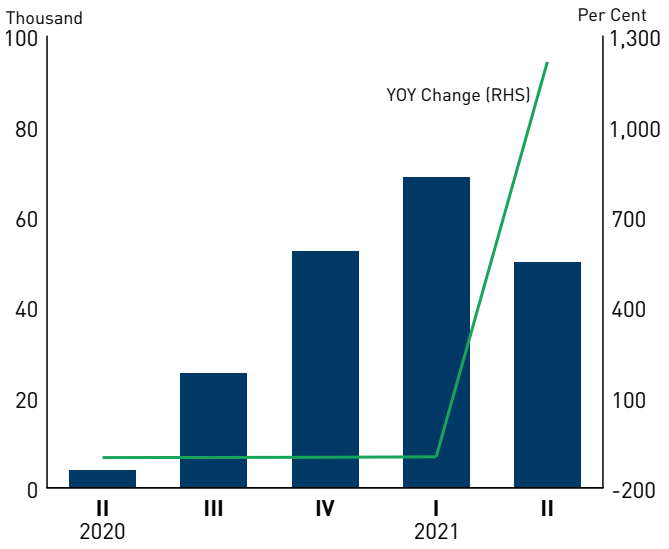


Exhibit 2.8: Visitor Arrivals



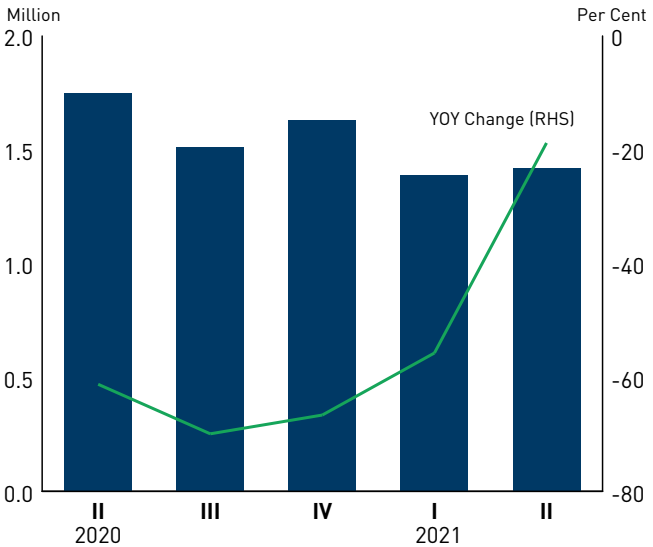
ACCOMMODATION

The accommodation sector expanded by 13 per cent year-on-year in the second quarter of 2021, extending the 16 per cent growth recorded in the preceding quarter. The growth was largely due to low base effects as border restrictions, implemented to limit the importation of COVID-19, caused the value-added of the sector to plunge by 35 per cent a year ago.[2] In addition, government and domestic tourism demand also provided some support to the sector during the quarter. However, compared to its pre-COVID level in the second quarter of 2019, the value-added of the sector remained 27 per cent lower in the second quarter of 2021.

Total visitor arrivals increased by 1,214 per cent year-on-year in the second quarter of 2021, a sharp reversal from the 97 per cent contraction in the first quarter (Exhibit 2.8). This was on account of low base effects as the number of visitor arrivals plunged by nearly 100 per cent in the second quarter of 2020. In absolute terms, visitor arrivals were only at 1.1 per cent of the level seen in the second quarter of 2019.

At the same time, gross lettings at gazetted hotels declined by 19 per cent in the second quarter of 2021, improving from the 56 per cent contraction in the first quarter (Exhibit 2.9). As the decline in available room-nights was slightly larger than the decline in gross lettings, the average occupancy rate edged up by 0.2 percentage-point on a year-on-year basis to reach 50 per cent in the second quarter. This was higher than the average occupancy rate of 44 per cent registered in the previous quarter.

Exhibit 2.9: Gross Lettings at Gazetted Hotels



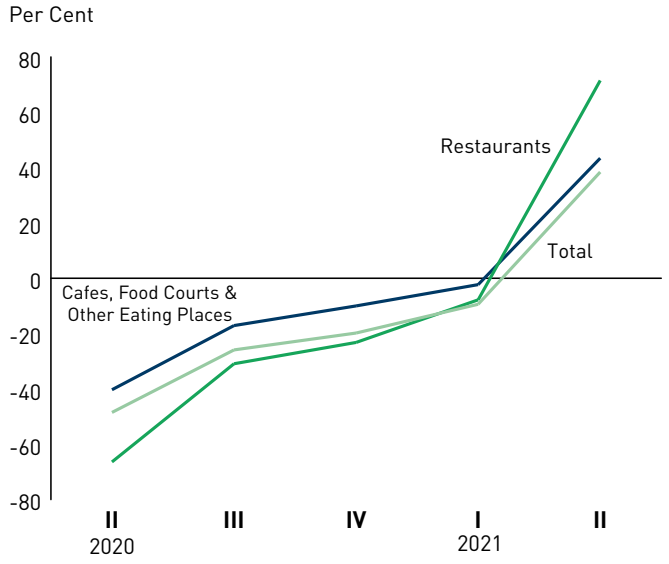
2 *The Multi-ministry Task Force began barring short-term visitors from entering or transiting through Singapore in the first quarter of 2020 to contain the COVID-19 outbreak. This continued to adversely affect the accommodation sector's performance during the second quarter of 2020.*

FOOD & BEVERAGE SERVICES

The food & beverage services sector expanded by 37 per cent year-on-year in the second quarter of 2021, reversing the 9.2 per cent contraction in the preceding quarter.

Overall food & beverage sales volume increased by 38 per cent in the second quarter, a turnaround from the 9.4 per cent decline in the first quarter (Exhibit 2.10). The strong growth was due to the low base a year ago when CB measures had adversely affected food & beverage sales volumes. However, compared to the same quarter in 2019, the overall food & beverage sales volume in the second quarter of 2021 remained 29 per cent lower.

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



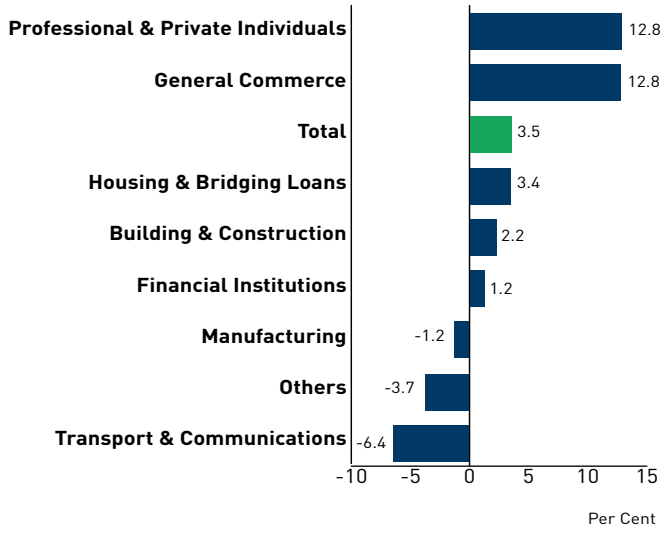
Higher sales volumes were seen across all segments during the second quarter of 2021, except for food caterers (-44 per cent), which continued to be adversely affected by restrictions on large-scale events and gatherings. By contrast, sales volumes of restaurants (72 per cent), cafes, food courts & other eating places (43 per cent) and fast food outlets (30 per cent) rose in the second quarter from the low base a year ago.

FINANCE & INSURANCE

The finance & insurance sector grew by 9.1 per cent year-on-year in the second quarter of 2021, extending the 5.7 per cent growth in the preceding quarter. Growth was underpinned by the strong performance of the banking, insurance, fund management and other auxiliary segments.

The banking segment was boosted by the continued growth of net commissions received from brokerage and other services and interest income from loans. Asian Currency Unit (ACU) non-bank loans rose by 5.1 per cent in the second quarter, buoyed by an increase in loans and trade bills to East Asia and the Americas. Meanwhile, Domestic Banking Unit (DBU) non-bank lending climbed by 3.5 per cent, following four quarters of contraction. This was largely supported by lending to the general commerce sector and professional & private individuals, which more than offset a decline in credit extended to the manufacturing and transport & communications sectors (Exhibit 2.11).

Exhibit 2.11: Growth of DBU Loans & Advances to Non-Bank Customers by Industry in 2Q 2021



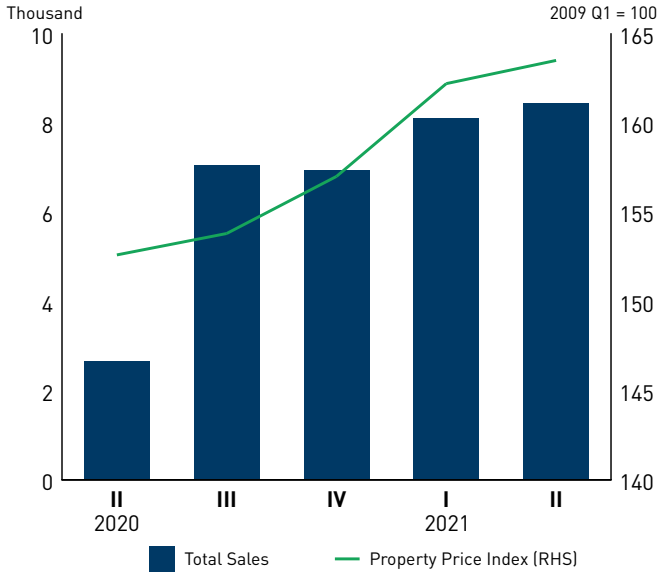
The insurance segment also grew strongly in the second quarter, reflecting the sustained demand for life insurance products, although this was partially offset by weaker demand for general insurance as business activity was crimped by the re-imposition of domestic restrictions in response to the rise in COVID-19 infections. In addition, the sentiment-sensitive segments, comprising fund management, forex and security dealing activities, recorded good outturns as global equity markets remained resilient. Other auxiliary activities also expanded as the shift towards e-payments continued to benefit payments processing activities.

REAL ESTATE

The real estate sector expanded by 26 per cent year-on-year in the second quarter of 2021, rebounding from the 3.1 per cent contraction in the preceding quarter. The strong growth of the sector was on account of a low base in the same quarter last year due to the CB measures. However, compared to the same quarter in 2019, the value-added of the sector remained 7.4 per cent lower.

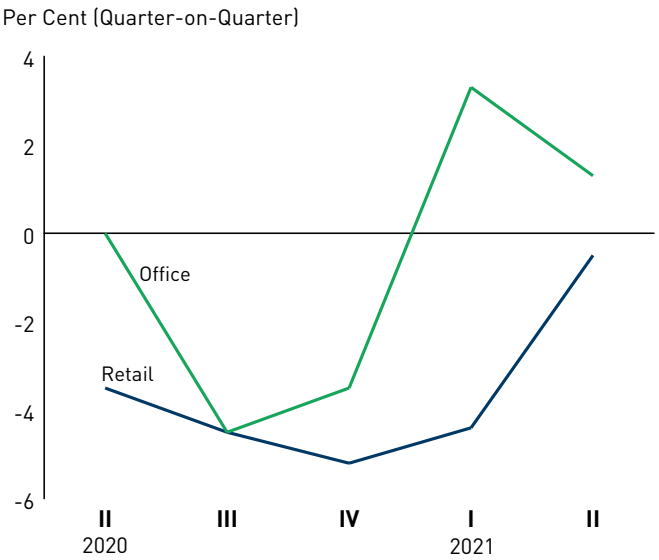
Within the sector, the number of private residential sales transactions surged by 217 per cent on a year-on-year basis in the second quarter, with higher sales seen across all regions of Singapore. This was due to low base effects as CB restrictions had curtailed sales activities in the second quarter of last year. Meanwhile, private residential property prices rose by 0.8 per cent on a quarter-on-quarter basis during the quarter, moderating from the 3.3 per cent increase in the previous quarter (Exhibit 2.12).

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



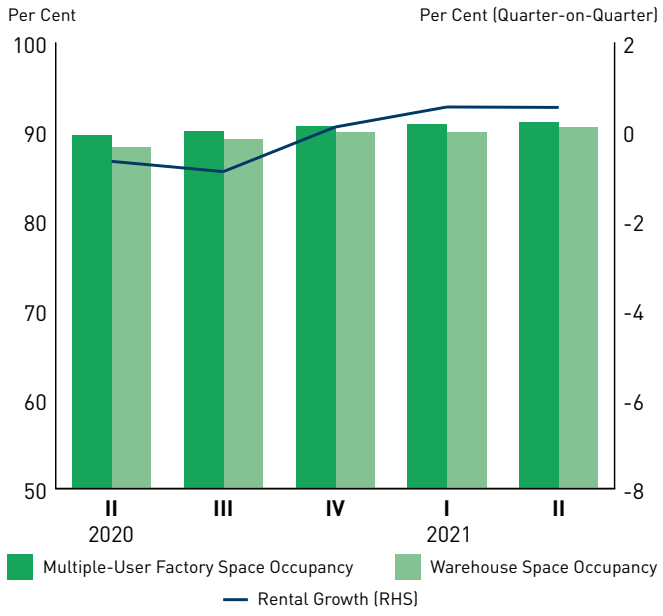
Conditions in the commercial and industrial property space markets were mixed. For the private retail space market, rentals declined by 0.5 per cent on a quarter-on-quarter basis in the second quarter, moderating from the 4.4 per cent drop in the previous quarter (Exhibit 2.13). Meanwhile, the average occupancy rate of private retail space came in at 90 per cent during the quarter, unchanged from the preceding quarter. By contrast, rentals for private office space rose by 1.3 per cent on a quarter-on-quarter basis, extending the 3.3 per cent growth in the preceding quarter. The average occupancy rate of private office space inched down from the 87 per cent recorded in the first quarter to 86 per cent in the second quarter.

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



As for the private industrial space market, rentals rose by 0.6 per cent on a quarter-on-quarter basis in the second quarter, the same pace of increase as in the first quarter. The occupancy rates for private sector multiple-user factory and warehouse spaces stood at 91 per cent and 90 per cent respectively, unchanged from that seen in the previous quarter (Exhibit 2.14).

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



PROFESSIONAL SERVICES

In the second quarter of 2021, the professional services sector grew by 9.4 per cent year-on-year, reversing the 4.5 per cent contraction in the preceding quarter. All segments within the sector expanded, except for the legal segment. The expansion of the sector was mainly driven by the architectural & engineering, technical testing & analysis and other professional, scientific & technical services segments.

CHAPTER

03

ECONOMIC OUTLOOK

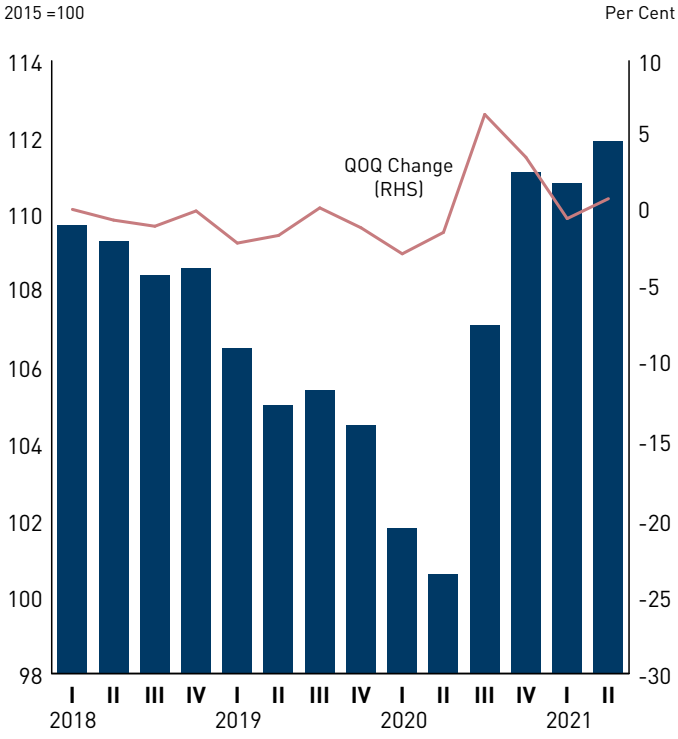
CHAPTER 3
ECONOMIC OUTLOOK

LEADING INDICATORS

On a quarter-on-quarter basis, the composite leading index (CLI) increased by 1.0 per cent in the second quarter of 2021, a turnaround from the 0.3 per cent decline in the previous quarter (Exhibit 3.1).

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

Exhibit 3.1: Composite Leading Index Levels and Growth Rate



OUTLOOK FOR 2021

In May, MTI maintained Singapore's GDP growth forecast for 2021 at "4.0 to 6.0 per cent", in view of heightened uncertainties in the external economic environment arising from the COVID-19 pandemic, as well as the domestic health situation.

Since then, COVID-19 cases continue to be on the rise globally due to the spread of the highly transmissible Delta variant. However, vaccination rates have also picked up in key advanced economies such as the US and Eurozone, which have in turn allowed them to press on with their re-opening plans notwithstanding an uptick in cases. By contrast, regional economies which have been slow to vaccinate their populations have had to re-impose restriction measures to curb a resurgence in infections. This has in turn dampened their growth outlook. On balance, the recovery in external demand for Singapore for the rest of the year remains largely on track. Details of the outlook of the key external economies are as follows.

In the US, the pace of economic growth is expected to pick up in the second half of 2021. Continuing improvements in labour market conditions, along with elevated savings due to the disbursement of fiscal stimulus cheques, will bolster personal consumption expenditure, which will in turn support the US' economic recovery. The Eurozone economy is also projected to see a faster pace of recovery in the second half of 2021. The strong pickup in vaccine deployment in recent months has led to a quicker-than-expected resumption in business activity. This has resulted in an improvement in business sentiments and employment expectations, which will support a rebound in domestic demand.

In Asia, China's growth is expected to ease in the second half of 2021 on the back of a moderation in investment growth amidst weaker base effects and credit conditions. The latest COVID-19 outbreak could also weigh on the recovery of consumption in the near term as restrictions have been imposed to contain the virus. In Japan, the pace of economic recovery is projected to quicken in the second half of 2021. While the re-imposition of a state of emergency in Tokyo and Okinawa to slow the spread of the virus is expected to weigh on domestic consumption in the near term, strong external demand will continue to support growth.

Growth in the key Southeast Asian economies in the second half of 2021 is likely to be slower than earlier projected. In particular, the recovery in domestic demand in countries such as Malaysia, Indonesia and Thailand are expected to be dampened by the tightening of restrictions to contain the surge in COVID-19 infections, although external demand should lend some support to their GDP growth.

At the same time, downside risks in the global economy remain. First, there continues to be uncertainty surrounding the trajectory of the COVID-19 pandemic. The ongoing economic recovery in advanced economies could be derailed if vaccination progress stalls due to vaccine hesitancy or if the efficacy of existing vaccines is weakened as a result of virus mutations or waning antibody levels. Meanwhile, effective containment of the outbreaks in regional economies may be impeded by their slow vaccination rollouts, which could then lead to an even sharper and more protracted period of slowdown in these economies. Second, there are upside risks to inflation, especially if supply-side bottlenecks persist alongside a stronger pickup in final demand. This could result in an earlier or larger increase in interest rates than currently anticipated, thereby triggering a sharp tightening of global financial conditions. The latter could in turn lead to a premature withdrawal of policy support in economies with limited fiscal space and delay their economic recovery. Third, continued geopolitical uncertainty involving the major economies could weigh on trade and the global economic recovery.

Domestically, the performance of the Singapore economy in the first half of 2021 was stronger than expected. The COVID-19 situation has also stabilised, with our vaccination programme continuing to make good progress. Barring a major setback in the global economy, the Singapore economy is expected to continue to see a gradual recovery in the second half of the year, supported in large part by outward-oriented sectors. The progressive easing of domestic and border restrictions as our vaccination rates continue to rise will also help to support the recovery of our consumer-facing sectors and alleviate labour shortages in sectors that are reliant on migrant workers.

Against this backdrop, the recovery of the various sectors of the economy over the course of the year is expected to remain uneven. First, the growth prospects for outward-oriented sectors (e.g., manufacturing and wholesale trade) remain strong given the rebound in global demand. In particular, the manufacturing sector is projected to see robust growth, driven largely by the electronics and precision engineering clusters on the back of strong semiconductor and semiconductor equipment demand. At the same time, the growth outlook for the finance & insurance and information & communications sectors remains positive. The former will be supported in part by an expected increase in domestic and foreign credit demand alongside the broader economic recovery in Singapore and the region. Meanwhile, the latter will be bolstered by healthy enterprise and consumer demand for digital solutions & services, as well as games & software publishing activities.

Second, the aviation- and tourism-related sectors (e.g., air transport and arts, entertainment & recreation) are projected to recover more slowly than previously expected. Even though domestic border restrictions may be eased towards the later part of the year, especially for travellers from countries that have managed to control the pandemic and vaccinate a large part of their populations, demand is not expected to return quickly as travel restrictions globally are likely to be lifted cautiously and global travel demand may also remain sluggish amidst the spread of more contagious strains of the virus. As such, activity in these sectors is expected to remain significantly below pre-COVID levels even by the end of the year.

Third, while consumer-facing sectors (e.g., retail trade and food & beverage services) have been adversely affected by ongoing domestic restrictions (e.g., dining-in limits), they should start to recover as the restrictions are eased over the course of the year and consumer sentiments improve in tandem with better labour market conditions. Nonetheless, these sectors are not expected to return to pre-COVID levels by year-end, in part due to the subdued tourism outlook.

Fourth, the construction and marine & offshore engineering sectors are projected to see some recovery from the low base last year. However, labour shortages arising from prevailing border restrictions on the entry of migrant workers, especially from South Asia, are likely to continue to weigh on the recovery of activities at worksites and shipyards. While border restrictions may be eased towards the later part of the year, thus alleviating labour shortages, the output of these sectors is expected to remain substantially below pre-COVID levels even at the end of the year.

Taking into account the better-than-expected performance of the Singapore economy in the first half of the year, as well as the latest external and domestic economic developments, **MTI has upgraded the GDP growth forecast for 2021 to "6.0 to 7.0 per cent", from "4.0 to 6.0 per cent".**

FEATURE ARTICLES

FEATURE ARTICLE

FIRM-LEVEL RETURNS TO EMPLOYER-SPONSORED TRAINING

INTRODUCTION

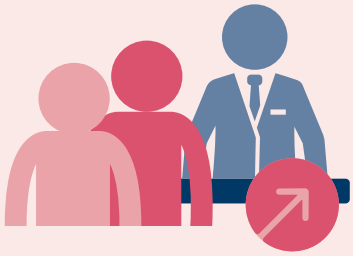
Between 2010 and 2018, the number of employer-sponsored training places with funding support from SkillsFuture Singapore (SSG) generally increased. This reflects part of the positive response from firms to the Government's ongoing efforts to encourage employers to support their employees for training. This article examines the impact of employer-sponsored training on firm-level outcomes.

FINDINGS

A 10 percentage-point increase in the proportion of local workers sponsored for training led to:

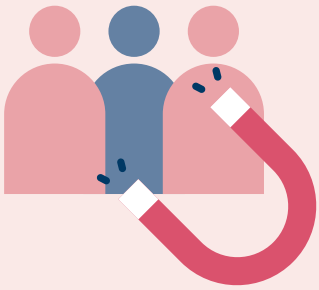
0.7
per cent
higher revenue
on average
over 4 years

0.5
per cent
larger local employment
on average
over 4 years



2.2
per cent
improvement in labour productivity
on average
over 2 years

0.6
percentage-point
improvement in the retention of local employees in the year of training



POLICY TAKEAWAY

Our findings suggest that employer-sponsored training is effective at improving firm-level outcomes. Under the Next Bound of SkillsFuture, the Government will continue to support enterprises to further develop their workforce through training. These measures will enable enterprises to transform and stay ahead of industry disruption, as part of the nation's workforce development strategy.

EXECUTIVE SUMMARY

- Since 2010, the number of employer-sponsored training places with funding support from SkillsFuture Singapore (SSG) has seen a general uptrend. This partly reflects the result of the Government's ongoing effort to encourage employers to support their employees for training.

- While previous studies have established positive returns to training for individuals in Singapore, this study represents our first attempt to examine the returns that accrue to firms from sponsoring their employees for training. Specifically, the study examines the impact of employer-sponsored training on firms' revenue, local employment, labour productivity and retention of local employees.

- Our results show that there are positive returns to firms from sponsoring their workers for training. In particular, we find that for a 10 percentage-point increase in the proportion of local workers sponsored for training by firms, firms' annual revenue was 0.7 per cent higher on average over a four-year period (i.e., in the year of training and three years after training), while their local workforce was 0.5 per cent larger on average over the four years. The increase in revenue and local employment could have come about because the training had enabled firms to expand the scale of their operations, possibly by improving the efficiency and capability of their workers. Reflecting the latter, we find evidence that even as the firms increased their local workforce, they also experienced improvements in labour productivity (2.2 per cent on average over two years). Meanwhile, investments in worker training was found to improve firms' retention of their local employees (0.6 percentage-point in the year of training).

- The positive returns from employer-sponsored training suggest that it will be beneficial for firms to invest in the training of their workers. On its part, the Government will continue to support employers in their workforce development journey.

The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry, SkillsFuture Singapore or the Government of Singapore.[1]

INTRODUCTION

In recent years, the Singapore Government has ramped up efforts to support Singaporeans in their pursuit of lifelong learning and skills mastery, notably through the launch of the SkillsFuture national movement in 2015. A key component of the movement is promoting greater involvement by employers in the upskilling of their workers and in recognising skills-based career progression. Strengthening the enterprise pillar of the skills ecosystem is also a major focus area under the Next Bound of SkillsFuture. Given the strong push for employers to support their workers for training, it is important to quantify the returns to employers from such investments. This study represents a first attempt to empirically examine the returns to employer-sponsored training on firm-level outcomes in Singapore.

LITERATURE REVIEW

From the academic literature, there are two main channels through which employer-sponsored training can benefit firms. First, such training could raise the productivity of the firms' workforce by equipping them with the relevant skillsets and enhancing their capabilities. With a more productive workforce, firms would be better able to expand into new activities. As the firms expand the scale of their operations, their revenue and employment would rise in tandem. Second, employer-sponsored training could improve the retention of workers, thereby leading to increased human capital accumulation at the firm. This is especially if the training is focused on firm-specific skills.

1 *We would like to thank Ms Yong Yik Wei, Mr Kuhan Harichandra, Mr Lau Zheng Yi and Mr Lee Zen Wea for their useful suggestions and comments, as well as the Department of Statistics for its invaluable statistical support. We are also grateful to the Enterprise Engagement Office at SkillsFuture Singapore for its inputs to this study. All errors belong to the authors.*

Empirical studies in other countries have largely focused on the impact of employer-sponsored training on firms' productivity, and generally found positive effects. For instance, Almeida and Carneiro (2009) found that among large manufacturing firms in Portugal, an increase in employer-sponsored training of 10 hours per employee per year raised firms' productivity in the same year by 0.6 per cent on average. Similarly, Colombo and Stanca (2008) found that in Italy, an increase in the share of trainees by 10 percentage-points raised firms' productivity by 0.7 per cent in the same year.

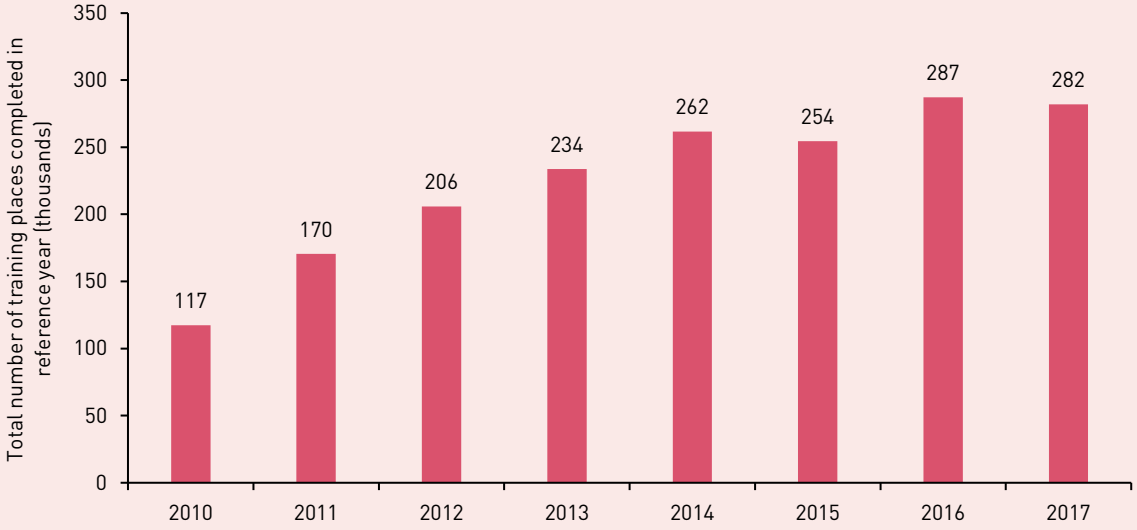
In Singapore's context, past studies have found positive returns to training at the individual level. For example, Lee (2013) found that low-wage workers who participated in structured training between 2007 and 2009 experienced an average real wage increase of 3.1 per cent. Other analyses of specific training programmes have also found positive individual-level returns. For instance, Teo and Wen (2018) found that participating in Workforce Skills Qualification (WSQ) training increased trainees' average real wages and their probability of employment in the year after training. Similarly, Suhaiemi and Ong (2019) found that the SkillsFuture Work-Study Post-Diploma programme for fresh and recent polytechnic graduates, previously known as the Earn and Learn Programme, had a positive effect on wages, with participants enjoying a wage premium over a comparable group of polytechnic graduates both during and after graduating from the programme.

DATA AND EMPIRICAL METHODOLOGY

To examine the firm-level returns to employer-sponsored training, this study uses data from SkillsFuture Singapore (SSG) on SSG-funded training completed by Singapore Citizens and Permanent Residents between 2010 and 2018.[2] This dataset includes information on the number of trainees sponsored by each firm. The training data is then merged with a firm-level longitudinal administrative dataset, which includes data on the key characteristics of firms such as their revenue, employment and labour productivity. The resulting firm-level dataset differentiates between employees who were sponsored for training by their main employer[3] (henceforth referred to as employer-sponsored trainees), and those who were sponsored for training by an employer that was not their main employer (i.e., non-main employer). For the purpose of this study, employer-sponsored training refers only to training that was sponsored by the worker's main employer.[4]

Between 2010 and 2017, the number of employer-sponsored training places has generally seen an increase (Exhibit 1).[5] At the firm-level, the share of employer-sponsored trainees among the local workforce of a firm was relatively stable during the period of analysis, with the median firm sponsoring around 13 per cent of its local workforce for training (Exhibit 2).

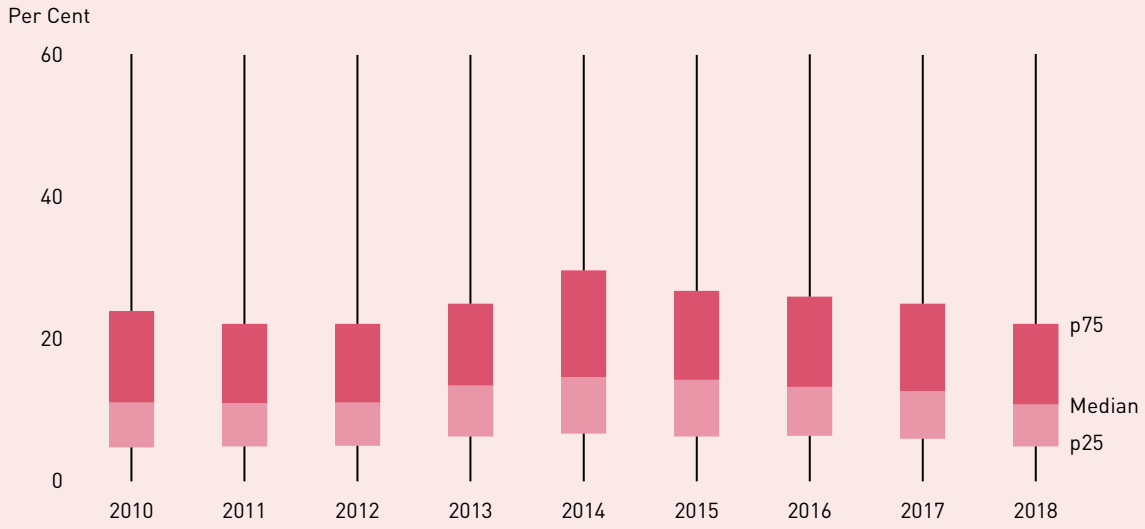
Exhibit 1: Number of Employer-Sponsored Training Places (Thousands), 2010-2017*



Source: Authors' calculation, based on data from SSG
* Data for 2018 is not shown as it was incomplete at the start of this study (refer to footnote 5).

2 *The data captures only courses funded by SSG. Individuals who attended non-SSG-funded training may also contribute positively to firm-level outcomes, but this cannot be examined in the study due to the lack of data on such training.*
3 *To construct the firm-level dataset, a worker is assigned to a firm based on his/her main employer, which refers to the firm at which the worker had worked the most number of months in a given year.*
4 *Workers are considered to be sponsored for training by a non-main employer if the main employer is not the firm that had sponsored the worker for training due to a job switch by the worker. Training sponsored by non-main employers is excluded from the definition of "employer-sponsored training", as this study focuses on the benefits of training that accrue to the sponsoring firms.*
5 *At the commencement of the study, the 2018 claims data for training that was completed in 2018 was incomplete due to the lag between the completion of training and the submission of claims by firms, i.e., not all of the training claims were submitted by the cut-off period of the study. Nonetheless, the available 2018 training records are included in the study sample for analysis as they increase the sample size and allow for more precise estimation of the shorter-term returns to employer-sponsored training.*

Exhibit 2: Distribution of Employer-Sponsored Trainee Share among Firms with at least One Employer-Sponsored Trainee (%), 2010-2018



Source: Authors' calculation, based on data from SSG and other administrative sources
Note: Data was compiled based on firms with available revenue and value-added (VA) data and had local employees in the reference year. Percentiles were computed based on firms with at least one employer-sponsored trainee.

In terms of the characteristics of firms, an examination of the data shows that firms with trained employees[6] (including employer-sponsored trainees) had higher revenue and labour productivity (as measured by VA per worker) as well as more local workers on average as compared to firms that never had trained employees (Exhibit 3).

Exhibit 3: Characteristics of Firms by Training Status, 2010-2018

	Firms with no trained employees in all years	Firms with at least one trained employee in at least one year
Panel A: Number of Firms		
Number of Unique Firms	145,500	88,600
Panel B: Firm-level Characteristics (Average in 2010 – 2018)		
Average Revenue ($'000)	12,594	85,135
Average VA per Worker ($'000)	76.9	79.7
Average Number of Local Workers	5	63

Source: Authors' calculation, based on data from SSG and other administrative sources
Note: Trained employees refer to local employees who had attended any form of training, including employer-sponsored training or training sponsored by a non-main employer.

6 *For the main analysis, we focus on firms with trained employees, which include both employer-sponsored trainees and trainees sponsored by their non-main employers, rather than on a narrower set of firms with at least one employer-sponsored trainee. This is because the number of unique firms in the latter sample is significantly smaller, and may hence result in less precise estimates in the regression analysis. Nonetheless, we have also repeated the analysis using the latter sample of firms as a robustness check, and find results that are similar to our main findings.*

Apart from such observable differences, there may also be unobservable differences across firms which could lead to selection bias. For example, firms which have better management quality – a factor not observed in the data – may systematically choose to sponsor their employees for training to improve the capability of their workforce. At the same time, firms with better management quality may have higher levels of worker engagement, which may in turn lead to an improvement in their outcomes (e.g., productivity). Consequently, a simple comparison of the outcomes of firms that sponsored training with those that did not, without accounting for management quality, would overstate the impact of employer-sponsored training since the differences in outcomes would also reflect the effect of management quality.

To mitigate such selection biases and derive the causal impact of employer-sponsored training on firm-level outcomes, we first restrict our analytical sample to the 88,600 firms which had trained employees in at least one of the years between 2010 and 2018 (see Exhibit 3). Next, we utilise the fixed effects regression specification to control for time-invariant firm-level characteristics (e.g., management quality of the firm), observable firm-level characteristics that change across time (e.g., educational qualification of the firm's local workforce), as well as sector-specific economic time trends (e.g., sector-specific demand conditions that affect firm-level outcomes). As the returns of employer-sponsored training to the firm may materialise with a time lag, we incorporate three lags in our regression to estimate the effect of employer-sponsored training for up to three years after training. Our regression specification is thus as follows:

$$Y_{it} = \sum_{j=0}^{3} \beta_{1j} \cdot EmpShare_{i,t-j} + X_{it} + \alpha_i + \delta_{st} + \epsilon_{it} \quad (1)$$

Where:

- Y_{it} denotes the log revenue, log VA per worker, log local employment or the one-year retention rate of local employees of firm i in year t;
- $EmpShare_{i,t-j}$ is the share of local employees who were sponsored for training by their main employer (firm i) in year $t-j$;
- X_{it} are the firm-level controls, including the firm's age, ownership status, average age of local employees, share of male local employees, share of local employees with degree qualifications, share of local employees sponsored for training by their non-main employers, and the log of the grant amount received in the previous year of firm i in year t;
- α_i denotes the firm fixed effects;
- δ_{st} denotes the sector-year fixed effects; and
- ϵ_{it} represents the error term capturing unobservable factors affecting Y_{it}.

To further investigate if the impact of employer-sponsored training varies across firms of different sizes, we run a regression specification where we interact the training variable with dummy variables that denote whether the firm was a small- and medium-sized enterprise (SME)[7]:

$$Y_{it} = \sum_{j=0}^{3} \beta_{1j} \cdot SME_{i,t-j} + \sum_{j=0}^{3} \beta_{2j} \cdot SME_{i,t-j} \times EmpShare_{i,t-j} + \sum_{j=0}^{3} \beta_{3j} \cdot nonSME_{i,t-j} \times EmpShare_{i,t-j} + X_{it} + \alpha_i + \delta_{st} + \epsilon_{it} \quad (2)$$

Where:

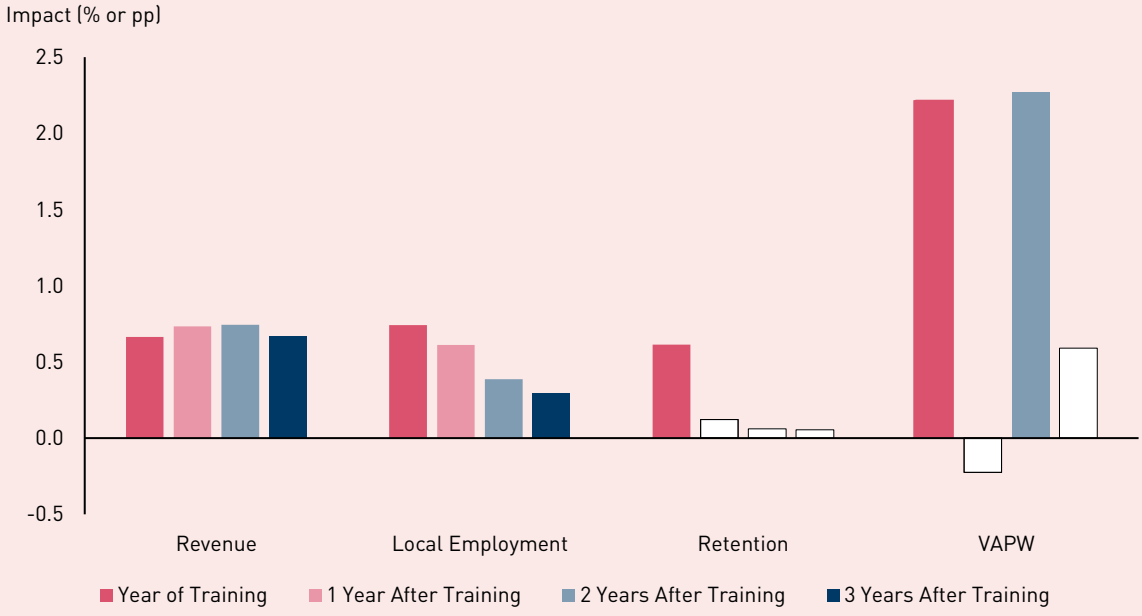
- $SME_{i,t-j}$ is an indicator for whether firm i was a SME in year t-j;
- $nonSME_{i,t-j}$ is an indicator for whether firm i was a non-SME in year t-j; and
- All other variables are as defined in equation (1).

7 *SMEs are defined as enterprises with operating receipts not more than $100 million or employment not more than 200 workers.*

FINDINGS

Our findings show that employer-sponsored training led to better outcomes for firms across all the outcomes studied. In addition, we find that the returns on revenue and local employment were sustained for up to three years after training (Exhibit 4).

Exhibit 4: Impact of 10 Percentage-Point Increase in Employer-Sponsored Trainee Share of Firms' Local Workforce



Note: Coloured bars indicate that the corresponding regression coefficients are statistically significant at the 5% level.

Specifically, we find that for every 10 percentage-point (pp) increase in the proportion of local workers sponsored for training, the firms' annual revenue was 0.7 per cent higher on average over a four-year period (i.e., in the year of training and three years after training). Similarly, the firms' local workforce was 0.5 per cent larger on average over the four-year period. These findings suggest that employer-sponsored training had enabled firms to expand the scale of their operations, possibly by improving the efficiency and capability of their workers. Reflecting the latter, we find evidence that even as firms increased their local workforce, they also experienced improvements in labour productivity. Specifically, labour productivity was found to be 2.2 per cent higher on average over two years (including in the year of training), likely because employer-sponsored training equipped the firms' workers with new skills or capabilities to perform their tasks more efficiently. Meanwhile, investments in worker training also helped firms to retain their workers. In particular, we find that for every 10pp increase in the employer-sponsored trainee share, the retention of local employees improved by 0.6pp in the year of training.

By firm size, our results show that SMEs saw strong positive returns to employer-sponsored training across all the outcomes studied (Exhibit 5). For the non-SMEs, while the estimates for most outcomes were positive, they were not statistically significant due to the small sample size.[8] Overall, our results suggest that it would be beneficial for firms, especially SMEs, to invest in the training of their local workers.

Exhibit 5: Impact of 10 Percentage-Point Increase in Employer-Sponsored Trainee Share of Firms' Local Workforce, by Firm Size

Firm Type	Revenue	Local Employment	Retention	VA per Worker
SMEs	+0.7% (over 4 years)	+0.5% (over 4 years)	+0.4pp (over 2 years)	+2.2% (over 2 years)
Non-SMEs	No statistically significant impact	No statistically significant impact	+0.8pp (in year of training)	No statistically significant impact

8 *There were 24,800 SMEs and 700 non-SMEs with at least one trained employee on average each year in 2010-2018.*

To ensure the robustness of our findings, we conduct three further checks. First, we introduce a firm-specific linear time trend to the fixed effects regression model to address concerns that there could be reverse causality (i.e., firms which are rapidly expanding their operations are more likely to sponsor training). Second, we employ a different empirical strategy by using propensity score matching to construct a control group from among firms that never had trained employees but are observably similar to firms that had trained employees (i.e., treated firms). We then run the fixed effects regression using the pooled sample of treated and matched control firms. Third, to address concerns that firms which sponsor training may be different from firms which recruit trained employees (e.g., from the open market), we restrict the sample to only firms that had sponsored at least one trainee (employer-sponsored training) in 2010-2018. The results from these three alternative samples or specifications are similar to our main results, indicating the robustness of our findings.

CONCLUSION

Our study finds that employer-sponsored training leads to positive returns for firms, especially SMEs. In particular, firms that sponsored workers for training benefitted from higher revenue, local employment, labour productivity and the retention of their local employees. Several of these positive outcomes were also found to be sustained for a few years after training. These results indicate that it would be beneficial for employers to invest in workforce training and development.

On its part, the Government will continue to support employers in their effort to develop their workforce. Under the Next Bound of SkillsFuture, the Government has rolled out new initiatives that are targeted at firms. For example, the SkillsFuture Enterprise Credit[9] provides additional funding support for enterprise and workforce transformation, while the SkillsFuture Queen Bee initiative establishes public-private sector partnerships to accelerate employer-initiated skills development efforts across firms, particularly SMEs. These measures will help enterprises to transform and stay ahead of industry disruptions, as well as play a more prominent role in the nation's workforce development strategy.

Contributed by:

Mr Ang Kang Jie, Economist
Mr Jonathan Khoo, Economist
Ms Marsha Teo, Economist (currently on secondment to the Central Provident Fund Board)
Ms Wen Jia Ying, Economist (currently on secondment to the Ministry of Manpower)
Economics Division
Ministry of Trade and Industry

9 *The SkillsFuture Enterprise Credit was announced in the Unity Budget Statement delivered in February 2020. The scheme provides eligible employers with a one-off $10,000 credit to cover up to 90% of out-of-pocket expenses on qualifying costs for supportable initiatives related to workforce development (e.g., course fee expenses for Professional Conversion Programmes and Rank-and-File Place-and-Train Programmes) and enterprise transformation (e.g., Enterprise Development Grant and Productivity Solutions Grant), over and above the prevailing support levels of existing schemes.*

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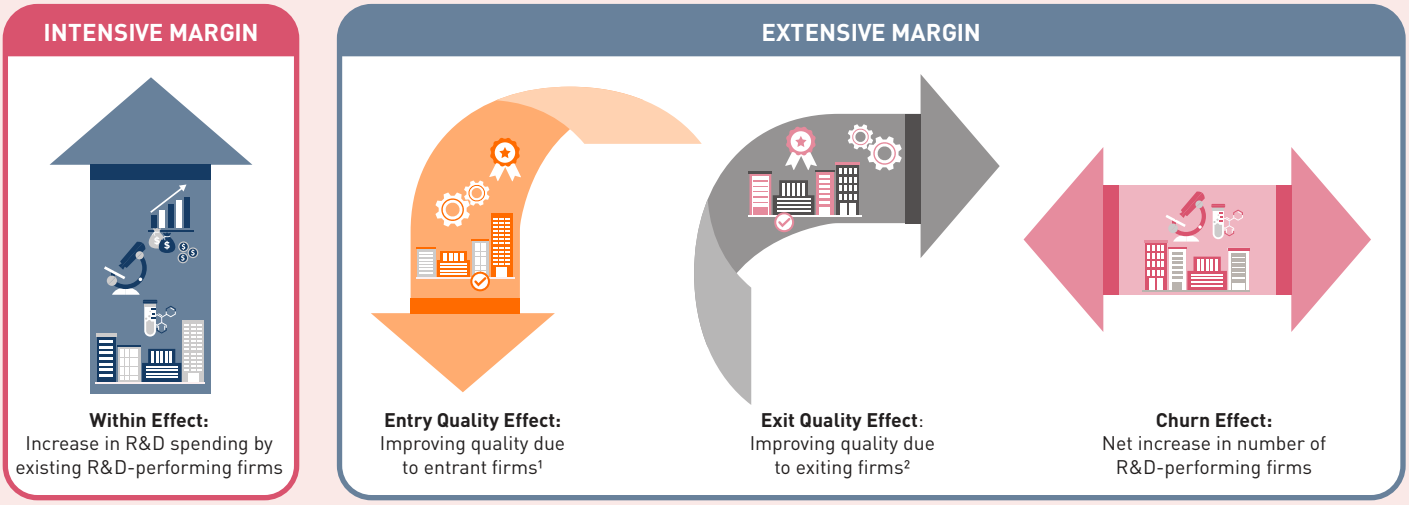
FEATURE ARTICLE

EXAMINING THE EXTENSIVE AND INTENSIVE MARGINS OF PRIVATE RESEARCH AND DEVELOPMENT (R&D) EXPENDITURE GROWTH IN SINGAPORE

INTRODUCTION

In the innovation ecosystem, the private sector is an important driver of value creation and source of R&D. To obtain a deeper understanding of the drivers of private R&D expenditure growth in Singapore, this study examines the intensive and extensive margins of business expenditure on R&D (BERD) growth.

BERD growth can be decomposed into the following components:



[1] Improving quality arises when entrant firms spend more on R&D compared to the average R&D spending of firms of the same firm archetype in the previous period.
[2] Improving quality arises when exiting firms spent less on R&D compared to the average R&D spending of firms of the same firm archetype in the previous period.

FINDINGS

Finding 1

Since the 2009 Global Financial Crisis, BERD growth in Singapore has largely been weighed down by weaker extensive margins, as the number of entrant R&D firms fell and the number of firms that stopped performing R&D increased. By contrast, the intensive margin of BERD growth remained resilient.

Finding 2

Government funding for R&D-performing firms has been supportive of positive outcomes, with government-funded firms exhibiting stronger BERD growth than non-government-funded firms.

CONCLUSION

The Government will continue to encourage existing R&D-performing firms to deepen R&D activities (i.e., intensive margin), and incentivise new firms to start performing R&D (i.e., extensive margin). Supported by the Government's investments under the Research, Innovation and Enterprise 2025 Plan, private enterprises will continue to play an important role in accelerating Singapore's transformation into an innovation-led economy.

EXECUTIVE SUMMARY

- Using a panel dataset from the Agency for Science, Technology and Research's (A*STAR) annual National Survey of Research and Development (R&D), this study examines the dynamics of Business Expenditure on R&D (BERD) growth in Singapore, at the overall economy level and by different firm archetypes, over two periods (2002-2010 and 2010-2018).

- This study decomposes BERD growth into four components – (i) Within Effect, (ii) Entry Quality Effect, (iii) Exit Quality Effect, and (iv) Churn Effect. The Within Effect can be interpreted as the intensive margin of BERD growth and reflects changes in R&D spending by firms that already perform R&D. The Entry Quality Effect, Exit Quality Effect and Churn Effect can be interpreted jointly as the extensive margin of BERD growth, which reflects changes in R&D spending due to (i) quality changes in the composition of firms that perform R&D (caused by the entry and exit of firms), and (ii) the net change in the number of R&D-performing firms.

- Since the 2009 Global Financial Crisis, overall BERD growth in Singapore has largely been weighed down by weaker extensive margins. Notably, there was a significant moderation in the Churn Effect, as the number of entrant R&D firms fell and the number of firms that stopped performing R&D increased. By contrast, the intensive margin of overall BERD growth remained resilient, easing only slightly during the period of 2010-2018 compared to the earlier period of 2002-2010.

- The study also finds that government funding for R&D-performing firms has been supportive of positive outcomes, with government-funded firms exhibiting stronger BERD growth (supported by positive Within, Churn and Exit Quality Effects) than non-government-funded firms.

- Overall, these findings highlight the complementary roles that the public and private sectors play in the R&D ecosystem, with public funding catalysing private R&D expenditure and strengthening private firms' R&D capabilities over time. In order to drive BERD growth in the coming years, the Government will continue to encourage existing R&D-performing firms to deepen their R&D activities (i.e., intensive margin) and incentivise new firms to start performing R&D (i.e., extensive margin). Supported by the Government's $25 billion investment under the Research, Innovation and Enterprise (RIE) 2025 Plan, private enterprises will continue to play an important role in accelerating Singapore's transformation into an innovation-led economy.

*The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry (MTI), Agency for Science, Technology and Research (A*STAR), Economic Development Board (EDB), Enterprise Singapore (ESG), National Research Foundation (NRF) or the Government of Singapore.*[1]

INTRODUCTION

In the innovation ecosystem, the private sector is an important driver of value creation and source of research and development (R&D). Recognising the key role that the private sector plays in Singapore's ambitions to become an innovation-led economy, the Government has been encouraging firms to undertake R&D and also to strengthen their capability to innovate and scale up. Between 2002 and 2018, the number of organisations performing R&D in the private sector rose from 519 to 857 (or 3.2 per cent per annum, p.a.). During this period, business expenditure on R&D (BERD) grew robustly by 6.5 per cent p.a., supported by an increase in BERD by both local (2.6 per cent p.a.) and foreign (8.8 per cent p.a.) enterprises. In turn, private R&D investments have contributed positively to productivity growth, with an earlier MTI study finding that a 1 per cent increase in R&D stock raised firm-level productivity by 0.135 per cent on average (see Teo et al., 2019).

1 *We would like to thank Ms Yong Yik Wei for her useful suggestions and comments, as well as EDB, ESG and NRF for their inputs to this study. We would also like to acknowledge the statistical support from A*STAR's Research and Statistics Unit. All errors belong to the authors.*

However, analysis of aggregate BERD trends tends to mask firm-level dynamics and variations over different time periods. For instance, since the 2009 Global Financial Crisis, BERD growth in Singapore has slowed. Between 2010 and 2018, BERD increased by 5.1 per cent p.a. (or 49 per cent cumulatively), compared to 7.9 per cent p.a. (or 84 per cent cumulatively) between 2002 and 2010. During the two periods, the R&D expenditure and entry/exit dynamics of firms also differed across different enterprise segments.

Against this backdrop, this study examines the intensive and extensive margins of BERD growth to obtain a deeper understanding of the drivers of private R&D expenditure in Singapore. We define the intensive margin of BERD growth to be the component that can be attributed to changes in R&D expenditure by firms that already perform R&D. In comparison, the extensive margin of BERD growth is defined as the component that is influenced by the quantity and quality of R&D entrant and exiting firms.

LITERATURE REVIEW

Various studies overseas have examined the drivers of private R&D growth across selected economies at the sectoral and firm levels, with variations in the methodology adopted.

At the sectoral level, the studies generally decompose private R&D intensity growth into intrinsic (i.e., due to changes within industries) and structural (i.e., due to changes in sectoral composition) components. Using industry-level panel data, Van Reenen (1997) examined the factors behind the United Kingdom's (UK) slow business R&D growth between 1973 and 1992 by decomposing the aggregate changes in R&D intensity into within-industry and between-industry (i.e., changes in the sectoral shares of output, which affected aggregate R&D intensity because sectors had varied R&D intensities) effects. From this shift-share analysis, the author found that the UK's slow growth in R&D intensity was primarily caused by the within-industry effect (e.g., slow R&D intensity growth in the manufacturing sectors), rather than the between-industry effect (e.g., slow restructuring towards high-tech sectors). Applying a similar approach using data from the 2008 European Union (EU) Industrial R&D Investment Scoreboard, Moncada-Paternò-Castello et al. (2010) examined the contributions of intrinsic and structural effects in explaining the EU's lower corporate R&D intensity relative to the United States (US), and found that the difference was mainly attributable to the structural effect because of the US' greater specialisation in sectors with high R&D intensity (e.g., information communications technology, ICT).

At the firm level, Higón et al. (2011) decomposed the private R&D expenditure growth of Spanish manufacturing firms between 1990 and 2006 by its intensive (i.e., contribution of R&D deepening among firms that already performed R&D) and extensive (i.e., contributions of entrant firms that started to perform R&D and exiting firms that ceased to perform R&D) margins. The authors found that the relative importance of each component differed for small and large firms. For small firms, R&D expenditure growth was largely driven by the extensive margin, with the R&D spending of entrant firms exceeding the loss in R&D spending by exiting firms. For large firms, R&D expenditure growth by continuing firms was the main contributor to overall R&D expenditure growth (i.e., intensive margin).

EMPIRICAL METHODOLOGY

For this study, we draw on Higón et al.'s (2011) approach to decompose changes in BERD between time t and $t\text{-}1$ (i.e., $\Delta\text{BERD}_{i,t}$) into (i) changes in BERD by continuing firms c, and (ii) the net change in BERD from entering and exiting firms (i.e., increase in BERD from entering firms e, net of loss of BERD from exiting firms x). However, we build on their methodology by further decomposing the net change in BERD from entering and exiting firms into the contributions from (i) the net change in the number of firms, and (ii) changes in the relative quality of entering and exiting firms. To do this, we re-write the mathematical equation in terms of the number of firms and the average BERD of firms in each group and re-arrange the terms. The final decomposition of BERD growth for firm archetype[2] i between time t and $t\text{-}1$ (i.e., $BERD\ growth_{i,t}$) is obtained by dividing all the terms by BERD in time $t\text{-}1$:

$$\begin{aligned}\Delta\text{BERD}_{i,t} &= \sum_{f\in c}(BERD_{f,i,t} - BERD_{f,i,t-1}) + \sum_{f\in e} BERD_{f,i,t} - \sum_{f\in x} BERD_{f,i,t-1} \\ &= n_{c,i,t}\,(b_{c,i,t} - b_{c,i,t-1}) + n_{e,i,t}\,b_{e,i,t} - n_{x,i,t-1}\,b_{x,i,t-1} \\ &= n_{c,i,t}\,(b_{c,i,t} - b_{c,i,t-1}) + n_{e,i,t}\,(b_{e,i,t} - b_{i,t-1}) - n_{x,i,t-1}\,(b_{x,i,t-1} - b_{i,t-1}) + (n_{e,i,t} - n_{x,i,t-1})\,b_{i,t-1}\end{aligned}$$

2 *For the aggregate-level BERD growth decomposition, the firm archetype i includes all firms in the economy.*

$$BERD\ growth_{i,t} = \frac{\Delta BERD_{i,t}}{BERD_{i,t-1}} = \frac{n_{c,i,t}(b_{c,i,t} - b_{c,i,t-1})}{BERD_{i,t-1}} \quad \text{[Within Effect]}$$

$$+ \frac{n_{e,i,t}(b_{e,i,t} - b_{i,t-1})}{BERD_{i,t-1}} \quad \text{[Entry Quality Effect]}$$

$$- \frac{n_{x,i,t-1}(b_{x,i,t-1} - b_{i,t-1})}{BERD_{i,t-1}} \quad \text{[Exit Quality Effect]}$$

$$+ \frac{(n_{e,i,t} - n_{x,i,t-1})b_{i,t-1}}{BERD_{i,t-1}} \quad \text{[Churn Effect]}$$

Where:

- Firm f is a continuing R&D firm (c), new entrant R&D firm (e), or exiting R&D firm (x)
- $BERD_{f,i,t}$ is the BERD of firms (where f is c, e or x) of firm archetype i at time t
- $n_{f,i,t}$ is the number of firms (where f is c, e or x) of firm archetype i at time t
- $b_{i,t}$ is the average BERD of all firms of firm archetype i at time t
- $b_{f,i,t}$ is the average BERD of firms (where f is c, e or x) of firm archetype i at time t

Based on the above decomposition, BERD growth can be mathematically expressed as four components – (i) Within Effect, (ii) Entry Quality Effect, (iii) Exit Quality Effect, and (iv) Churn Effect. The Within Effect contributes positively if continuing firms spend more on R&D between time *t-1* and *t*. The Entry Quality Effect contributes positively if new entrants in time *t* spend more on R&D on average in time *t*, compared to the average R&D spending of firms of the same firm archetype *i* in time *t-1*. Similarly, the Exit Quality Effect contributes positively if exiting firms in time *t-1* spent less on R&D on average in time *t-1*, compared to the average R&D spending of firms of the same firm archetype *i* in time *t-1*. Lastly, the Churn Effect contributes positively if the number of entrants in time *t* exceeds the number of exiting firms in time *t-1*.

The Within Effect can be interpreted as the intensive margin of BERD growth, as it measures the contribution to BERD by existing firms that perform R&D in both the previous and present periods. The Entry Quality, Exit Quality and Churn Effects can be interpreted jointly as the extensive margin of BERD growth, as they measure the contribution to BERD by new firms performing R&D net of the contribution of firms that stopped performing R&D. Specifically, the Entry Quality and Exit Quality Effects reflect whether BERD growth is due to quality changes in the composition of firms that perform R&D (caused by the entry and exit of firms), while the Churn Effect measures the net change in the number of R&D-performing firms.

DATA

This study uses an anonymised panel dataset from the Agency for Science, Technology and Research's (A*STAR) annual National Survey of R&D over the period of 2002 to 2018. The dataset contains information on firms' R&D expenditure, revenue, employment, industry classification and sources of R&D funding, among others. In this study, we examine the drivers of BERD growth over two eight-year periods[3] (i.e., 2002-2010 and 2010-2018), covering 1,127 and 1,347 firms respectively.

Our analysis is conducted at the overall economy level (i.e., for all firms), as well as by firm archetypes. The segmentation of firms is based on their ownership status (i.e., local[4] and foreign firms), small- and medium-sized enterprise (SME) status[5], and whether they received government support (e.g., R&D funding[6] from agencies such as A*STAR, Economic Development Board and Enterprise Singapore).

SUMMARY STATISTICS

Between 2002 and 2018, the number of firms performing R&D in Singapore rose (Exhibit 1). Notably, the number of R&D-performing local firms rose more rapidly (3.4 per cent p.a.) than the number of R&D-performing foreign firms (2.8 per cent p.a.). During this period, both local and foreign firms also saw growth in their average BERD (Exhibit 2). Reflecting the contribution of foreign firms to Singapore's innovation landscape, their average BERD ($12.5 million) was almost 1.9 times the average BERD across all firms ($6.6 million) in 2018.

3 *Cumulative BERD growth between 2002 and 2010 (or 2010 and 2018) reflects eight years of growth, with 2002 (or 2010) as the base year.*
4 *Local firms are defined as firms that have at least 30 per cent local equity ownership.*
5 *SMEs are defined as firms with sales revenue that does not exceed $100 million, or with employment size that does not exceed 200.*
6 *In 2018, R&D expenditure in the private sector was primarily sourced from its own funds (83 per cent). Other sources of funding included foreign-based companies (10 per cent), Government sector (4.3 per cent), private sector (1.7 per cent), foreign governments and international organisations (0.3 per cent), and higher education sector (0.01 per cent).*

Exhibit 1: Number of Local and Foreign Firms Performing R&D, 2002-2018

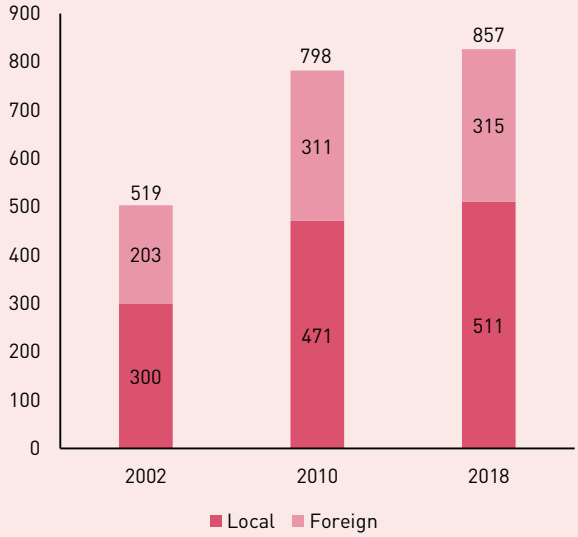
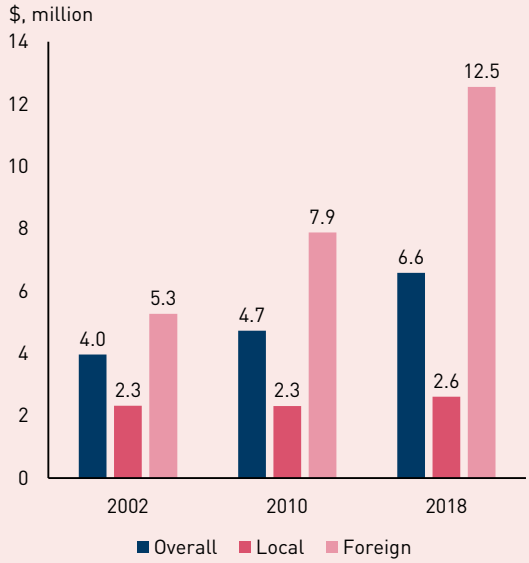


Exhibit 2: Average BERD for Local and Foreign Firms Performing R&D, 2002-2018



Source: Authors, A*STAR
Notes: The number of local and foreign firms may not sum to the overall figure because the analysis of local/foreign firms excluded firms that changed their ownership status in the period. The number of firms and average BERD in 2010 reflect the number of firms and average BERD at the end of the 2002-2010 period. This may differ from the corresponding figures at the start of the 2010-2018 period because of changes in the local/foreign ownership status of some firms.

Over the years, there was a sizeable increase in the number of R&D-performing SMEs, although non-SMEs remained a key driver of overall BERD in the economy because of their higher average R&D spending. Between 2002 and 2018, the number of R&D-performing SMEs and non-SMEs both rose, with the increase in SMEs (3.3 per cent p.a.) outpacing that of non-SMEs (1.6 per cent p.a.) (Exhibit 3). During this period, the average BERD increased for both SMEs (3.9 per cent p.a.) and non-SMEs (1.7 per cent p.a.) (Exhibit 4). Nonetheless, as at 2018, non-SMEs continued to be the main contributor to overall BERD in the economy, with an average BERD of $20.6 million. As a comparison, the average BERD of R&D-performing SMEs was $2.9 million in 2018.

Exhibit 3: Number of SMEs and Non-SMEs Performing R&D, 2002-2018

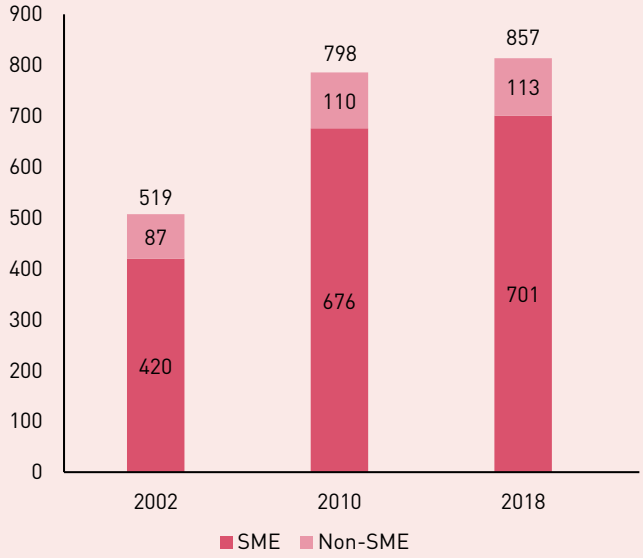
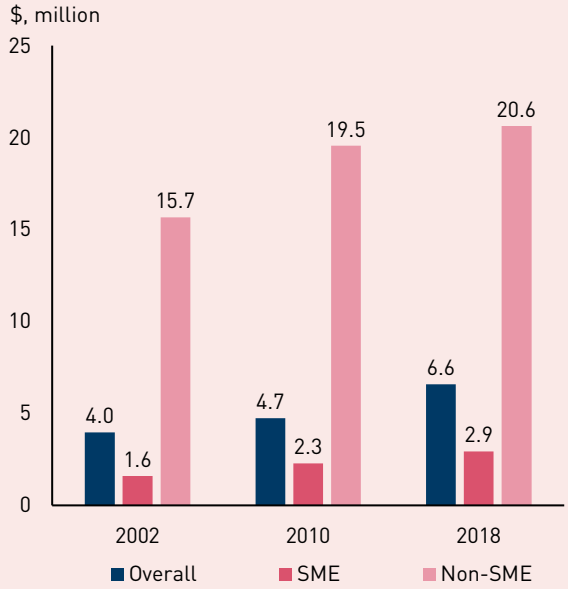


Exhibit 4: Average BERD for SMEs and Non-SMEs Performing R&D, 2002-2018



Source: Authors, A*STAR
Notes: The number of SMEs and non-SMEs may not sum to the overall figure because the analysis of SMEs/non-SMEs excluded firms that changed their SME ownership status in the period. The number of firms and average BERD in 2010 reflect the number of firms and average BERD at the end of the 2002-2010 period. This may differ from the corresponding figures at the start of the 2010-2018 period because of changes in the SME status of some firms.

By government funding status, the share of R&D-performing firms without government funding rose from 57 per cent in 2002 to 62 per cent in 2018, in tandem with a 3.7 per cent p.a. increase in the number of such firms over this period (Exhibit 5).[7] Both firms with and without government funding saw their average BERD levels rise between 2002 and 2018 (3.6 per cent p.a. and 3.3 per cent p.a. respectively) (Exhibit 6). Given its stronger growth, the BERD of firms with government funding pulled further ahead of the BERD of firms without government funding. In 2018, BERD in firms with government funding averaged $11.1 million, almost three times the average BERD in firms without government funding ($3.8 million).

Exhibit 5: Number of Firms Performing R&D With Government Funding and Without Government Funding, 2002-2018

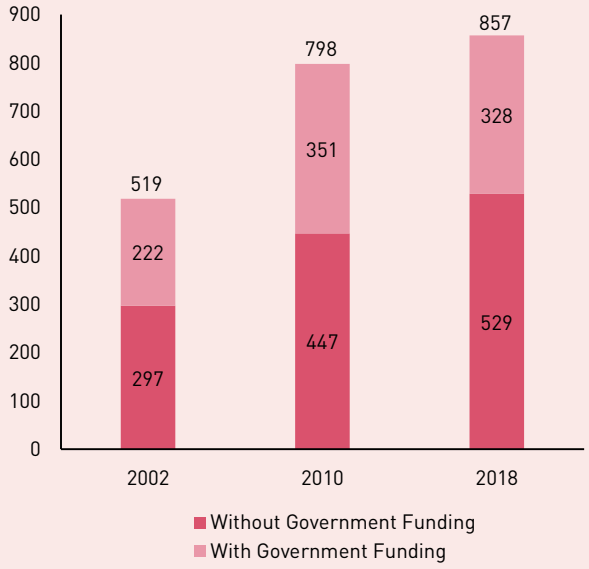
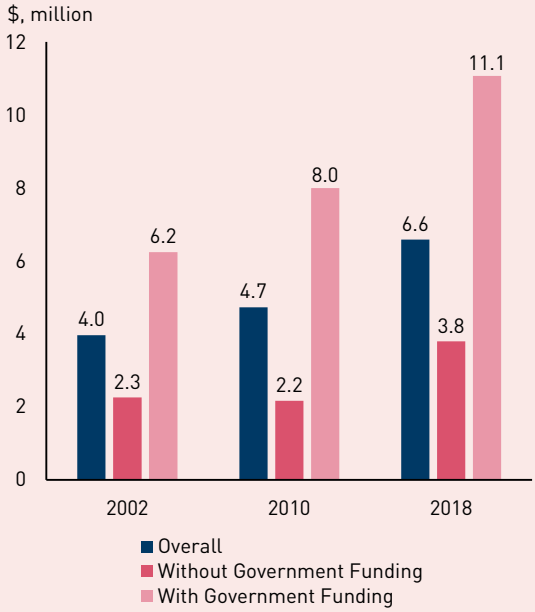


Exhibit 6: Average BERD for Firms Performing R&D With Government Funding and Without Government Funding, 2002-2018



Source: Authors, A*STAR
Notes: Firms with government funding in 2002 and 2010 received it at least once in the 2002-2010 period, while those with government funding in 2018 received it at least once in the 2010-2018 period. The number of firms and average BERD in 2010 reflect the number of firms and average BERD at the end of the 2002-2010 period. This may differ from the corresponding figures at the start of the 2010-2018 period because of changes in the government funding status of some firms between the 2002-2010 and 2010-2018 periods.

DECOMPOSITION RESULTS

In this section, we examine the intensive and extensive margins of BERD growth in Singapore over two periods (i.e., 2002-2010 and 2010-2018) at the overall economy level, and also for the following firm archetypes: (i) local and foreign firms, (ii) SMEs and non-SMEs, and (iii) firms with and without government funding. We do so by decomposing BERD growth into the Within, Entry Quality, Exit Quality and Churn Effects (see equation in the section on empirical methodology above).

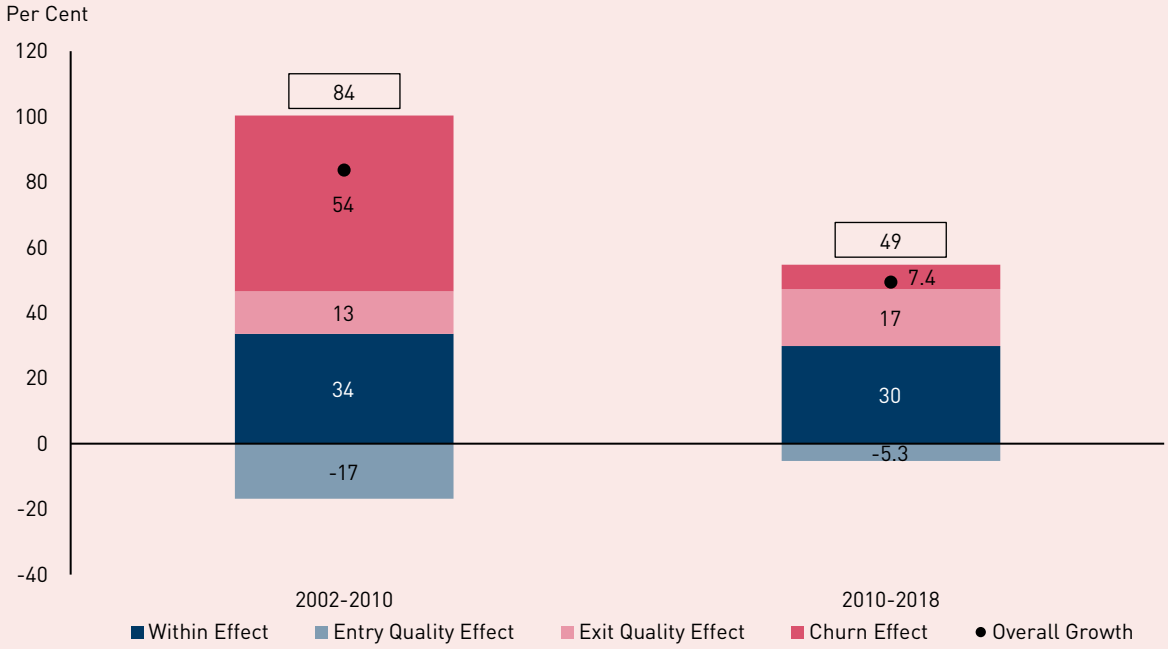
Overall Economy

As highlighted earlier, BERD growth in Singapore has slowed since the 2009 Global Financial Crisis. Between 2010 and 2018, BERD increased by 49 per cent cumulatively, compared to 84 per cent cumulatively between 2002 and 2010. Decomposing the BERD growth for the two periods into its components, we find that the slowdown in BERD growth was primarily due to a moderation in the Churn Effect (from 54 per cent for 2002-2010 to 7.4 per cent for 2010-2018) (Exhibit 7). The latter was in turn caused by a smaller net increase in the number of firms performing R&D in the later period.[8] On the other hand, the Within Effect (i.e., increase in BERD by continuing firms) remained resilient, easing only slightly in the later period (from 34 per cent for 2002-2010 to 30 per cent for 2010-2018).

7 *In comparison, the number of R&D-performing firms with government funding increased by 2.5 per cent p.a. between 2002 and 2018.*
8 *Specifically, between the 2002-2010 and 2010-2018 periods, the net increase in R&D-performing firms moderated from 279 to 59, as the number of new R&D-performing firms (i.e., entrant firms) fell (from 608 to 550), while the number of R&D-performing firms that exited (i.e., exiting firms) increased (from 329 to 491).*

At the same time, the Entry Quality and Exit Quality Effects improved between 2002-2010 and 2010-2018. The average BERD of entrant firms rose over time[9], although it remained lower than the BERD of the average R&D-performing firm in the overall economy (i.e., negative Entry Quality Effect, which eased from -17 per cent for 2002-2010 to -5.3 per cent for 2010-2018). For exiting firms, their BERD remained below that of the average R&D-performing firm in the overall economy, with the differential widening between the two periods (i.e., positive Exit Quality Effect, which improved from 13 per cent for 2002-2010 to 17 per cent for 2010-2018).

Exhibit 7: BERD Growth Decomposition (Overall Economy), 2002-2010 and 2010-2018



Source: Authors

Ownership Status

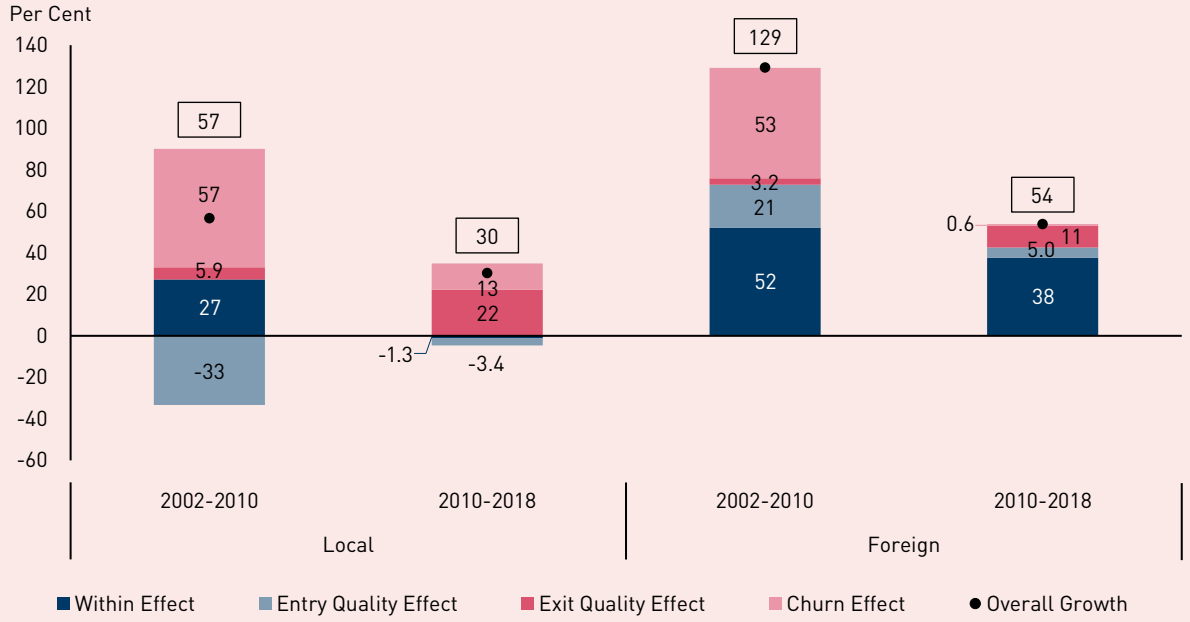
Between the 2002-2010 and 2010-2018 periods, cumulative BERD growth for both local (57 per cent to 30 per cent) and foreign (from 129 per cent to 54 per cent) firms moderated (Exhibit 8). Similar to the trends for the overall economy, the moderation in BERD growth for both archetypes was primarily driven by a slowdown in the Churn Effect, with the slowdown being sharper for foreign firms than for local firms. In the case of local firms, a decline in its Within Effect (27 per cent to -1.3 per cent) also contributed to the moderation in its BERD growth.

On the other hand, improvements in the Exit Quality Effect helped to support BERD growth in the later period for both archetypes. In both cases, their respective Exit Quality Effects remained positive and improved in the later period as (i) lower-quality firms (i.e., firms with BERD below the average level for their firm archetype) continued to exit the R&D ecosystem, and (ii) the gap between the average BERD of exiting firms and that of their firm archetype widened. Reflecting progress in attracting higher-quality new entrants to perform R&D, the Entry Quality Effect for local firms also improved between the two periods (from -33 per cent to -3.4 per cent), although it remained negative.

Notwithstanding the moderation in the BERD growth of foreign firms, they continue to be an important source of BERD in Singapore, with their average BERD ($12.5 million in 2018) remaining far higher than that for local firms ($2.6 million in 2018) (see Exhibit 2).

9 *Between the 2002-2010 and 2010-2018 periods, the average BERD of entrant firms rose from $3.4 million to $4.4 million.*

Exhibit 8: BERD Growth Decomposition (Local/Foreign Ownership), 2002-2010 and 2010-2018



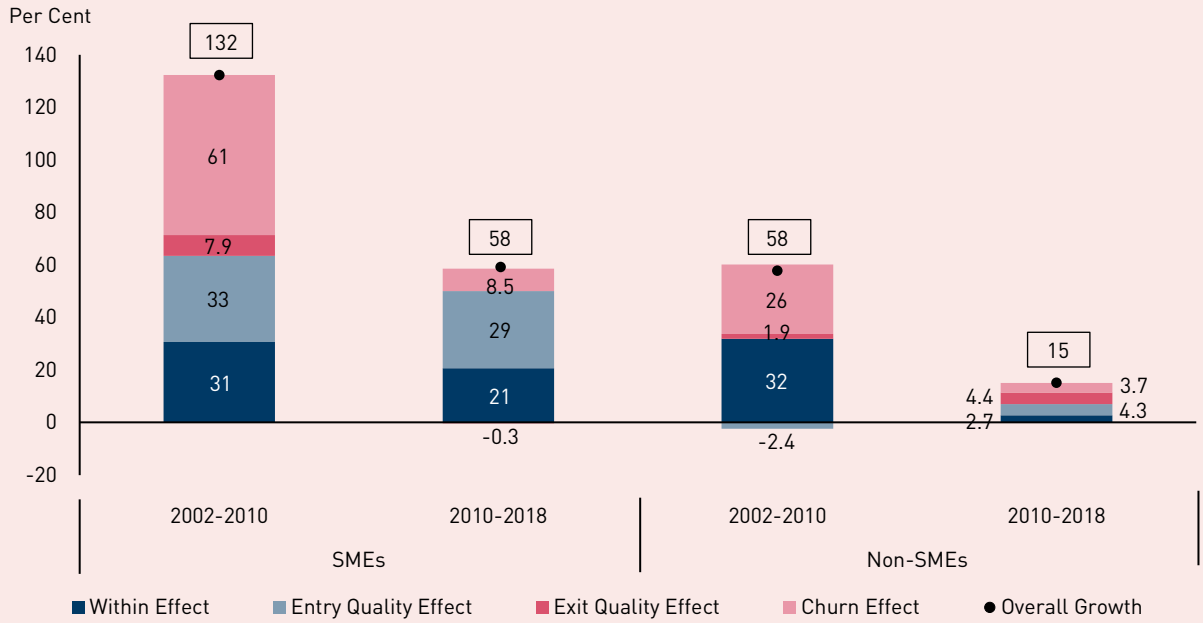
Source: Authors

SME Status

Likewise, cumulative BERD growth moderated between 2002-2010 and 2010-2018 for both SMEs (from 132 per cent to 58 per cent) and non-SMEs (from 58 per cent to 15 per cent) (Exhibit 9). The slowdown in BERD growth for SMEs was largely due to a moderation in the Churn (from 61 per cent to 8.5 per cent) and Exit Quality (from 7.9 per cent to -0.3 per cent) Effects. As for non-SMEs, the slowdown in their BERD growth could be attributed to a reduction in both the Churn (from 26 per cent to 3.7 per cent) and Within (from 32 per cent to 2.7 per cent) Effects. By contrast, there were improvements in the Entry Quality (from -2.4 per cent to 4.3 per cent) and Exit Quality (from 1.9 per cent to 4.4 per cent) Effects.

While BERD growth remained stronger for SMEs relative to non-SMEs in the more recent period (i.e., 2010-2018), non-SMEs continue to be an important source of BERD given their significantly higher average BERD levels ($20.6 million in 2018) compared to SMEs ($2.9 million in 2018) (see Exhibit 4).

Exhibit 9: BERD Growth Decomposition (SME Status), 2002-2010 and 2010-2018



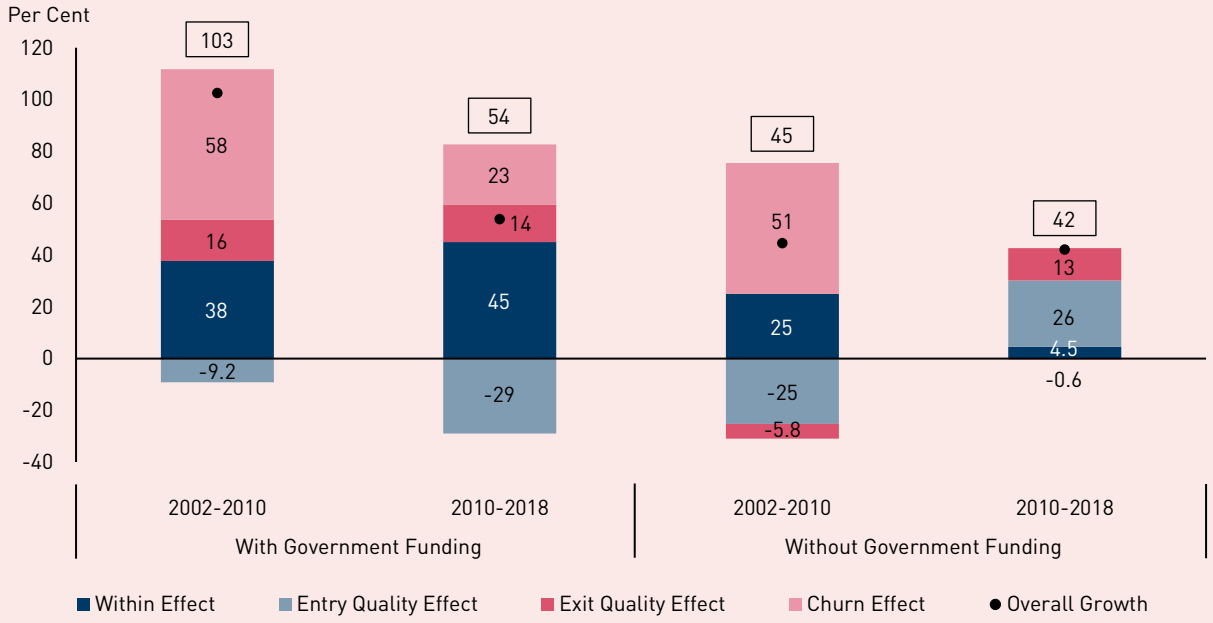
Source: Authors

Government Support Status

Between 2002-2010 and 2010-2018, the cumulative BERD growth of firms that received government funding slowed more sharply as compared to those that did not receive government funding (Exhibit 10). Notwithstanding this, in the later period, the BERD growth of firms with government funding (54 per cent) remained stronger than that of firms without government funding (42 per cent).

For firms with government funding, the Within Effect strengthened (from 38 per cent to 45 per cent) between 2002-2010 and 2010-2018 (i.e., continuing firms increased their R&D expenditure – and to a larger degree – over time). The BERD growth for these firms in the later period was also supported by positive Churn and Exit Quality Effects. By contrast, a negative Entry Quality Effect continued to weigh on their BERD growth (i.e., entrant firms with government funding spent less on R&D than the average R&D-performing firm with government funding). This is likely because government support for newer R&D firms might be in new growth areas or more experimental areas where the risk is higher. Nonetheless, over time, these firms are likely to increase their R&D spending in Singapore's innovation ecosystem, as evidenced by the strong Within Effect for continuing firms.

Exhibit 10: BERD Growth Decomposition (Government Funding Status), 2002-2010 and 2010-2018



Source: Authors

CONCLUSION

Since the 2009 Global Financial Crisis, BERD growth in Singapore has largely been weighed down by weaker extensive margins. Notably, there was a significant moderation in the Churn Effect, as the number of entrant R&D firms fell and the number of firms that stopped performing R&D increased. By contrast, the intensive margin of BERD growth remained resilient, with the Within Effect easing only slightly in the more recent period (i.e., 2010-2018) compared to the earlier period (i.e., 2002-2010). There are also substantial variations in the drivers of BERD growth across the different firm archetypes.

A key finding of this study is that government funding for R&D-performing firms has been supportive of positive outcomes, with government-funded firms exhibiting stronger BERD growth (supported in turn by positive Within, Churn and Exit Quality Effects) than non-government-funded firms. The positive results reaffirm the complementary roles that the public and private sectors play in the R&D ecosystem, with public funding catalysing private sector R&D expenditure, and strengthening private firms' R&D capabilities over time.

In order to drive BERD growth in the coming years, the Government will continue to encourage existing R&D-performing firms to deepen their R&D activities (i.e., intensive margin) and incentivise new firms to start performing R&D (i.e., extensive margin). To this end, a broad suite of measures has been put in place, including tax deductions on R&D expenditure, and grants such as the Enterprise Development Grant and the Research and Innovation Scheme for Companies. At the same time, to enhance the vibrancy and dynamism of Singapore's innovation ecosystem, the Government has also embarked on other initiatives. These include the establishment of Centres of Innovation to help SMEs bridge the gap between research and commercialisation, and the setting up of the Open Innovation Network to provide a single gateway to the open innovation ecosystem in Singapore, where enterprises can seek out co-innovation and test-bedding opportunities. Supported by the Government's $25 billion investment under the Research, Innovation and Enterprise (RIE) 2025 Plan[10], private enterprises will continue to play an important role in accelerating Singapore's transformation into an innovation-led economy.

Contributed by:

Mr Benjamin Toh, Economist
Dr Kuan Ming Leong, Principal Economist
Economics Division
Ministry of Trade and Industry

10 The RIE 2025 Plan is for the period of 2021 to 2025, and forms the main thrust of the Singapore Government's investments in R&D, particularly in strategic domain areas. For more details, see National Research Foundation (2020).

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

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