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MAIN INDICATORS OF THE SINGAPORE ECONOMY







Chapter 1

THE SINGAPORE ECONOMY

ECONOMIC PERFORMANCE

Real GDP grew by **2.7%** in 1024



Quarterly Growth (YoY)



Main Drivers of Growth in 1Q24

Finance & Insurance



0.8%-point contribution

Transportation & Storage



LABOUR MARKET

Resident Unemployment Rate Employment (QoQ Change)





Sectors with the Highest Employment Growth in 1Q24

+12,000 employed



Other Services Industries



Administrative & Support Services





Finance & Insurance

PRODUCTIVITY (YoY Growth) Value-Added per Actual Hour Worked increased by





Sectors with the Highest Growth in Value-Added per Actual Hour Worked in 1Q24







7.3%

Information & A Communications

Accommodation

Finance & Insurance



OVERVIEW ○

In the first quarter of 2024,

- The Singapore economy grew by 2.7 per cent on a year-on-year basis. The sectors that contributed the most to GDP growth during the quarter were the finance & insurance, transportation & storage and wholesale trade sectors.
- The seasonally-adjusted unemployment rates edged up slightly at the overall level, for residents and for citizens, notwithstanding a moderation in the number of retrenchments over the same period.
- Total employment rose by 9,800 on a quarter-on-quarter basis, extending the gains in the preceding quarter. Excluding Migrant Domestic Workers (MDWs), total employment increased by 4,900 on the back of resident employment gains.
- The Consumer Price Index-All Items (CPI-All Items) rose by 3.0 per cent year-on-year, moderating from the 4.0 per cent increase in the preceding quarter.

OVERALL PERFORMANCE

The Singapore economy grew by 2.7 per cent on a yearon-year basis in the first quarter of 2024, extending the 2.2 per cent growth in the previous quarter (Exhibit 1.1). On a quarter-on-quarter seasonally-adjusted basis, the economy expanded by 0.1 per cent, moderating from the 1.2 per cent growth in the preceding quarter.

Exhibit 1.1: GDP and Sectoral Growth Rates in 1Q 2024



The manufacturing sector contracted by 1.8 per cent yearon-year, a pullback from the 1.4 per cent growth in the previous quarter. Weakness in the sector was mainly driven by the output declines in the biomedical manufacturing (-16.7 per cent), electronics (-4.3 per cent) and general manufacturing (-3.0 per cent per cent) clusters.

The services producing industries grew by 3.9 per cent yearon-year, faster than the 2.0 per cent growth registered in the previous quarter. Growth was supported by expansions in all the services sectors, with the accommodation (14.4 per cent), transportation & storage (6.8 per cent) and finance & insurance (6.5 per cent) sectors posting the strongest growth.

The construction sector grew by 4.1 per cent year-onyear, moderating from the 5.2 per cent growth in the previous quarter. While private sector construction output contracted, it was more than offset by the expansion in public sector construction output.

The top three positive contributors to GDP growth in the first quarter were the finance & insurance, transportation & storage and wholesale trade sectors (Exhibit 1.2).

Exhibit 1.2: Percentage-Point Contribution to Growth in Real GDP in 1Q 2024 (By Sector)



SOURCES OF GROWTH

Total demand increased by 5.4 per cent year-on-year in the first quarter of 2024, moderating from the 7.4 per cent increase in the previous quarter (Exhibit 1.3). The growth in total demand was supported by increases in both external and domestic demand during the quarter.

External demand rose by 5.9 per cent year-on-year, slower than the 11.0 per cent increase in the previous quarter. Meanwhile, domestic demand rose by 3.7 per cent yearon-year, a reversal from the 2.9 per cent contraction in the preceding quarter.

Within domestic demand, consumption expenditure rose by 5.8 per cent year-on-year, faster than the 2.5 per cent increase in the preceding quarter. The increase in consumption expenditure was supported by both higher public (6.0 per cent) and private consumption (5.8 per cent).

Meanwhile, gross fixed capital formation (GFCF) fell by 2.3 per cent year-on-year, a reversal from the 3.0 per cent increase in the previous quarter. The fall in GFCF during the quarter was due to a decline in private sector GFCF (-4.7 per cent), which outweighed an increase in public sector GFCF (6.8 per cent). Private sector GFCF decreased on the back of lower investments in private construction & works, private transport equipment and machinery & equipment, which more than offset higher investments in intellectual property products. Meanwhile, public sector GFCF rose due to higher investments in public construction & works, machinery & equipment and intellectual property products, even as investments in public transport equipment fell.

Exhibit 1.3: Changes in Total Demand*

		2024			
	I.	Ш	Ш	IV	I
Total Demand	1.1	-2.5	-1.4	7.4	5.4
External Demand	2.1	-1.6	-1.8	11.1	5.9
Total Domestic Demand	-1.6	-5.3	-0.5	-2.9	3.7
Consumption Expenditure	6.2	2.6	2.5	2.5	5.8
Public	6.0	-1.7	4.2	1.1	6.0
Private	6.3	4.0	2.0	3.0	5.8
Gross Fixed Capital Formation	0.3	-2.3	-1.9	3.0	-2.3
Changes in Inventories	-3.4	-3.7	-0.8	-3.4	0.4

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

LABOUR MARKET

Unemployment and Retrenchment¹

Compared to December 2023, the seasonally-adjusted unemployment rates in March 2024 increased marginally at the overall level (from 2.0 per cent to 2.1 per cent), for residents (from 2.8 per cent to 3.0 per cent) and for citizens (2.9 per cent to 3.1 per cent) (Exhibit 1.4).

Exhibit 1.4: Unemployment Rate (Seasonally-Adjusted)



In March 2024, an estimated 72,500 residents, including 63,700 Singapore citizens, were unemployed. These were higher than the number of unemployed residents (67,800) and citizens (59,700) in December 2023.²

Total retrenchments fell to 3,000 in the first quarter of 2024, from 3,460 in the preceding quarter (Exhibit 1.5). The decrease in retrenchments was broad-based, with retrenchments falling in the services (from 2,520 to 2,300), manufacturing (from 780 to 600), and construction (from 150 to 100) sectors.

Exhibit 1.5: Retrenchments



Employment³

Total employment expanded by 9,800 on a quarter-onquarter basis in the first quarter of 2024, extending the gains (+11,600) in the preceding quarter (Exhibit 1.6). Excluding MDWs, total employment rose by 4,900. Employment growth during the quarter was wholly supported by an increase in resident employment.

Total employment growth was largely driven by the services sector (+15,200; or +10,200 excluding MDWs), supported by employment gains in the other services (+12,000), administrative & support services (+3,400) and finance & insurance (+2,100) sectors (Exhibit 1.7). Over the same period, employment in the manufacturing (-3,100) and construction (-2,400) sectors declined.

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







Hiring Expectations

According to EDB's latest Business Expectations Survey for the Manufacturing Sector, hiring expectations in the sector were negative. Specifically, a net weighted balance of 2 per cent of manufacturers expected to hire fewer workers in the second quarter of 2024 as compared to the first quarter. Firms in the other electronic modules & components segment of the electronics cluster were the most optimistic, with a net weighted balance of 29 per cent of firms expecting to increase hiring in the second quarter. By contrast, firms in the infocomms & consumer electronics segment of the electronics cluster were the most pessimistic, with a net weighted balance of 32 per cent of firms expecting to reduce hiring in the second quarter.

Meanwhile, hiring expectations for services firms remained 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 second quarter of 2024 as compared to the first quarter. Among the services sectors, firms in the accommodation sector had the strongest hiring sentiments, with a net weighted balance of 27 per cent of firms expecting to increase hiring in the second quarter. On the other hand, firms in the retail trade sector were the most pessimistic, with a net weighted balance of 17 per cent of firms expecting to hire fewer workers in the second quarter.

COMPETITIVENESS

Productivity

Overall labour productivity, as measured by real valueadded per actual hour worked, rose by 1.7 per cent yearon-year in the first quarter of 2024, moderating from the 2.2 per cent increase in the previous quarter (Exhibit 1.8).⁴

Among the sectors, the information & communications (12.0 per cent), accommodation (11.0 per cent) and finance & insurance (7.3 per cent) sectors recorded the strongest productivity gains in the first quarter. The transportation & storage (5.8 per cent), professional services (4.2 per cent), retail trade (3.1 per cent), wholesale trade (2.3 per cent), food & beverage services (1.3 per cent) and construction (1.1 per cent) sectors also saw productivity improvements. By contrast, productivity declines were observed in the administrative & support services (-1.3 per cent), real estate (-1.1 per cent), other services (-0.3 per cent) and manufacturing (-0.3 per cent) sectors.





In the first quarter, the productivity of outward-oriented sectors as a whole rose by 4.1 per cent year-on-year, moderating slightly from the 4.5 per cent increase in the previous quarter.⁵ Meanwhile, productivity growth for the domestically-oriented sectors as a whole was flat, following the 0.4 per cent increase in the preceding quarter.

⁴ Similarly, overall labour productivity, as measured by real value-added per worker, grew by 0.4 per cent in the first quarter of 2024, a reversal from the 0.8 per cent decline in the preceding quarter.

⁵ 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 3.6 per cent on a year-on-year basis in the first quarter of 2024 (Exhibit 1.9), extending the increase of 3.2 per cent in the preceding quarter. The rise in overall ULC during the quarter was due to an increase in total labour cost per worker which outweighed the rise in labour productivity as measured by real value-added per worker.



Exhibit 1.9: Changes in Unit Labour Cost in 1Q 2024

By sectors, the ULC for the construction sector was 3.2 per cent higher year-on-year in the first quarter reflecting a pickup in total labour cost per worker alongside a decline in labour productivity.

The ULC for services producing industries rose by 3.3 per cent year-on-year. Among the services sectors, ULC increased the most in the administrative & support services sector (13.2 per cent) as the increase in total labour cost per worker was accompanied by a fall in labour productivity. Meanwhile, ULC fell in the information & communications sector (-1.5 per cent) as productivity gains more than offset the increase in total labour cost per worker.

Over the same period, the ULC for the manufacturing sector picked up by 2.3 per cent year-on-year. The rise in the sector's ULC occurred on the back of a fall in labour productivity while total labour cost per worker rose. Unit business cost (UBC) for the manufacturing sector rose by 5.8 per cent on a year-on-year basis in the first quarter of 2024, faster than the 3.4 per cent increase in the previous quarter (Exhibit 1.10). The rise in UBC during the quarter was due to the increases in unit services costs (6.8 per cent), manufacturing ULC (2.3 per cent) and unit non-labour production taxes (44.7 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 \$1.7 billion and \$3.5 billion respectively in the first quarter of 2024 (Exhibit 1.11 and Exhibit 1.12).

For FAI, the largest contribution came from the manufacturing sector, which attracted \$984 million worth of commitments. Within the manufacturing sector, the biomedical manufacturing and precision engineering clusters garnered the largest amounts of commitments, at \$525 million and \$195 million respectively. Meanwhile, the research & development cluster attracted the most FAI commitments within the services sector, at \$442 million. Investors from Europe contributed the most to total FAI, at \$462 million (or 27.1 per cent).

Exhibit 1.11: Fixed Asset Investments by Industry Cluster in 1Q 2024



For TBE, the services sector attracted the highest amount of commitments, at \$3.0 billion. Within the sector, the headquarters & professional services and logistics clusters garnered the most TBE commitments, at \$2.7 billion and \$199 million respectively. Among the manufacturing clusters, the precision engineering and transport engineering clusters attracted the largest amounts of TBE commitments, at \$277 million and \$81.4 million respectively. Domestic investors were the largest source of TBE commitments, with commitments of \$2.4 billion (or 68.3 per cent).

Exhibit 1.12: Total Business Expenditure by Industry Cluster in 1Q 2024



When these projects are fully implemented, they are expected to generate \$3.5 billion of value-added and create more than 5,000 jobs in the coming years

PRICES

Consumer Price Index

The Consumer Price Index-All Items (CPI-All Items) rose by 3.0 per cent on a year-on-year basis in the first quarter of 2024, moderating from the 4.0 per cent increase in the preceding quarter (Exhibit 1.13). On a quarter-on-quarter seasonally-adjusted basis, CPI-All Items inflation came in at 0.3 per cent, slowing from the 0.8 per cent recorded in the previous quarter.

Exhibit 1.13: Changes in CPI



Most CPI categories saw price increases on a year-onyear basis in the first guarter of 2024, thus contributing positively to CPI-All Items inflation during the guarter (Exhibit 1.14). Food prices rose by 3.4 per cent on account of the higher costs of food serving services such as hawker food and restaurant meals, as well as non-cooked food items such as bread & cereals. Housing & utilities costs increased by 3.3 per cent as accommodation costs picked up. Prices of household durables & services went up by 1.0 per cent due to more expensive domestic & household services. Healthcare costs climbed by 4.7 per cent on the back of an increase in the costs of outpatient and hospital services. Transport costs rose by 1.8 per cent due to higher petrol and car prices and bus & train fares, as well as more expensive point-to-point transport services, which collectively outweighed the lower cost of airfares. Communication costs picked up by 2.3 per cent on account of a rise in the prices of telecommunication services. Recreation & culture prices rose by 4.9 per cent due to increases in the costs of holiday travel and recreational & cultural services. Education costs increased by 3.3 per cent because of higher fees at commercial institutions, childcare centres and universities. Prices of miscellaneous goods & services increased by 2.4 per cent as the prices of personal care items and alcoholic drinks & tobacco rose. By contrast, clothing & footwear prices fell by 0.2 per cent, mainly due to cheaper footwear and ready-made garments.

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

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		2024			
	I	Ш	Ш	IV	I
All items	6.1	5.1	4.1	4.0	3.0
Food	8.0	6.6	4.8	4.0	3.4
Clothing & Footwear	6.8	4.5	-0.5	-0.6	-0.2
Housing & Utilities	5.3	4.4	3.8	3.8	3.3
Housing Durables & Services	2.6	1.9	1.8	1.3	1.0
Healthcare	4.0	4.6	4.3	5.1	4.7
Transport	9.2	6.4	4.9	5.0	1.8
Communication	2.1	2.7	3.0	3.8	2.3
Recreation & Culture	6.8	6.5	5.3	5.9	4.9
Education	3.0	2.7	2.5	2.7	3.3
Miscellaneous Goods & Services	2.6	3.3	3.6	2.8	2.4

INTERNATIONAL TRADE

Merchandise Trade

Singapore's total merchandise trade grew by 4.8 per cent on a year-on-year basis in the first quarter, after the 2.1 per cent decrease in the preceding quarter (Exhibit 1.15). The increase in total merchandise trade was due to the growth in both oil trade (+3.4 per cent) and non-oil trade (+5.2 per cent).

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

Per Cent

			2023			2024
	I.	Ш	Ш	IV	ANN	I.
Merchandise Trade	-7.9	-18.8	-16.5	-2.1	-11.7	4.8
Merchandise Exports	-6.5	-16.9	-15.6	0.2	-10.1	4.4
Domestic Exports	-8.0	-19.5	-22.6	-1.7	-13.5	0.3
Oil	8.5	-28.1	-26.9	-2.1	-14.2	6.0
Non-Oil	-16.2	-13.4	-19.5	-1.4	-13.1	-3.4
Re-Exports	-5.3	-14.6	-9.5	1.8	-7.1	7.9
Merchandise Imports	-9.4	-20.8	-17.4	-4.7	-13.4	5.3
Oil	-7.0	-34.4	-25.0	-4.1	-19.0	2.1
Non-Oil	-10.0	-16.6	-15.2	-4.8	-11.9	6.1

Total merchandise exports rose by 4.4 per cent in the first quarter, extending the 0.2 per cent increase in the preceding quarter. This was due to the increase in both domestic exports (+0.3 per cent) and re-exports (+7.9 per cent).

The growth in domestic exports was due to the increase in oil domestic exports which outweighed the decline in non-oil domestic exports (NODX). In particular, oil domestic exports grew by 6.0 per cent. In volume terms, oil domestic exports increased by 7.0 per cent.

Meanwhile, NODX declined by 3.4 per cent in the first quarter, following the 1.4 per cent decrease in the previous quarter. The decline in NODX was due to the decrease in both electronics and non-electronics domestic exports. Total merchandise imports grew by 5.3 per cent in the first quarter, after the 4.7 per cent decline in the previous quarter. The increase in imports was due to the growth in both oil and non-oil imports. Specifically, oil imports rose by 2.1 per cent, while non-oil imports increased by 6.1 per cent due to higher electronics and non-electronics imports.

Services Trade

Total services trade expanded by 7.5 per cent on a yearon-year basis in the first quarter, rebounding from the 2.8 per cent contraction in the previous quarter (Exhibit 1.16). Both the exports and imports of services saw positive year-on-year growth during the quarter.

Services exports rose by 8.0 per cent in the first quarter, a turnaround from the 3.9 per cent decrease in the preceding quarter. The increase in services exports was largely attributable to a pickup in the exports of transport services, travel services and other business services. Meanwhile, services imports expanded by 7.0 per cent, a turnaround from the 1.5 per cent decline in the previous quarter. The rise in services imports was also largely due to an increase in the imports of transport services, travel services and other business services.

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

		2023				
	l.	Ш	Ш	IV	ANN	I.
Total Services Trade	-0.1	-5.4	-6.9	-2.8	-3.8	7.5
Services Exports	-1.4	-7.5	-7.4	-3.9	-5.1	8.0
Services Imports	1.4	-3.1	-6.3	-1.5	-2.4	7.0

BALANCE OF PAYMENTS

Singapore recorded an overall balance of payments surplus of \$27.3 billion in the first quarter of 2024, higher than the surplus of \$13.2 billion in the preceding quarter (Exhibit 1.17).

Exhibit 1.17: Balance of Payments



Current Account

The current account surplus increased to \$37.2 billion in the first quarter of 2024, from \$34.4 billion in the previous quarter. This was due to a narrowing of the primary income deficit, which more than offset the decline in the goods and services trade surpluses and a widening of the secondary income deficit.

The surplus in the goods account fell by \$7.8 billion to \$45.1 billion in the first quarter, as goods exports declined by more than the fall in goods imports.

Meanwhile, the surplus in the services account fell by \$0.9 billion to \$12.9 billion in the first quarter. This was mainly due to an increase in net payments for other business services, alongside a fall in net receipts for maintenance and repair services as well as insurance services. Collectively, these more than outweighed the combined effect of lower net payments for travel services as well as higher net receipts for transport services.

The primary income deficit narrowed by \$13.6 billion to \$17.1 billion in the first quarter, as primary income receipts rose by more than the increase in payments.

The secondary income deficit widened by \$2.1 billion to \$3.7 billion in the first quarter, as the decline in secondary income receipts exceeded the reduction in secondary income payments.

Capital and Financial Account

The capital and financial account registered a smaller net outflow of \$8.1 billion in the first quarter of 2024, compared to \$19.9 billion in the preceding quarter. The decline in net outflows was mainly due to lower net outflows of "other investment" and portfolio investment. These more than offset the decline in net inflows of direct investment, as well as the reversal of financial derivatives from a net inflow to a net outflow position.

"Other investment" recorded net outflows of \$8.6 billion in the first quarter, down from \$36.3 billion in the previous quarter. The decline was primarily driven by the switch from a net outflow to a net inflow position in the non-bank private sector. At the same time, net outflows of portfolio investment edged down to \$31.1 billion in the first quarter, from \$32.5 billion in the preceding quarter, on account of reduced net outflows from resident deposit-taking corporations.

Meanwhile, net inflows of direct investment fell to \$33.2 billion in the first quarter, from \$46.7 billion in the preceding quarter, as the decrease in foreign direct investments into Singapore exceeded the decline in residents' direct investments abroad.

Financial derivatives switched to net outflows of \$1.6 billion in the first quarter, from the net inflows of \$2.2 billion in the preceding quarter.

6 Net inflows in net balances are indicated by a minus (-) sign. For more details regarding the change in sign convention to the financial account, please refer to DOS's information paper on "Singapore's International Accounts: Methodological Updates and Recent Developments".



CHAPTER

SECTORAL PERFORMANCE



Chapter 2

SECTORAL PERFORMANCE







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**

1Q23

2023

3Q23

4023

1024

1023

2Q23

3Q23

4Q23

1024

1.1%

1Q24

2.6%

0.9%

OVERVIEW \circ

In the first quarter of 2024,

- The manufacturing sector contracted by 1.8 per cent year-on-year, a reversal from the 1.4 per cent growth in the preceding quarter. The sector was weighed down by output declines in the biomedical manufacturing, electronics and general manufacturing clusters, which more than offset output expansions in the precision engineering, chemicals and transport engineering clusters.
- The construction sector expanded by 4.1 per cent year-on-year, extending the 5.2 per cent expansion in the previous quarter.
- The wholesale trade sector expanded by 1.5 per cent year-on-year, picking up from the 0.2 per cent expansion recorded in the preceding quarter.
- The retail trade sector expanded by 2.7 per cent year-on-year, rebounding from the 0.3 per cent contraction recorded in the previous quarter.
- The transportation & storage sector posted growth of 6.8 per cent year-on-year, accelerating from the 2.8 per cent growth recorded in the previous quarter.
- The accommodation sector expanded by 14.4 per cent year-on-year, accelerating from the 1.5 per cent growth in the previous quarter.
- The food & beverage services sector expanded by 1.1 per cent year-on-year, reversing the 1.5 per cent contraction in the previous quarter.
- The finance & insurance sector expanded by 6.5 per cent year-on-year, improving from 5.4 per cent gain in the preceding quarter.
- The real estate sector expanded by 0.6 per cent year-on-year, following the 0.1 per cent growth in the previous quarter.
- The professional services sector expanded by 2.5 per cent year-on-year, a turnaround from the 0.7 per cent contraction in the preceding quarter.

MANUFACTURING

The manufacturing sector contracted by 1.8 per cent on a year-on-year basis in the first quarter of 2024, reversing from the 1.4 per cent growth in the previous quarter (Exhibit 2.1). The sector was weighed down by output declines in the biomedical manufacturing, electronics and general manufacturing clusters, which more than offset output expansions in the precision engineering, chemicals and transport engineering clusters (Exhibit 2.2).



Exhibit 2.1: Manufacturing Sector's Growth Rate





The transport engineering cluster expanded by 13.3 per cent year-on-year in the first quarter, supported by a 25.4 per cent increase in the aerospace segment. Growth of the aerospace segment was bolstered by greater demand for aircraft parts and maintenance, repair and overhaul (MRO) jobs from commercial airlines on the back of strong air travel demand globally. Similarly, the land segment grew by 1.7 per cent. On the other hand, output in the marine & offshore engineering segment fell by 0.3 per cent on account of a lower level of activity in the shipyards.

Output in the chemicals cluster grew by 6.6 per cent yearon-year in the first quarter, largely supported by expansions in the specialties and petrochemicals segments. The specialties segment grew by 17.2 per cent on account of a higher level of production of mineral oil additives. Meanwhile, output in the petrochemicals segment rose by 13.2 per cent on the back of a low production base last year, partly due to plant maintenance shutdowns. Similarly, the petroleum segment grew marginally by 0.7 per cent. By contrast, the other chemicals segment declined by 8.1 per cent, weighed down by a lower level of output in fragrances. The precision engineering cluster expanded by 4.7 per cent year-on-year in the first quarter. Output in the machinery & systems (M&S) segment grew by 7.8 per cent, supported by an increase in the production of frontend semiconductor equipment. Conversely, the precision modules & components segment contracted by 6.6 per cent due to a lower level of output of metal precision components and dies, moulds, tools, jigs and fixtures.

The general manufacturing cluster contracted by 3.0 per cent year-on-year in the first quarter. Output in the miscellaneous industries declined by 6.5 per cent due to a lower production of construction-related materials. Meanwhile, the food, beverage & tobacco segment contracted by 1.1 per cent on account of a lower level of output of beverage products and animal feeds. On the other hand, the printing segment grew by 1.4 per cent.

The electronics cluster contracted by 4.3 per cent yearon-year in the first quarter, driven by output declines across all segments, except the infocomms & consumer electronics segment. Output in the computer peripherals & data storage, semiconductors and other electronic modules & components segments fell by 12.2 per cent, 5.4 per cent and 2.0 per cent respectively. In particular, the contraction in the semiconductors segment was on account of weak demand for automotive and industrial chips. On the other hand, the infocomms & consumer electronics segment grew by 22.9 per cent.

The biomedical manufacturing cluster contracted by 16.7 per cent year-on-year in the first quarter. This was largely due to a 26.8 per cent decline in the output of the pharmaceuticals segment, resulting from a different mix of active pharmaceutical ingredients (APIs) being produced. Output in the medical technology segment declined by 1.4 per cent on the back of lower exports for medical devices.

CONSTRUCTION

The construction sector grew by 4.1 per cent year-on-year in the first quarter of 2024, extending the 5.2 per cent expansion in the previous quarter.

In the first quarter, nominal certified progress payments, a proxy for construction output, rose by 6.7 per cent yearon-year, moderating from the 14.2 per cent increase recorded in the previous quarter (Exhibit 2.3). Higher certified progress payments were seen in the public (18.5 per cent) sector, which outweighed a contraction in the private (-4.7 per cent) sector. The growth in public certified progress payments was largely driven by higher outturns in public industrial building (70.8 per cent) and civil engineering (26.4 per cent) works. On the other hand, the decline in private certified progress payments was led by contractions in private industrial (-13.2 per cent) and institutional & others (-25.8 per cent) building works.

Exhibit 2.3: Changes in Contracts Awarded and Certified Payments



Construction demand in terms of contracts awarded fell by 13.0 per cent year-on-year in the first quarter, reversing the 43.8 per cent expansion in the previous quarter (Exhibit 2.3). The fall in contracts awarded during the quarter was on account of lower private sector construction demand (-43.7 per cent), which outweighed an increase in public sector construction demand (8.9 per cent). The former was led by a fall in contracts awarded for private residential (-16.6 per cent) and commercial (-94.2 per cent) building works, while the latter was led by an increase in contracts awarded for public institutional & others (186 per cent) building works.

WHOLESALE TRADE

The wholesale trade sector expanded by 1.5 per cent yearon-year in the first quarter of 2024, picking up from the 0.2 per cent expansion in the previous quarter.

The expansion in the sector was led by a 7.0 per cent year-on-year growth in foreign wholesale trade sales volume over the period (Exhibit 2.4), accelerating sharply from the 1.7 per cent expansion recorded in the previous quarter. The increase was led by growth in the sales volume of petroleum & petroleum products (9.2 per cent), metals, timber & construction materials (19.3 per cent) and electronic components (16.6 per cent). Meanwhile, there were large declines in the sales volume of the telecommunications & computers (-8.0 per cent) and ship chandlers & bunkering (-22.4 per cent) sub-segments.

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



At the same time, the domestic wholesale trade sales volume increased by 0.4 per cent year-on-year, reversing the 0.3 per cent contraction in the previous quarter. The expansion was largely led by growth in sales volume of metals, timber & construction materials (76.9 per cent), telecommunications & computers (31.1 per cent) and ship chandlers & bunkering (39.4 per cent). On the other hand, sales volume of petroleum & petroleum products (-18.0 per cent) and other wholesale trade (-9.2 per cent) declined.

RETAIL TRADE

The retail trade sector expanded by 2.7 per cent year-onyear in the first quarter of 2024, reversing the 0.3 per cent contraction in the previous quarter.

In the first quarter, overall retail sales volume increased by 2.6 per cent year-on-year, reversing the 1.5 per cent decline in the preceding quarter (Exhibit 2.5). Growth in overall retail sales volume in the first quarter of 2024 was driven by both non-motor vehicular sales (1.7 per cent) and motor vehicular sales (8.8 per cent). Non-motor vehicular sales volume was supported primarily by growth in the watches and jewellery (6.4 per cent) and food & alcohol (15.6 per cent) segments. By contrast, sales volumes of computer & telecommunications equipment (-7.0 per cent) and optical goods & books (-6.2 per cent) segments shrank.

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



TRANSPORTATION & STORAGE

The transportation & storage sector expanded by 6.8 per cent year-on-year in the first quarter of 2024, picking up from the 2.8 per cent growth posted in the previous quarter. The water transport, air transport and land transport segments expanded during the quarter.

In the water transport segment, the volume of sea cargo handled grew by 7.7 per cent year-on-year in the first quarter, picking up from the 6.1 per cent expansion in the previous quarter (Exhibit 2.6). The expansion in sea cargo volume handled was due to the increase in general cargo (6.9 per cent), bulk cargo (9.0 per cent) and oil-in-bulk cargo volumes (9.0 per cent). At the same time, container throughput grew by 10.7 per cent during the quarter.

Exhibit 2.6: Changes in Container Throughput and Sea Cargo Handled



Meanwhile, the air transport segment posted strong growth in the first quarter. In particular, the volume of air passenger traffic (less transit) handled at Changi Airport rose by 27.1 per cent year-on-year in the first quarter, following the 31.2 per cent growth posted in the previous quarter (Exhibit 2.7). The high growth rates in both quarters were due to the relatively lower bases in the first quarter of 2023 and fourth quarter of 2022 respectively, when the volume of air passenger traffic remained below prepandemic levels.¹ Air passenger traffic volume exceeded its pre-COVID level (i.e., first quarter of 2019) by 0.7 per cent in the first quarter. Reflecting the recovery in air travel, the number of aircraft landings increased by 20.5 per cent year-on-year to reach 44,674 in the first quarter of 2024, extending the 23.2 per cent increase in the preceding quarter. Meanwhile, total air cargo shipments handled at Changi Airport rose sharply by 13.9 per cent in the first quarter, reversing the 0.5 per cent contraction in the previous quarter.

Exhibit 2.7: Changes in Air Transport



ACCOMMODATION

The accommodation sector expanded robustly by 14.4 per cent year-on-year in the first quarter of 2024, accelerating from the 1.5 per cent growth in the preceding quarter.

In the first quarter, total visitor arrivals surged by 49.6 per cent year-on-year, extending the 35.2 per cent growth in the previous quarter (Exhibit 2.8). In level terms, the number of visitor arrivals in the first quarter of 2024 was around 4.4 million, reaching 92.9 per cent of the 4.7 million visitor arrivals recorded in the first quarter of 2019 (i.e., pre-COVID level).

Exhibit 2.8: Visitor Arrivals



Reflecting the recovery in visitor arrivals, gross lettings at gazetted hotels climbed by 22.1 per cent year-on-year in the first quarter, extending the 6.4 per cent increase in the previous quarter (Exhibit 2.9). At the same time, the average occupancy rate of gazetted hotels rose by 3.6 percentage-points year-on-year to reach 81.5 per cent in the first quarter of 2024. This was an improvement over the 76.8 per cent recorded in the previous quarter.

Exhibit 2.9: Gross Lettings at Gazetted Hotels



FOOD & BEVERAGE SERVICES

The food & beverage services sector expanded by 1.1 per cent year-on-year in the first quarter of 2024, reversing the 1.5 per cent decline in the previous quarter.

Overall food & beverage sales volume rose by 0.6 per cent year-on-year in the first quarter, reversing the 2.9 per cent decline in the previous quarter (Exhibit 2.10). The increase in food & beverage sales volume was led by food caterers (15.4 per cent) and cafes, food courts & other eating places (0.8 per cent). On the other hand, the sales volume for fast food outlets (-7.0 per cent) and restaurants (-0.8 per cent) fell.

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



FINANCE & INSURANCE

The finance & insurance sector expanded by 6.5 per cent year-on-year, improving from the 5.4 per cent gain in the preceding quarter.

The strong first quarter growth was broad-based across the various segments. Notably, the surge in transaction volumes across most asset classes had boosted net fees and commissions incomes in the banking and fund management segments. Further, there was some improvement in credit intermediation activity even as interest rates remained elevated. Overall loans to residents expanded by 1.4 per cent year-on-year in the first quarter of 2024, the first positive reading since the third quarter of 2022, mainly supported by lending to non-bank financial institutions and business services, as well as housing loans (Exhibit 2.11). Loans to non-residents however contracted by 1.0 per cent, weighed down by the decline in lending to the Americas region (Exhibit 2.12). Exhibit 2.11: Growth of Bank Loans & Advances to Non-Bank Residents by Industry in 1Q 2024



Exhibit 2.12: Growth of Bank Loans & Advances to Non-Bank Non-Residents by Region in 1Q 2024



The insurance and other auxiliary activities segments recorded firm growth compared to a year ago, with the former benefiting from strong growth in net premiums. The latter segment, which largely comprises payments players, was bolstered by higher tourist spending, which helped to offset some slowdown in activity in the first quarter as households had earlier brought forward spending to the last quarter of 2023, before the GST rate hike in January 2024.

REAL ESTATE

The real estate sector expanded by 0.6 per cent year-onyear in the first quarter of 2024, following the 0.1 per cent growth in the preceding quarter. The growth of the sector was due to expansions in the residential, commercial and industrial property segments.

Within the sector, private residential certified payments grew by 0.9 per cent year-on-year in the first quarter, extending the 1.7 per cent increase in the previous quarter. Meanwhile, total private residential property sales rose by 2.6 per cent in the first quarter, moderating from the 20.8 per cent increase in the previous quarter. (Exhibit 2.13).

Exhibit 2.13: Total Sales for Private Residential Units and Private Residential Certified Payments



In the private commercial retail space market, demand, as measured by total occupied space, rose by 2.1 per cent on a year-on-year basis in the first quarter of 2024, continuing the 1.7 per cent expansion in the previous quarter. Similarly, demand for private commercial office space rose by 1.0 per cent in the first quarter, extending the 1.6 per cent increase in the preceding quarter (Exhibit 2.14).

Exhibit 2.14: Total Occupied Space for Private Sector Commercial Office and Retail Spaces



Similarly, demand for private industrial space rose by 0.8 per cent on a year-on-year basis in the first quarter, following the 0.8 per cent increase in the preceding quarter (Exhibit 2.15).





PROFESSIONAL SERVICES

In the first quarter of 2024, the professional services sector grew by 2.5 per cent year-on-year, reversing from the 0.7 per cent contraction in the previous quarter. All segments within the sector recorded positive year-on-year growth in the first quarter.

Box Article 2.1

PERFORMANCE AND OUTLOOK OF THE CHEMICALS CLUSTER IN SINGAPORE

The chemicals cluster is a major cluster within the manufacturing sector in Singapore, accounting for 15.9 per cent of the sector's nominal value-added (VA) and 3.3 per cent of Singapore's overall nominal VA in 2022.¹ This box article examines the composition of the chemicals cluster, its recent performance, as well as its short- and medium-term outlook.

Petroleum and petrochemicals are key segments in Singapore's chemicals cluster

The chemicals cluster in Singapore is made up of four segments, namely the petroleum, petrochemicals, specialty chemicals and other chemicals segments. The petroleum and petrochemicals segments, which comprise highly integrated facilities, account for the largest shares of the cluster's nominal VA, at 63.7 per cent collectively in 2022 (Exhibit 1).

Exhibit 1: Segments in the chemicals cluster

Segment	Share of the chemicals cluster's nominal VA in 2022	Description
Petroleum	33.9 per cent	This segment produces refined petroleum products from feedstock such as crude oil. Refined petroleum products include transportation fuels (e.g., jet fuel, gasoline, diesel, marine fuel), as well as feedstock for petrochemicals production (e.g., naphtha).
Petrochemicals	29.8 per cent	This segment produces petrochemicals such as olefins (e.g., ethylene), aromatics (e.g., benzene), as well as primary petrochemical derivatives (e.g., polyethylene, ethylene oxide).
Specialty Chemicals	22.5 per cent	This segment produces chemicals for specific uses such as additives (e.g., lubricant, fuel and food additives), industrial gases, electronic chemicals and biofuels. Products in this segment are generally closer to end-market consumers, and higher in VA content.
Other Chemicals	13.9 per cent	This segment produces intermediate chemicals (e.g., fragrances) that go into a wide range of products, including consumer products such as personal care products, perfumes and cosmetics.

Singapore's chemicals cluster saw a period of downturn in 2022 and 2023, largely driven by the petrochemicals segment

The chemicals cluster entered a downturn in 2022 and 2023, contracting by 5.6 per cent and 6.7 per cent, respectively. The main drivers of the performance of the cluster over this period were the petrochemicals and petroleum segments. Notably, even though these segments occupy adjacent positions in the chemicals value-chain, they faced divergent demand and supply dynamics during this period.

For the petrochemicals segment, production levels fell sharply in 2022 (-12.6 per cent) due to a combination of weak external demand, global petrochemical overcapacity, and poor supply conditions such as high feedstock costs (Exhibit 2). <u>First</u>, demand faced by Singapore's plants had weakened in 2022 on the back of a sharp moderation in industrial activities in major export markets following the strong growth clocked in 2021. For instance, China – a key export demand market – experienced a growth slowdown in 2022² (as a result of its adherence to a zero-COVID strategy and property market downturn), which limited its industrial activity and demand for petrochemicals. <u>Second</u>, the weak demand experienced by Singapore's plants was compounded by excess petrochemical capacity in the region, which led to an oversupply of petrochemical products in the market. This could be attributed in part to new petrochemical capacities that came on-stream in China. <u>Finally</u>, high feedstock prices during this period – a result of elevated crude oil prices following the Russia-Ukraine war – further eroded margins and hence dampened production in Singapore's plants. In 2023, production in the petrochemicals segment remained weak (-14.8 per cent), amidst continued unfavourable external demand and supply conditions, as well as major plant maintenance shutdowns.

By contrast, production in the petroleum segment started to pick up in mid-2021 due to a surge in demand for transportation fuels (e.g., jet fuel, gasoline, diesel) (Exhibit 2). The boost in demand for these fuels was supported by the lifting of travel restrictions in economies across the region following the easing of COVID-19 lockdowns. Consequently, production rates in refineries in Singapore's petroleum segment increased significantly and refining margins rose to historic double-digit levels by mid-2022. For the full year, the segment expanded by 7.5 per cent. In 2023, while refining margins remained supported by the continued recovery in travel demand, the petroleum segment contracted marginally (-1.5 per cent), weighed down by plant maintenance shutdowns.

In sum, the downturn in the chemicals cluster in 2022 was driven by the contraction in output in the petrochemicals segment, which outweighed growth in the petroleum segment, over the same period. The softening of petroleum production and persistent surplus conditions in the petrochemicals segment in the subsequent year led the cluster to contract further in 2023.



Exhibit 2: Performance of the chemicals cluster and selected segments, 1021 - 1024

2 China's GDP grew by 3.0 per cent in 2022, moderating sharply from the 8.4 per cent growth in 2021. It is also substantially lower than the 7.7 per cent growth per annum (compound annual growth rate) from 2009 to 2019.

Net weighted balance (Per Cent)

Singapore's chemicals cluster is expected to return to growth in 2024, partly due to capacity expansions in the specialty chemicals segment, as well as a gradual recovery in the petrochemicals segment

Since 4Q23, the chemicals cluster has posted two consecutive quarters of year-on-year (yoy) growth after seven consecutive quarters of decline (1Q22 – 3Q23) (Exhibit 2). This upturn in performance was largely attributable to positive outturns in the specialty chemicals segment, as well as an improvement in the output of the petrochemicals segment.

In the specialty chemicals segment, production growth was strong in 4Q23 and 1Q24, at 17.8 per cent and 17.2 per cent respectively. This reflected improved regional demand as well as the segment's shift towards catering to global demand for sustainability. For instance, there were large capacity expansions to support the production of sustainable aviation fuel in Singapore, which led to a ramp-up in output towards the end of 2023.³ The continued ramp-up in output from the new capacities that have come on-stream is expected to sustain growth in this segment for the rest of 2024.

As for the petrochemicals segment, the contraction in its output eased throughout 2Q23 to 4Q23 after reaching a trough in 1Q23. By 1Q24, output has turned expansionary (13.2 per cent yoy), although this was largely off the low base a year ago. While the segment is expected to continue to recover gradually over the course of the year, there remain headwinds to the segment's growth due to planned petrochemical capacity expansions in the region, including China. In particular, the International Energy Agency (IEA) has estimated that China's expansions will make up 51 per cent of all new olefin capacity between 2022 and 2028.

Reflecting domestic chemical manufacturers' cautiously optimistic sentiments in 2024, a net weighted balance⁴ of 2 per cent of firms in the chemicals cluster are projecting improved business conditions for the period of April to September 2024 relative to 1Q24, a slight improvement from the net weighted balance of 0 per cent recorded in the preceding quarter (Exhibit 3).

15 10 5 0 -5 -10 -15 -20 -25 -30 1Q21 3Q21 1022 3022 1Q23 3023 1Q24 Source: Economic Development Board

Exhibit 3: General business outlook in the next six months relative to the current quarter for the chemicals cluster, 1Q21-1Q24

3 Neste, a chemicals company, reported the opening of expanded capacity for sustainable aviation fuel in Singapore in 2023.

4 Establishments were asked to indicate their expectations of general business conditions in terms of directional change (i.e., "up", "same" or "down"). Establishments' responses were then weighted by total output and aggregated to derive the weighted percentage for "up", "same" or "down" at the sub-cluster and cluster level. Net weighted balance was calculated by taking the difference between the weighted percentage of "up" responses and the weighted percentage of "down" at the sub-cluster of "down" responses. A positive number indicates a net positive balance or net upward movement, while a negative number denotes a net negative balance or net downward trend.

Singapore's chemicals cluster is poised for growth over the medium term

Over the medium term, while decarbonisation pressures will pose some headwinds, Singapore's chemicals cluster is expected to continue to grow, supported by petrochemicals demand from key export markets, as well as capacity expansions to cater to the rising demand for sustainable chemical products.

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ECONOMIC OUTLOOK



Chapter 3

ECONOMIC OUTLOOK

LEADING INDICATORS

On a quarter-on-quarter basis, the composite leading index (CLI) rose by 1.2 per cent in the first quarter of 2024, faster than the 0.4 per cent expansion in the previous quarter (Exhibit 3.1).

All nine components of the CLI rose on a quarter-on-quarter basis, namely wholesale trade, the stock of finished goods, new companies formed, the US Purchasing Managers' Index, domestic liquidity, stock price, non-oil sea cargo handled, money supply and non-oil retained imports.





OUTLOOK FOR 2024

Since the Economic Survey of Singapore in February, the external economic environment has remained resilient. In particular, economic growth in the US and China was better than expected in the first quarter, due largely to strongerthan-expected domestic demand and external demand respectively. Meanwhile, growth in regional economies like South Korea and Taiwan was supported by the global electronics recovery, led by strong demand for AI-related chips. Looking ahead, GDP growth in the major economies is expected to taper gradually in the immediate quarters due to tight financial conditions, before picking up alongside anticipated policy rate cuts later in the year.

Against this backdrop, Singapore's manufacturing and trade-related sectors are expected to see a gradual pickup in growth over the course of the year. Within the manufacturing sector, the electronics cluster is projected to recover gradually in the coming quarters, supported by demand for semiconductors for end-markets such as smartphones, PCs and AI. Growth in the electronics cluster will in turn have positive spillover effects on the precision engineering cluster, as well as the machinery, equipment & supplies segment of the wholesale trade sector. In addition, the chemicals cluster within the manufacturing sector is projected to continue to expand, partly due to capacity expansions such as that in sustainable aviation fuel.

Meanwhile, the stronger-than-anticipated recovery in air travel and tourism demand will continue to bolster the growth of aviation- and tourism-related sectors such as accommodation, air transport and aerospace, as well as consumer-facing sectors such as retail trade and food & beverage services. At the same time, the finance & insurance sector will be supported by higher tourist spending which will benefit the payments segment, as well as the projected peaking of global policy interest rates which will support the banking and fund management segments through higher commissions and fees. Taking into account the performance of the Singapore economy in the first quarter, as well as the latest global and domestic economic developments, the GDP growth forecast for Singapore for 2024 is maintained at **1.0 to 3.0 per cent**.

FEATURE ARTICLE

INCREASES IN AUTONOMOUS UNIVERSITY COHORT PARTICIPATION RATE AND THE LABOUR MARKET

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Feature Article

INCREASES IN AUTONOMOUS UNIVERSITY COHORT PARTICIPATION °RATE AND THE LABOUR MARKET

OVERVIEW

The Autonomous University Cohort Participation Rate (AU CPR) has risen since 2011, contributing to an increase in the intake of students in Singapore's AUs, and a rise in the supply of university graduates relative to other groups in the labour market. This could reduce the relative wage of university graduates unless relative demand also rose concurrently.

To better understand whether the rise in relative supply of university graduates was matched by an increase in relative demand, this article examines how the relative wage of university graduates changed with the increase in AU CPR between 2011 and 2016, and delves into possible mechanisms behind the findings.





FINDINGS

Finding 1:

Our main regression analysis showed that the composition-adjusted relative wage of university graduates remained stable even as AU intake rose between 2011 and 2016. This suggests that there was a concurrent increase in relative demand for university graduates that matched the rise in relative supply.

Finding 2:

Using relative demand regressions, we found evidence that the increase in relative demand was primarily due to exogenous demand shifts (e.g., secular increases in demand for university graduates from skill-intensive sectors), as well as endogenous demand increases due to technological choice (i.e., sectors shifting towards existing skill-intensive technologies because of a rise in the relative supply of university graduates, which in turn raised the relative demand for university graduates).

POLICY TAKEAWAY

The increase in the relative supply of university graduates arising from the 2011 – 2016 AU CPR increases was matched by a rise in the relative demand for these graduates.

These findings are encouraging and suggest that our economic agencies have been successful in anchoring firms and skilled jobs in Singapore, and that our AUs have been able to nurture a skilled workforce that is able to compete successfully for and perform well in these jobs.

MOE will continue working with MTI, MOM and other economic agencies to support AUs in equipping students with the necessary skills to take on good jobs in the economy, and closely monitor the labour market outcomes of all students amid the planned increase in AU CPR announced in March 2023.



♀ EXECUTIVE SUMMARY ♀

- The Autonomous University Cohort Participation Rate (AU CPR) has risen since 2011, contributing to an increase in the intake of students in Singapore's AUs, and consequently, a rise in the supply of university graduates relative to other educational groups in the labour market. Economic theory predicts that an increase in the relative supply of university graduates could lead to a fall in their relative wage unless the relative demand for them also rises concurrently.
- To better understand whether the rise in the relative supply of university graduates was matched by an increase in relative demand, this article examines how the relative wage of university graduates changed with the increase in AU CPR between 2011 and 2016. It also delves into the possible mechanisms that drove these findings.
- Using fixed-effects regression analysis (which controlled for students' characteristics), we found that the composition-adjusted relative wage of university graduates remained stable even as AU intake rose between 2011 and 2016. This suggests that there was a concurrent increase in the relative demand for university graduates that matched the rise in the relative supply of university graduates.
- Based on theoretically-motivated relative demand regressions, we found evidence that the increase in relative demand for university graduates was primarily due to exogenous demand shifts (e.g., secular increases in demand for university graduates from skill-intensive sectors). At the same time, there was some suggestive evidence that endogenous demand increases due to technological choice (i.e., sectors shifting towards existing skill-intensive technologies because of a rise in the relative supply of university graduates, which in turn raised the relative demand for university graduates) could have contributed to some extent too.

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 or the Government of Singapore.¹

INTRODUCTION

Singapore's Autonomous Universities (AUs) are funded by the Ministry of Education (MOE). They provide both preemployment training such as undergraduate education for fresh school leavers, as well as Continuing Education & Training programmes for adult learners. Both types of programmes aim to support individuals in their pursuit of lifelong learning and prepare them for the workforce and industry needs.

The AU intake each year is planned based on the AU Cohort Participation Rate (AU CPR). MOE works with MOM, MTI and other economic agencies to review the AU CPR regularly to take into account Singapore's additional manpower needs across the economy in the medium term, while ensuring good employment prospects for our university graduates. Changes to the AU CPR are calibrated based on the labour market outcomes of past AU graduates and the anticipated industry demand for AU graduates.

Between 2005 and 2010, the AU CPR was stable, and ranged from 24 per cent to 26 per cent. The AU CPR was raised to 28 per cent in 2011, and further raised over the years to reach 40 per cent in 2020. This was accomplished via intake expansions at the existing AUs, including National University of Singapore (NUS), Nanyang Technological University (NTU) and Singapore Management University (SMU), as well as the introduction of three new AUs, namely Singapore University of Technology and Design (SUTD), Singapore Institute of Technology (SIT) and Singapore University of Social Sciences (SUSS), which diversified the university landscape and established new pathways.

¹ We would like to thank Ms Yong Yik Wei, Dr Andy Feng, Dr Gwee Yi Jie, and Mr Lee Zen Wea for their useful suggestions and comments. We are also grateful to the Department of Statistics (DOS) for their assistance in accessing administrative data of a longitudinal nature, and the Higher Education Planning Office from the Ministry of Education (MOE) for their inputs to this article. All errors belong to the authors.

Given that the increase in AU CPR would have raised the relative supply of university graduates in the labour market, economic theory predicts that the relative wage of university graduates could fall unless there was a concurrent increase in the relative demand for such graduates.

Against this backdrop, our study examined if the increase in relative supply of university graduates arising from the AU CPR increases from 2011 to 2016² was matched by a rise in relative demand for university graduates, by analysing the impact of AU expansions on the relative wage of university graduates. Our study also delved into the possible mechanisms that drove these findings. For the rest of this article, the terms "relative demand/supply" and "demand/supply" will be used interchangeably.

AU CPR INCREASES AND GRADUATE LABOUR MARKET OUTCOMES: THEORY AND EVIDENCE FROM THE ECONOMICS LITERATURE

The economics literature (e.g., Katz & Murphy, 1992; Card & Lemieux, 2001; Blundell et al., 2022) uses variants of a relative demand and supply framework to understand how changes in the supply of university graduates may affect the labour market. This framework accounts for the fact that different groups of workers may substitute or complement one another in the labour market to varying degrees, which in turn implies that large shifts in the supply of one group of workers could have an effect on their own wages as well as the wages of the other groups.

Based on this framework, AU CPR increases will raise the relative supply of university graduates (i.e., supply compared to other groups of workers). As university graduates are likely to be imperfect substitutes for other workers in the labour market, the increase in relative supply of university graduates may result in firms paying the university graduates less, thereby lowering their relative wage (i.e., wage compared to other groups of workers), if there is no change in the relative demand for university graduates (Exhibit 1a).

However, concurrent increases in the relative demand for university graduates may mitigate the negative impact of the increase in relative supply of university graduates on their relative wage. Changes in relative demand may occur through the following channels:

- <u>Exogenous relative demand shifts</u>. These changes in relative demand occur **independently** of changes in the relative supply of university graduates. They may arise from the widespread adoption of skill-intensive technologies, an expansion of existing skill-intensive sectors or the opening up of new skill-intensive product markets, possibly as a result of government investment.
- <u>Endogenous technological choice</u>. This may occur if the increase in relative supply of university graduates **causes** firms to shift towards **existing** skill-intensive technologies, which in turn raises the relative demand for university graduates.
- <u>Endogenous innovation</u>. This may occur if the increase in relative supply of university graduates incentivises the *invention* of skill-intensive technologies, which in turn raises the relative demand for university graduates.

If the relative demand for university graduates increases to match or exceed the rise in relative supply of university graduates, the relative wage of university graduates may remain stable or even increase (Exhibit 1b).

Exhibit 1: Theoretical impact of changes in relative demand (D) and supply (S) on the relative wage (w) of university graduates

Exhibit 1a: Only relative supply increases

Relative wage



- An increase in university intake raises the relative supply of university graduates $(S_0 \rightarrow S_1)$.
- This exerts downward pressure on their relative wage $(w_0 \rightarrow w_A)$ if relative demand for university graduates remains unchanged (D_0) .

Exhibit 1b: Relative demand and supply both increase



- An increase in relative demand for university graduates through the channels outlined above $(D_0 \rightarrow D_1)$ can mitigate the supply-driven downward pressure on relative wage.
- In such cases, relative wage may remain stable or even increase ($\geq w_0$) even though the relative supply of university graduates has increased.

Empirical evidence from the economics literature suggests that the relative demand and supply framework is able to predict the relative wage changes of university graduates when their supply increases well, and that it is possible for relative demand to shift sufficiently to fully match the increase in relative supply of university graduates.

For example, Katz & Murphy (1992) found that a parsimonious model incorporating exogenous relative demand shifts and changes in the relative supply of university graduates predicted changes in the relative wage of university graduates in the US well (Exhibit 2a). In addition, Blundell et al. (2022) found that the relative wage of university graduates in the UK remained stable despite an increase in the relative supply of university graduates over the same period (Exhibit 2b). The authors found some evidence to suggest that the stability in relative wage could have been the result of a shift towards more decentralised processes (e.g., with more employee autonomy) that in turn raised the demand for more educated workers.

Exhibit 2: Empirical evidence from the economics literature

Exhibit 2a: Chart from Katz & Murphy (1992)

Predicted relative wages from a relative demand-supply model tracked actual relative wage changes well.



Exhibit 2b: Chart from Blundell et al. (2022)

Relative wage of UK university graduates remained stable despite a rise in the relative supply of university graduates.

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IMPACT OF AU CPR INCREASES ON RELATIVE WAGES IN SINGAPORE

In this section, we first examined economy-wide summary statistics on the wages of resident workers from the Comprehensive Labour Force Survey (CLFS). We found that even after graduates from the expanded AU cohorts entered the labour market, thereby increasing the relative supply of university graduates (Exhibit 3), the relative wage of university graduates vis-à-vis polytechnic graduates – a comparator group chosen for technical reasons³ – remained stable (Exhibit 4).





Source: Ministry of Manpower's (MOM) Comprehensive Labour Force Survey (CLFS)

³ We used polytechnic graduates as the main comparison group for technical reasons. Specifically, polytechnic graduates were likely to be more similar to university graduates than secondary graduates for example, which would allow us to minimise the impact of compositional differences across workers (e.g., in terms of family background, ability, or motivation) on relative wage.

⁴ Resident workers with degrees include graduates from Private Educational Institutions and overseas universities. While we presented the supply in relative terms, data from the CLFS showed that the absolute supply of university graduates also rose over the same period, from 438,000 in 2007 to 945,000 in 2021.

Exhibit 4: Change in relative wage of university graduates vis-à-vis polytechnic graduates compared to 2014, for all resident workers and resident workers aged 25 – 29



Source: MOM's CLFS

While these economy-wide statistics provide suggestive evidence that the labour market has adjusted to the AU CPR increases well, there is still the possibility that the relative wage changes presented are not reflective of the impact of the AU CPR increases if the AU CPR increases had also led to a change in the composition of university and polytechnic graduates, especially in terms of variables that could independently affect their wages such as ability, demographics or socioeconomic status.

To mitigate this issue, we next conducted regression analyses using individual-level data.

(i) Data and methodology for individual-level analysis

We carried out econometric analyses using individual-level data, which would allow us to account for potential confounders such as the demographic and socioeconomic characteristics of individuals.

Specifically, we used administrative data for the period of 2005 to 2021, and focused on residents (i.e., Singapore Citizens and Permanent Residents) in the 1986 to 1995 birth cohorts who graduated from university or polytechnic, and for whom we were able to observe their wage outcomes at ages 26, 27 and 28.

This data allowed us to estimate changes in the relative wage of university graduates for the post- vs pre-AU CPR expansion birth cohorts (where pre-AU CPR expansion birth cohorts refer to those born in 1989 or earlier, while the post-AU CPR expansion birth cohorts refer to those born in 1990 or after) via fixed-effects regressions that accounted for potential confounders, including demographic characteristics and socioeconomic status. Like the summary statistics presented earlier, the comparison group in our main regression was limited to polytechnic graduates as they were likely to be more similar to university graduates than those from other educational groups. Finally, our regression analysis differentiated between AU and non-AU university graduates.

Our main regression specification was:

$$y_{i,a} = \sum_{g} \alpha_{g} \cdot edu_{i,a,g} + \sum_{c} \alpha_{c} \cdot cohort_{i,c} + \sum_{g} \sum_{c \in [1986, 1988]} \delta_{gc} \cdot (edu \times cohort)_{i,a,g,c} + \sum_{g} \beta_{g} \cdot (edu \times post - expansion indicator)_{i,a,g,c} + \gamma X_{i} + \varepsilon_{i,a}$$

where i,a,g,c indexed individuals, age, educational group, and birth cohort respectively, and

- y_{ia} was the log of monthly real wage⁵;
- edu_{i,a,g} were indicators for individuals with AU or non-AU degrees; the base/omitted category consisted of
 individuals with polytechnic diplomas (e.g., an AU indicator would take the value of 1 if an individual had an
 AU degree, and 0 otherwise);
- cohort_{i,c} were birth cohort indicators (e.g., an indicator for the 1990 birth cohort would take the value of 1 for an individual from the 1990 birth cohort, and 0 otherwise); 1989 was the omitted cohort as it was the last birth cohort where the majority of individuals were not affected by the AU CPR increase;
- post expansion indicator was an indicator variable that took the value of 1 for the cohorts affected by the AU CPR increase (i.e., the 1990 – 1995 birth cohorts), and 0 otherwise;
- X, were controls for sex, parental education, parental housing type, and parental income; and
- $\varepsilon_{i,a}$ was the error term

The coefficient of interest in this regression is β_g , which is an estimate of how the relative wage of university graduates (vis-à-vis polytechnic graduates) changed for the cohorts affected by the AU CPR increase, after accounting for differences in individual characteristics.⁶

In addition, we performed several robustness checks in line with the literature (e.g., Blundell et al., 2000) to remove or reduce the influence of other potential confounders. The two key checks we carried out were:

- <u>Incorporating national examination scores into the regression</u>. As national examination scores are
 observable proxies of students' ability/motivation which could have affected the wages of university and
 polytechnic graduates independently of the AU CPR increases, including the scores in the regression would
 help to better control for these potential confounders.
- <u>Restricting the sample to AU applicants</u>. This robustness check limited the comparison group of polytechnic graduates to those who had applied to, but did not enter, the AUs. As this is a group that was likely to be more similar to AU graduates in terms of unobservable confounders such as motivation, restricting the sample to this group could help to remove the effect of these confounders.

(ii) Impact on relative wage

Our regression results suggest that the **increase in the relative supply of university graduates arising from the AU CPR increases was broadly matched by a rise in relative demand**. Following the AU expansion (i.e., after the 1989 birth cohort), β_g for AU and non-AU graduates was close to zero and statistically insignificant for our main regression and robustness checks (Exhibit 5). This implies that the relative wage of university graduates (vis-à-vis polytechnic graduates) remained unchanged even after the AU CPR was raised.⁷

5 Real wages were deflated using the Consumer Price Index, with 2019 as the base year.

⁶ More precisely, β_g is an estimate of how wages changed for birth cohorts affected by the AU CPR increase, relative to the 1989 birth cohort, the last cohort where most individuals were not affected by the AU CPR increase.

⁷ The stability observed in the relative wage of university graduates is consistent with Blundell et al. (2022), who found that university expansions in the UK did not change the relative wage of degree holders.

Change in relative wage after AU	Age 26		Age 27		Age 28	
expansion (percentage-points)	Non-AU	AU	Non-AU	AU	Non-AU	AU
Main regression	NA ⁹	-1.2	-0.5	-1.2	0.8	-0.4
Robustness: No controls		-1.1	-0.7	-1.1	0.6	-0.4
Robustness: Controls for PSLE score		-1.2	-0.5	-1.3	0.7	-0.2
Robustness: Restricting sample to AU applicants only		1.1	1.6	-0.1	0.9	-0.1

Exhibit 5: Change in relative wage of AU and non-AU graduates after AU CPR increases, ages 26 - 288

*** p<0.01, ** p<0.05, * p<0.1. Statistically insignificant coefficients are in grey Source: Authors' estimates

(iii) Impact on employment rates

Beyond wages, the labour market could have also adjusted to the AU CPR increases along the employment margin. However, we did not find evidence of this as summary statistics suggest that the employment rates of AU and non-AU university graduates, as well as polytechnic diploma graduates, remained high and stable after the AU expansion (i.e., after the 1989 birth cohort) (Exhibit 6).¹⁰

Exhibit 6: Employment rate by educational group and birth cohort at age 27¹¹



8 The results for the change in relative wage (i.e., β_g) at ages 26 – 28 are from three separate regressions that used wage at age 26, 27 and 28 as the outcome variable respectively.

9 The change in relative wage for non-AU degree graduates at age 26 is not reported as their wage had already diverged from that of polytechnic graduates in the birth cohorts unaffected by the AU expansion, which implies that any further changes in their relative wage at age 26 would likely not be attributable to the AU expansion. By contrast, the wages of AU graduates and non-AU graduates at other ages had not diverged from those of polytechnic graduates prior to the increase in the AU CPR.

10 Employment rate was computed as the number of individuals in formal employment divided by the number of individuals in a birth cohort (i.e., not restricted to economically active individuals only).

11 While the exhibit shows the employment rate of individuals at age 27, the trends are similar at ages 26 and 28.

POTENTIAL CHANNELS UNDERLYING STABILITY IN RELATIVE WAGE

(i) Data and methodology for analyses used to better understand demand channels

Our second set of econometric analyses focused on exploring the channels through which the relative demand for university graduates could have changed, by explicitly modelling relative demand changes as well as changes in the supply of workers in different age and educational groups.¹²

Specifically, we followed the literature (Katz & Murphy, 1992; Card & Lemeuix, 2001; Goldin & Katz, 2007; Blundell et al., 2022) and estimated the following theoretically-motivated relative demand equation (see Annex A for derivation) on a dataset of all resident workers aged 25 and above that was aggregated by educational groups, 5-year age bands and sectors:

$$\log \frac{W_{H,j,st}}{W_{M,j,st}} = b_{0,s} + b_{0,j} + f(t) + b_e \log \frac{L_{H,st}}{L_{M,st}} + b_a \left(\log \frac{L_{H,j,st}}{L_{M,j,st}} - \log \frac{L_{H,st}}{L_{M,st}}\right) + \epsilon_{e,j,s,t}$$

where:

- L represents total employment in the education x age band x sector cell;
- *e*, *j*, *s*, *t* index education group, 5-year age band, sector, and year, respectively;
- *H*, *M*, and *L* represent the high (degree¹³), mid (polytechnic), and low (post-secondary and below) education categories, respectively;
- f(t) is a function of time (e.g., linear or quadratic time trends); and
- b_{e} and b_{a} are the inverse of the elasticities of substitution between education groups (i.e., university degree and polytechnic graduates) and age groups (i.e., 5-year age bands), respectively.

This analysis allowed us to test whether the increase in relative demand for university graduates suggested by our findings in the earlier section was more likely to have arisen from exogenous demand changes or endogenous technological choice. The basic idea is as follows:

- If the relative demand for university graduates had risen in tandem with relative supply, and we did not explicitly model the demand shocks, there should be little or no correlation between the increase in the relative supply of university graduates and their relative wage (i.e., $b_e = 0$).
- If the demand increases were due solely to exogenous demand shocks, econometrically removing the effects of these shocks would restore the negative correlation between the relative supply of university graduates and their relative wage (i.e., $b_e < 0$). To net out exogenous demand, we added a secular time trend f(t) in the regression specification (i.e., exogenous demand is assumed to be modelled by the time trend variable).
- By contrast, if the demand increases were due solely to endogenous demand shocks, adding the secular time trend f(t) to the regression would not have any effect. There would thus still be little or no correlation between the increase in the relative supply of university graduates and their relative wage (i.e., b_e = 0).

We excluded the third demand channel highlighted earlier (i.e., endogenous innovation) from consideration as our assessment was that it was unlikely to have been a key driver of relative demand shifts over the period of our study. Specifically, increases in relative demand for university graduates arising from the invention of skill-intensive technologies typically occur with a lag, which is inconsistent with our observation of a stable relative wage shortly after the increase in the relative supply of university graduates occurred (see Exhibits 4 and 5).¹⁴

¹² The drawback of this approach is that we were not able to adjust for confounders as easily given that the data was aggregated and the variables used to control for confounders in the earlier analysis were not available for all observations in the full dataset.

¹³ Degree holders include both AU and non-AU university degree holders as data on whether an individual graduated from an AU was not available for the full dataset.
14 Beyond the three channels discussed, which would serve to raise wages if university education led to actual increases in human capital on the supply side, the literature also suggests the possibility of a separate supply channel – i.e., signalling – which could similarly raise the wages of university graduates. Under the signalling channel, employers use degree attainment as a signal of innate ability and are thus willing to pay more to hire university graduates. However, our assessment is that signalling was unlikely to have been a driver of changes in the relative wage of university graduates in our context. This is because if signalling had been a key factor, AU expansions would have weakened the signalling value of a degree over time and thus reduced the relative wage of university graduates. However, this was not what we observed in our study, i.e., the relative wage of university graduates remained stable over time even after the AU expansions.

(ii) Results

Using the above approach, we found evidence that the increase in relative demand for university graduates after the AU expansions was likely to be primarily due to exogenous demand increases. At the same time, there was some suggestive evidence that endogenous demand increases due to technological choice could have contributed to some extent too (Exhibit 7). (See Annex B for the detailed results.)

<u>First</u>, exogenous demand increases were likely to be a key driver of the increase in relative demand for university graduates as: (i) the correlation between the time trend and relative wage of university graduates (i.e., f(t)) was positive and statistically significant; and (ii) the addition of the time trend (which accounted for the effect of exogenous demand increases) restored part of the expected negative correlation between the relative supply of university graduates and their relative wage (i.e., $b_e < 0$), although the b_e term remained statistically insignificant. An analysis of job vacancies by sector before and after the AU CPR was increased suggests that the rise in labour demand for university graduates could have been driven by skill-intensive sectors such as the Finance & Insurance and Information & Communications sectors (Annex C).

<u>Second</u>, exogenous demand increases were unlikely to be the only driver of the increase in relative demand for university graduates as the negative correlation between the relative supply of university graduates and their relative wage remained relatively small (and statistically insignificant) even after exogenous demand increases were accounted for in our regression using the time trend. Beyond these regression results, the stability of the relative wage of university graduates in Exhibits 4 and 5 provides further evidence that exogenous demand increases were unlikely to be the only driver of the relative demand shifts, as it is unlikely that exogenous demand could have increased to the extent needed to match the rise in the relative supply of university graduates year after year, for more than a decade. Taken together, these observations suggest that the remaining channel under consideration – i.e., endogenous technological choice – could have also contributed to the rise in relative demand for university graduates over the period of our study.

Exhibit 7: Summary of relative	e demand regression results
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Correlation between variable and relative wage of university graduates for:Predicted regression result for a adding time trends to net out ex increasesIf only exogenous demandIf o tech		ult for each channel after t out exogenous demand eases	<u>Actual</u> regression result	
		If only endogenous technological choice		
Relative supply of university graduates (i.e., <i>b_e</i>)	 Negative and statistically significant 	• Close to 0 or positive	 Negative but statistically insignificant Smaller than benchmarks from the literature 	
Time trend (i.e., <i>f</i> (<i>t</i>))	 Positive and statistically significant 	• Close to 0	 Positive and statistically significant 	

CONCLUSION

Our study suggests that the increase in the relative supply of university graduates arising from the 2011 – 2016 AU CPR increases was matched by a rise in the relative demand for these graduates, as there was no evidence of a fall in the relative wage of university graduates. This was likely to be largely due to a concurrent rise in exogenous demand for university graduates from sectors such as Finance & Insurance and Information & Communications. It could potentially also be due to endogenous technological choice (i.e., the higher supply of university graduates could have led firms to shift towards existing skill-intensive technologies), albeit to a lesser extent.

A key caveat to our study is that our focus was only on the private returns to AU education. There are likely to be broader societal returns to AU education, such as improved economy-wide productivity from increased innovation or agglomeration effects, that were not captured in our study. Notwithstanding this caveat, our overall findings are encouraging and suggest that our economic agencies have been successful in anchoring firms and skilled jobs in Singapore, and that our AUs have been able to nurture a skilled workforce that is able to compete successfully for and perform well in these jobs.

In March 2023, in close consultation with MTI, MOM and other economic agencies, MOE announced plans to increase the Lifetime AU CPR for publicly-funded university degrees to 60 per cent by 2025. This takes into account the demand for degree-level manpower across the economy in the medium term, arising from our industry transformation efforts. The increase will be weighted towards enabling adult learners to access university education, and spread over time so that the curricula can adjust in response to industry demand. MOE will continue to work with agencies to support the AUs in equipping students with the necessary skills to take on good jobs in the economy, and closely monitor the labour market outcomes of all students across the various education pathways.

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ANNEX A: DERIVATION OF RELATIVE DEMAND REGRESSIONS

Similar to the literature (e.g., Card & Lemeuix, 2001; Goldin & Katz, 2007), our relative demand equation was derived based on an assumption of a Constant Elasticity of Substitution (CES) production function with two nests:

$$y_{st} = (\alpha_{H,t} L_{H,st}^{\rho} + \alpha_{M,t} L_{M,st}^{\rho} + \alpha_{L,t} L_{L,st}^{\rho})^{\frac{1}{\rho}} \& L_{e,st} = (\sum_{j} \beta_{j} L_{e,j,st}^{\eta})^{\frac{1}{\eta}}$$

where:

- *y* and *L* represent output and labour, respectively;
- *e*, *j*, *s*, *t* index education group, 5-year age band, sector, and year, respectively;
- *H*, *M*, and L represent the high (degree), mid (polytechnic), and low (post-secondary and below) education categories respectively;
- α and β are the skill-group-specific factors augmenting technological or productivity factors for each nest and group; and
- $\rho = 1 \frac{1}{\sigma_E}$ and $\eta = 1 \frac{1}{\sigma_A}$, where σ_E and σ_A represent the elasticities of substitution between skill groups and age groups, respectively. An elasticity of between 0 and 1 suggests that the groups are gross complements, while an elasticity of more than 1 suggests that the groups are substitutes.

Taking the first order condition and rearranging terms gave us the following relative demand equation for high-skilled relative to low-skilled workers, where w represents wage, ϵ is the error term, and the other terms are the same as before:

$$\log \frac{W_{H,j,st}}{W_{M,j,st}} = \log \frac{\alpha_{H,t}}{\alpha_{M,t}} + \beta_j + \delta_s - \frac{1}{\sigma_E} \log \frac{L_{H,st}}{L_{M,st}} - \frac{1}{\sigma_A} \left(\log \frac{L_{H,j,st}}{L_{M,j,st}} - \log \frac{L_{H,st}}{L_{M,st}}\right) + \epsilon_{e,j,st}$$
Relative exogenous demand

Assuming that relative exogenous demand is a function of time (i.e., $\log \frac{\alpha_{Ht}}{\alpha_{Mt}} = f(t)$) then gave the following estimable demand equation in the main text:

$$\log \frac{W_{H,j,st}}{W_{M,j,st}} = b_{0,s} + b_{0,j} + f(t) + b_e \log \frac{L_{H,st}}{L_{M,st}} + b_a (\log \frac{L_{H,j,st}}{L_{M,j,st}} - \log \frac{L_{H,st}}{L_{M,st}}) + \epsilon_{e,j,st}$$

where b_e and b_a are the inverse of the elasticities of substitution between educational groups (i.e., university degree and polytechnic graduates) and age groups (i.e., 5-year age bands), respectively.

ANNEX B: DETAILED RESULTS OF RELATIVE DEMAND REGRESSIONS

Across the regressions, the inverse of the elasticities of substitution between educational groups (b_e) became more negative (but still statistically insignificant) upon the addition of the time trend. The positive and statistically significant coefficient for the time trend implied that there was an exogenous, secular rise in relative skilled labour demand over time.

However, b_e remained statistically insignificant and less negative than typical estimates in the literature even after adding the time trend, suggesting the presence of some omitted variable bias. While this omitted variable bias could either be due to model misspecification or economy-wide relative demand shifts that we did not account for, we assessed that the former was less likely as the estimates of b_a were in line with the literature.¹⁵

As such, endogenous technological choice, the key remaining channel in the literature which we were unable to model explicitly, was a potential candidate for the source of the additional relative demand shift that had not been accounted for.

Exhibit B1: Results of relative demand regressions with different time trend assumptions

	(1)	(2)	(3)
Coefficient	No time trend	Linear time trend	Quadratic time trend
b _e	-0.007	-0.074	-0.071
b _a	-0.125***	-0.123***	-0.123***
Year		0.002**	0.462
Year ²			-0.0001
Sector FE	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
Observations	3,753	3,753	3,753
R-squared	0.560	0.560	0.560

*** p<0.01, ** p<0.05, * p<0.1. Statistically insignificant coefficients are in grey. Source: Authors' estimates

ANNEX C: COMPARISONS OF JOB VACANCIES BY SECTOR

Analysing the change in average job vacancies by sector for the post-AU expansion period of 2017-2019, as compared to the pre-AU expansion period of 2010-2016, we found that the Finance & Insurance and Information & Communications sectors experienced the largest changes in average job vacancies of 1,800 and 1,700 respectively (Exhibit C1). This suggests that the rise in relative labour demand for university graduates could have arisen partly due to demand from these sectors.

Exhibit C1: Change in average job vacancies by sector (calendar year 2010-2016 vs 2017-2019)

Sector	Change in average job vacancies (thousands)
Manufacturing	-0.5
Construction	-0.8
Wholesale Trade	0.0
Retail Trade	-0.5
Transportation & Storage	-0.1
Accommodation	0.4
Food & Beverage Services	-0.3
Information & Communications	1.7
Finance & Insurance	1.8
Real Estate	-0.7
Professional Services	0.6
Administrative & Support Services	0.0
Other Services Industries	-1.5

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