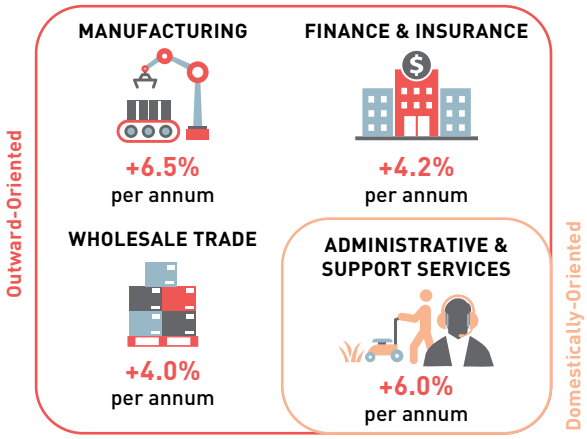
FEATURE ARTICLE

DRIVERS OF LABOUR PRODUCTIVITY GROWTH IN SINGAPORE 2009–2019

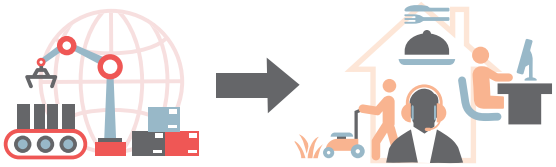
Singapore's labour productivity, as measured by real value-added per actual hour worked, grew by 2.8% per annum over the past decade, achieving the ambitious target of 2 to 3% per annum set by the Economic Strategies Committee. Singapore's productivity growth performance over the period exceeded that of most advanced economies.

SHIFT-SHARE ANALYSIS

Overall productivity growth was driven mainly by productivity improvements within sectors, particularly in outward-oriented sectors.



However, these gains were dampened slightly by a net shift in employment and hours worked from more productive outward-oriented sectors towards less productive domestically-oriented sectors.



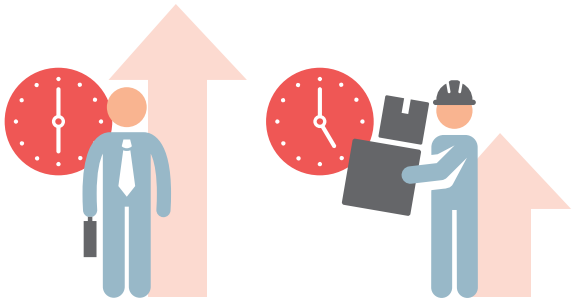
MANUFACTURING, WHOLESALE TRADE

FOOD SERVICES, OTHER SERVICES INDUSTRIES AND ADMINISTRATIVE & SUPPORT SERVICES

GROWTH ACCOUNTING ANALYSIS

Capital intensity improvements, particularly in non-residential construction & works and research & development, were the main drivers of productivity growth.

Labour quality improvements also contributed positively to productivity growth, supported by an increase in hours worked by skilled workers which outpaced that of less skilled workers.



SKILLED WORKERS

LESS-SKILLED WORKERS

CONCLUSION

Singapore's progress in raising aggregate productivity over the past decade is aligned with the Government's aims to uplift productivity to support economic growth and higher wages for Singaporeans. To sustain productivity growth over the longer term, it is important to press on with industry transformation and restructuring efforts.

EXECUTIVE SUMMARY

- This article examines Singapore's labour productivity performance over the past ten years against the productivity growth target of 2 to 3 per cent per annum set by the Economic Strategies Committee (ESC) in 2010. Shift-share and growth accounting analyses are also conducted to better understand the drivers of Singapore's labour productivity performance over the decade.

- From 2009 to 2019, Singapore's overall labour productivity, as measured by real value-added per actual hour worked, grew by 2.8 per cent per annum, achieving the target set by the ESC. Singapore's productivity growth performance over the past decade was also better than that of most advanced economies.

- The shift-share analysis finds that productivity gains over the decade were driven mainly by productivity improvements within sectors, especially the outward-oriented sectors. These gains were dampened slightly by a net shift in employment and hours worked from more productive outward-oriented sectors towards less productive domestically-oriented sectors. There are, however, signs that this shift effect has improved over time, with the effect turning positive in the later years of the decade as more productive outward-oriented services sectors such as Finance & Insurance and Information & Communications continued to gain employment and hours worked shares.

- The growth accounting analysis shows that higher capital intensity, especially in non-residential construction & works and research & development, was the main driver of productivity growth over the decade. Overall productivity growth was also supported by labour quality improvements and total factor productivity growth.

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]

1. INTRODUCTION

In its report released in February 2010, the Economic Strategies Committee (ESC) set an ambitious productivity growth target of 2 to 3 per cent per annum, which would in turn support economic growth of 3 to 5 per cent per annum, for Singapore to achieve over the decade (i.e., 2009 to 2019). Against this backdrop, this article examines Singapore's productivity performance over the past decade, including the drivers of the productivity performance.

Singapore's overall labour productivity growth between 2009 and 2019 is decomposed using two approaches. The first approach is a shift-share analysis to investigate the extent to which productivity growth was due to (i) productivity changes within sectors, (ii) shifts in employment and hours worked across sectors with different productivity levels, and (iii) shifts in employment and hours worked across sectors with different productivity growth rates. The second approach is a growth accounting analysis to examine how changes in (i) capital intensity, (ii) labour quality, and (iii) total factor productivity (TFP) contributed to labour productivity growth.

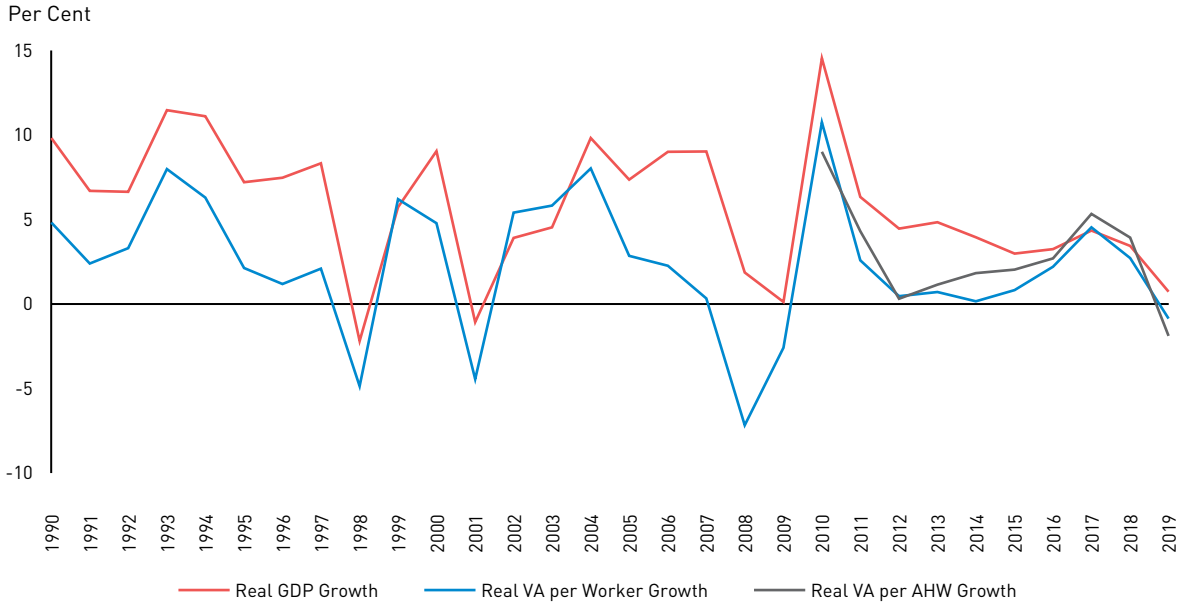
2. SINGAPORE'S PRODUCTIVITY PERFORMANCE (2009-2019)

Labour productivity measures how efficiently labour inputs are used to produce output, and can be computed in terms of real value-added (VA) per actual hour worked (AHW) or real VA per worker. Of the two measures, VA per AHW is recognised internationally, including by the International Labour Organisation, to be a better measure of labour productivity because actual hours worked capture the intensity of labour input more accurately. In Singapore's context, this measure has also become more relevant in recent years with the rising share of part-time workers in the economy, and cyclical changes in the number of hours worked by full-time workers (see Goh & Lin, 2015).

1 *We would like to thank Ms Yong Yik Wei, Dr Kuan Ming Leong and Mr Lee Zen Wea for their useful suggestions and comments. All errors belong to the authors.*

Productivity growth in Singapore generally follows a pro-cyclical pattern (Exhibit 1). During downturns, productivity falls in line with Gross Domestic Product (GDP) as firms cut output before letting go of workers. During upturns, firms boost their output but hire workers with a lag. Given the effect of business cycles on productivity, Singapore's productivity performance is better analysed over a longer time horizon, rather than for individual years.

Exhibit 1: Singapore's Real GDP, Real VA per Worker and Real VA per AHW Growth, 1990-2019



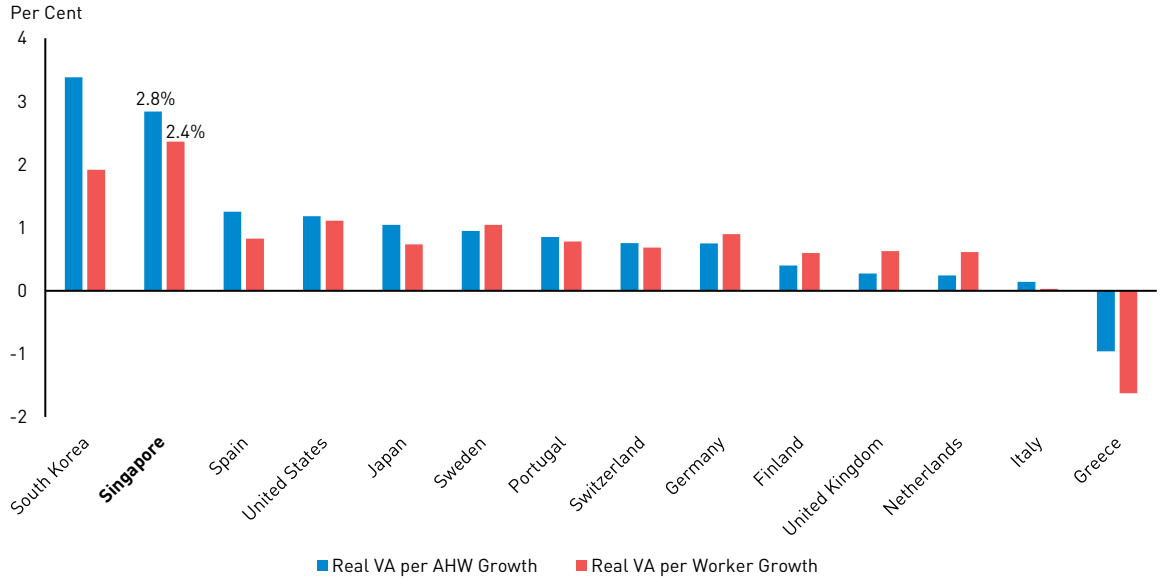
Source: DOS, MTI Staff Estimates
Note: Data for real VA per AHW growth is only available from 2010.

Over the past decade, both measures of labour productivity (i.e., real VA per AHW and real VA per worker) met the ESC's productivity growth target of 2 to 3 per cent per annum. Between 2009 and 2019, real VA per AHW grew at a compounded annual growth rate (CAGR) of 2.8 per cent.[2] In terms of real VA per worker, productivity rose by 2.4 per cent per annum, improving from the 1.4 per cent per annum growth in the preceding decade (i.e., 1999 to 2009). Cumulatively, Singapore's productivity increased by one-quarter (VA per worker) to one-third (VA per AHW) over the decade.

An international comparison shows that Singapore's productivity growth performance over the decade was better than that of most advanced economies (Exhibit 2). Between 2009 and 2019, real VA per AHW growth in Singapore (2.8 per cent per annum) exceeded that of the United States (1.2 per cent per annum), Japan (1.0 per cent per annum) and Switzerland (0.8 per cent per annum). Similarly, real VA per worker growth in Singapore (2.4 per cent per annum) surpassed that of South Korea (1.9 per cent per annum), United States (1.1 per cent per annum) and Germany (0.9 per cent per annum) over this period.

2 *Excluding the rebound in 2010 following the Global Financial Crisis (GFC), productivity growth between 2010 and 2019 remained healthy, at 2.2 per cent per annum (in terms of VA per AHW) and 1.5 per cent per annum (in terms of VA per worker). The better VA per AHW growth was due to a fall in hours worked per full-time worker and a rise in the share of part-time workers in the economy during this period.*

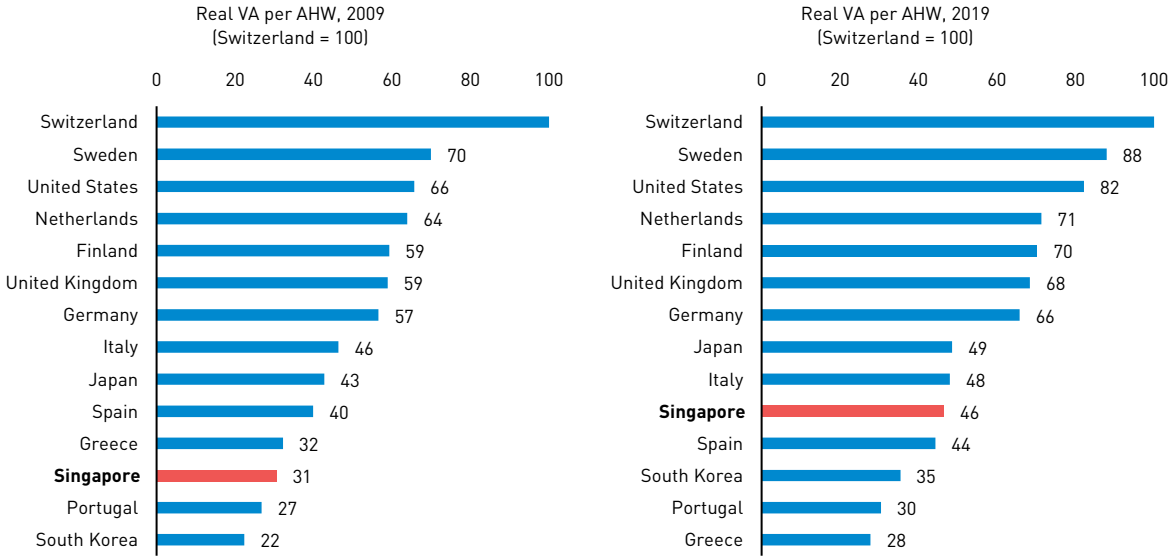
Exhibit 2: Productivity Growth (Real VA per AHW and Real VA per Worker) of Selected Advanced Economies (CAGR), 2009-2019



Source: OECD, DOS, MTI Staff Estimates

Given its stronger productivity growth over the decade, Singapore narrowed its productivity gap in level terms with other advanced economies. Between 2009 and 2019, Singapore's productivity level, in terms of VA per AHW, improved from 31 per cent to 46 per cent that of Switzerland, the frontier economy (Exhibit 3). Similarly, in terms of VA per worker, Singapore's productivity level rose from 53 per cent of Switzerland's level in 2009 to 63 per cent in 2019 (Exhibit 4). However, while Singapore is progressing in the right direction, there is still much room for Singapore to improve compared to the economies at or close to the frontier.

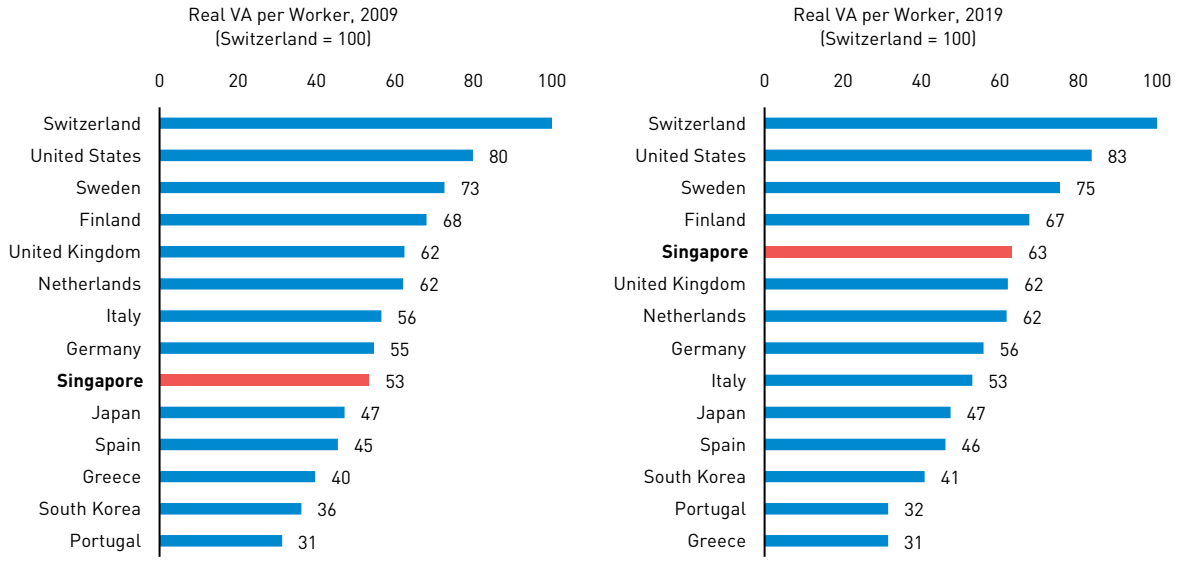
Exhibit 3: International Comparisons of Real VA per AHW, 2009 and 2019



Source: MTI Staff Estimates, OECD
Notes:

1. The comparisons are based on real GDP data at constant 2015 prices and converted to a common currency based on average market exchange rates from 2014 to 2016.
2. In the OECD, productivity is measured in terms of VA per hour worked.
3. 2018 figures are used for Switzerland and South Korea because the 2019 figures are not yet available.

Exhibit 4: International Comparisons of Real VA per Worker, 2009 and 2019



Source: MTI Staff Estimates, OECD
Note: The comparisons are based on real GDP data at constant 2015 prices and converted to a common currency based on average market exchange rates from 2014 to 2016.

Singapore's progress in raising aggregate productivity over the past decade is aligned with the aims of the ESC and the Committee on the Future Economy (CFE) to uplift productivity to support economic growth and higher wages for Singaporeans. To better understand the drivers of productivity growth over the decade, shift-share and growth accounting analyses are conducted, with a focus on decomposing productivity growth as measured by real VA per AHW. The next two sections describe the methodology and results of the two decomposition analyses.

3. SHIFT-SHARE ANALYSIS OF LABOUR PRODUCTIVITY GROWTH

Previous shift-share analyses (see Goh, 2014; Goh & Fan, 2015; Fan & Teo, 2016; Teo & Ong, 2018) found that Singapore's productivity growth was largely driven by productivity improvements within sectors. This section updates the earlier analyses and examines Singapore's productivity performance over the period of 2009 to 2019.

Methodology

Using shift-share decomposition, overall labour productivity (VA per AHW) growth in the economy can be expressed as a sum of three effects:

- Within Effect: The contribution of productivity growth within sectors to overall productivity growth;
- Static Shift Effect: The contribution of changes in the AHW shares of sectors with *different productivity levels* to overall productivity growth; and
- Dynamic Shift Effect: The contribution of changes in the AHW shares of sectors with *different productivity growth rates* to overall productivity growth.

In equation form, this can be represented as:

$$\frac{P_t - P_{t-1}}{P_{t-1}} = \sum_{i=1}^{n}\left[\left(\frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}\right) \times \frac{Y_{i,t-1}}{Y_{t-1}}\right] + \sum_{i=1}^{n}\left[\frac{P_{i,t-1}}{P_{t-1}} \times \left(\frac{H_{i,t}}{H_t} - \frac{H_{i,t-1}}{H_{t-1}}\right)\right] + \sum_{i=1}^{n}\left[\left(\frac{P_{i,t} - P_{i,t-1}}{P_{t-1}}\right) \times \left(\frac{H_{i,t}}{H_t} - \frac{H_{i,t-1}}{H_{t-1}}\right)\right]$$

where P_t is the productivity level (VA per AHW) of the economy in period t;
$Y_t = \sum_{i=1}^{n} Y_{i,t}$ is the total VA of the economy in period t;
$H_t = \sum_{i=1}^{n} H_{i,t}$ is the total AHW of the economy in period t; and
$i = 1,..., n$ is the i^{th} sector in the economy.

Decomposition of Overall Labour Productivity Growth

Singapore's labour productivity (VA per AHW) grew by 2.8 per cent per annum from 2009 to 2019. Overall productivity growth over this period was supported by higher productivity growth within the various sectors (i.e., positive Within Effect), but was dampened by a slight increase in the AHW shares of less productive sectors relative to more productive sectors (i.e., negative Static Shift Effect):[3,4]

- Within Effect: The Within Effect was the strongest driver of productivity growth, with productivity gains in the various sectors contributing 3.2 percentage-points to overall productivity growth each year.

- Static Shift Effect: There was a small shift in AHW from more productive sectors to less productive sectors, which dampened overall productivity growth slightly by 0.3 percentage-point each year.

- Dynamic Shift Effect: This effect was negative and negligible (-0.04 percentage-point each year) over the decade.

Contribution from Within Effect

The Within Effect dominated productivity growth dynamics from 2009 to 2019. Our key observations for this period are as follows:

- The Within Effect was supported by productivity growth in all sectors, except for Professional Services[5] (Exhibit 5). In particular, strong productivity improvements were posted by outward-oriented sectors such as Manufacturing (6.5 per cent per annum), Finance & Insurance (4.2 per cent per annum) and Wholesale Trade (4.0 per cent per annum), as well as the domestically-oriented Administrative & Support Services[6] sector (6.0 per cent per annum).[7] Collectively, these four sectors contributed 2.8 percentage-points each year to overall productivity growth from 2009 to 2019. The contribution by each of the remaining sectors was generally positive though small (less than 0.15 percentage-point each year).

- On aggregate, productivity gains in outward-oriented sectors (4.0 per cent per annum) outpaced that in domestically-oriented sectors (1.7 per cent per annum) from 2009 to 2019. In general, outward-oriented sectors are more productive than domestically-oriented ones because firms in these sectors have a strong incentive to improve their products and services, and transform and upgrade their processes, in order to remain competitive in global markets.

3 *The Within Effect, Static Shift Effect and Dynamic Shift Effect do not sum up to overall productivity growth because (i) the contributions of ownership of dwellings and taxes on products are excluded, and (ii) there is non-additivity of sectors as a result of the chain-linking of VA.*

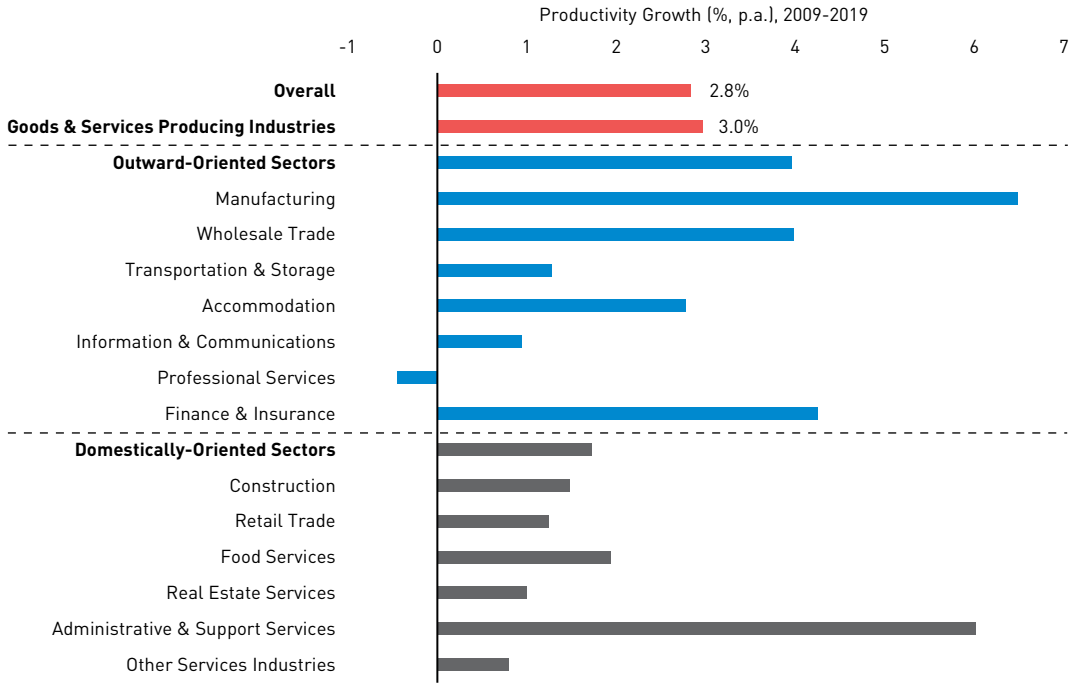
4 *The results of the shift-share decomposition excluding the rebound year of 2010 following the GFC are similar. Between 2010 and 2019, overall productivity (VA per AHW) rose by 2.2 per cent per annum, and was driven primarily by a strong Within Effect (+2.5 percentage-points each year). The Static Shift Effect remained small and negative (-0.3 percentage-point each year), while the Dynamic Shift Effect continued to be negligible (-0.03 percentage-point each year).*

5 *Between 2009 and 2019, productivity growth in the Professional Services sector was weighed down by strong employment growth (3.9 per cent per annum), which outpaced VA growth (3.0 per cent per annum). In turn, the strong employment growth was led by employment gains in the Activities of Head Offices and Management Consultancy Activities segment (5.8 per cent per annum). Nonetheless, there are signs that the sector's productivity growth has improved over time. In the second half of the decade (i.e., 2014 to 2019), VA per AHW in the Professional Services sector increased by 2.0 per cent per annum, reversing the 2.9 per cent per annum decline in the first half of the decade (i.e., 2009 to 2014).*

6 *The strong productivity performance of the Administrative & Support Services sector was supported by the rental and leasing segment (comprising the leasing of non-financial intangible assets, and the rental and leasing of motor vehicles, equipment and other tangible goods).*

7 *The classification of a sector as outward- or domestically-oriented is determined by the direct and indirect export share of the sector's total output as estimated using Input-Output tables and tourism receipts. Outward-oriented sectors include the Manufacturing, Wholesale Trade, Transportation & Storage, Accommodation, Information & Communications, Finance & Insurance and Professional Services sectors. Domestically-oriented sectors include the Construction, Retail Trade, Food Services, Real Estate Services, Administrative & Support Services and Other Services Industries sectors.*

Exhibit 5: Average Sectoral Productivity Growth, 2009-2019



Source: MTI Staff Estimates

Contribution from Static Shift Effect

From 2009 to 2019, overall productivity growth was dampened slightly by a net increase in the AHW shares of less productive domestically-oriented sectors compared to that of more productive outward-oriented sectors (Exhibit 6). The changes in AHW shares over the period were largely due to changes in employment shares across sectors. Our main observations for the period are as follows:

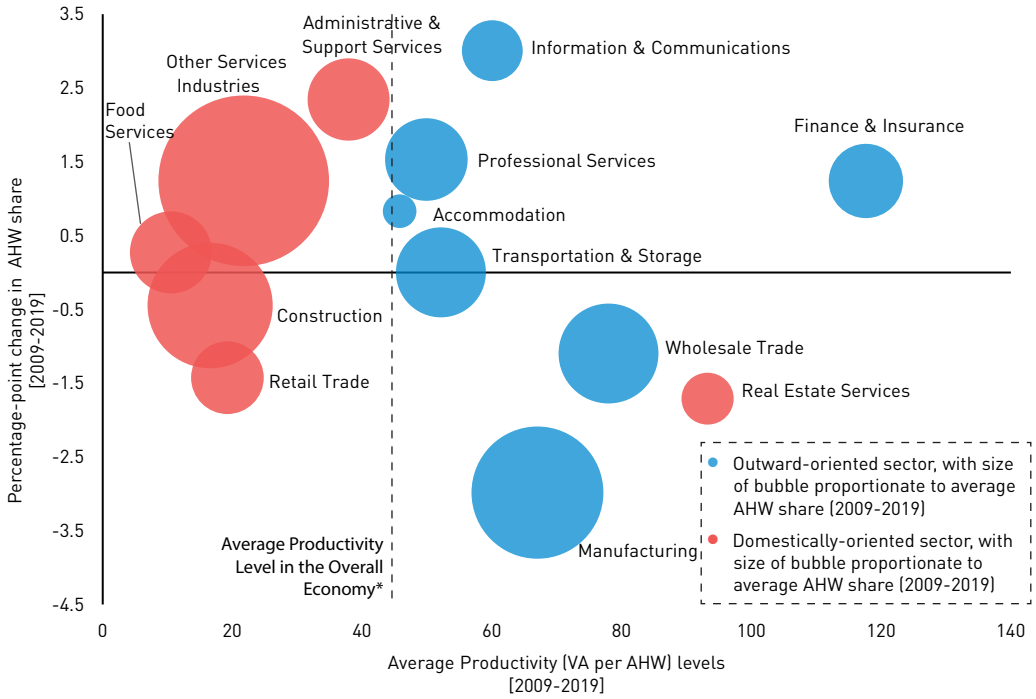
- Among the outward-oriented sectors, which had higher productivity levels than the overall economy average, the Manufacturing and Wholesale Trade[8] sectors saw a decline in their AHW shares, driven by a fall in their employment shares. On the other hand, the Information & Communications, Professional Services, Finance & Insurance and Accommodation experienced an increase in their AHW shares on the back of a rise in their employment shares. As the latter was not large enough to offset the former, the overall AHW share of the outward-oriented sectors fell over the period.

- Among the domestically-oriented sectors, which tended to be less productive than the overall economy, the Other Services Industries[9], Administrative & Support Services and Food Services sectors posted an increase in AHW shares, even as the Construction[10] and Retail Trade sectors saw a decline in their AHW shares. On net, the AHW shares of domestically-oriented sectors that were less productive than the overall economy rose over the period.[11]

- Taken together, the net decline in the AHW shares of more productive outward-oriented sectors, coupled with the net increase in the AHW shares of less productive domestically-oriented sectors, contributed to a small negative Static Shift Effect of -0.3 percentage-point per year over the period of 2009 to 2019. However, a closer examination of the Static Share Effect shows that it was driven by the trends in the earlier years of the decade (i.e., 2009-2016), with the effect turning positive in the later years (i.e., 2016-2019) as more productive outward-oriented services sectors such as Finance & Insurance and Information & Communications continued to gain AHW and employment shares.

8 Although employment in the Wholesale Trade sector rose between 2009 and 2019, the gains were insufficient to offset the employment growth in other sectors of the economy, thus resulting in a decline in its employment share.
9 The Other Services Industries expanded its employment on the back of increased demand for education, health and social services.
10 In line with weaker construction activity, foreign employment in the Construction sector fell by 3.8 per cent per annum between 2016 and 2019.
11 The only domestically-oriented sector that was more productive than the overall economy was the Real Estate Services sector. As the sector saw a decline in its AHW share over the period, it also weighed on overall productivity growth.

Exhibit 6: Change in AHW Share vs Average Productivity Levels by Sector, 2009-2019



Source: MTI Staff Estimates
*This excludes ownership of dwellings and taxes on products

Summary

Consistent with previous shift-share analyses for earlier periods, Singapore's overall labour productivity growth over the past decade was supported by productivity growth within sectors, especially the outward-oriented sectors, even as it remained weighed down by a small negative Static Shift Effect caused by a net shift in AHW and employment shares away from more productive outward-oriented sectors towards less productive domestically-oriented ones. There are, however, signs that the Static Shift Effect has improved over time, with the effect turning positive in the later years of the decade.

4. GROWTH ACCOUNTING ANALYSIS OF LABOUR PRODUCTIVITY GROWTH

Capital intensity and labour quality are important drivers of labour productivity growth. The influence of these factors on productivity can be examined by decomposing overall labour productivity growth into improvements in capital intensity, labour quality and TFP using a growth accounting approach:

- Capital Intensity: Capital intensity refers to the amount of machinery, equipment, intellectual property and infrastructure each unit of labour input uses for production. An increase in capital intensity can raise productivity by equipping workers with more capital to work with in the production process.

- Labour Quality: A more skilled workforce increases productivity because better-trained workers have a greater capacity to be efficient and innovative, and to produce higher-VA products and services.

- TFP: TFP captures the residual output growth that is not attributed to changes in the quantity and quality of capital and labour inputs. It measures how efficiently capital and labour are used together in the production process, and encompasses a wide range of factors, including technological progress, improvements in management practices and organisational structures, and the diffusion of technology across firms.

Previous analyses by Goh and Fan (2015) and Fan and Teo (2016) found that improvements in both capital intensity and labour quality supported overall labour productivity growth in earlier periods.

Methodology

Using a growth accounting approach, VA per AHW growth between 2009 and 2019 (i.e., 2.8 per cent per annum) can be decomposed into the contributions from changes in capital intensity, labour quality and TFP. Specifically, the economy is modelled using a Cobb-Douglas production function with constant returns to scale:

$$Y = A \prod_i H_i^{b_i} \prod_j K_j^{c_j}$$

where Y = real output;
A = Total Factor Productivity (TFP);
H_i = AHW of i^{th} type of labour;
b_i = share of output of the i^{th} type of labour;
K_j = net stock of j^{th} type of capita
c_j = share of output of j^{th} type of capital; and
$\sum_i b_i + \sum_j c_j = 1$ (i.e., constant returns to scale).

Given that $\Delta Y \approx \sum_i \Delta b_i \Delta H_i + \sum_j c_j \Delta K_j + \Delta A$ under the assumption that inputs are paid their marginal products in competitive markets, productivity growth can be decomposed into three components – (i) contribution from changes in labour quality, (ii) contribution from changes in capital intensity, and (iii) contribution from TFP:

$$\Delta \frac{Y}{H} \approx S_L \times \sum_i (s_i - h_i) \Delta H_i + \sum_j c_j \left(\Delta \frac{K_j}{H}\right) + \Delta A$$

where S_L = total wage share of output;
s_i = wage share of i^{th} type of labour;
h_i = AHW share of i^{th} type of labour.

For the purpose of the decomposition analysis, labour is divided into skilled and less-skilled labour based broadly on their occupation types.[12] The quality of each type of labour is proxied by the term $(s_i - h_i)$, which is positive when labour type i has higher wages than the other labour type. Hence, overall labour quality improves (and productivity increases) when the growth in total hours worked by skilled workers (with wages above the economy average) exceeds that of less-skilled workers (with wages below the economy average).

For capital intensity, the contributions from five types of capital – machinery & equipment, computer software, research & development (R&D), transport equipment[13] and non-residential[14] construction & works – are considered. Capital intensity of each capital type contributes positively to productivity growth when capital growth outpaces hours worked growth (i.e., there is more capital for each man-hour).

12 Broadly, workers who are Professionals, Managers, Executives, and Associate Professionals and Technicians are classified as skilled workers, while workers who are Clerical Support Workers, Service & Sales Workers, Craftsmen & Related Trades Workers, Plant & Machine Operators & Assemblers, and Cleaners, Labourers & Related Workers are classified as less-skilled workers.
13 Transport equipment includes ships & boats, aircrafts and other transport equipment.
14 Residential buildings are excluded because they are not used in the production process of firms. The imputed ownership of dwellings is also excluded from the productivity computations.

Decomposition of Overall Labour Productivity

From 2009 to 2019, capital intensity, labour quality and TFP all contributed positively to productivity growth:[15,16]

- Increases in capital intensity dominated productivity dynamics over this period, contributing an average of 2.2 percentage-points to overall productivity growth each year.
- Labour quality improvements also supported productivity growth, with a contribution of 0.2 percentage-point per year.
- TFP contributed an average of 0.6 percentage-point per year to productivity growth.

Contribution from Capital Intensity and Labour Quality

From 2009 to 2019, all capital types saw an increase in capital intensity, thereby contributing positively to productivity growth (Exhibit 7):

- Non-residential construction & works and R&D capital stock[17] each contributed 0.7 percentage-point per year to productivity improvements. These results are aligned with the Government's investments in public infrastructure (e.g., Mass Rapid Transit lines) and R&D. For instance, to strengthen Singapore's position as an R&D hub, the Government committed S$16 billion over 2011 to 2015 under the Research, Innovation & Enterprise (RIE) 2015 Plan, and S$19 billion over 2016 to 2020 under the RIE 2020 Plan.
- Positive contributions to productivity growth were also observed for machinery & equipment (0.3 percentage-point per year), computer software (0.3 percentage-point per year) and transport equipment (0.2 percentage-point per year).

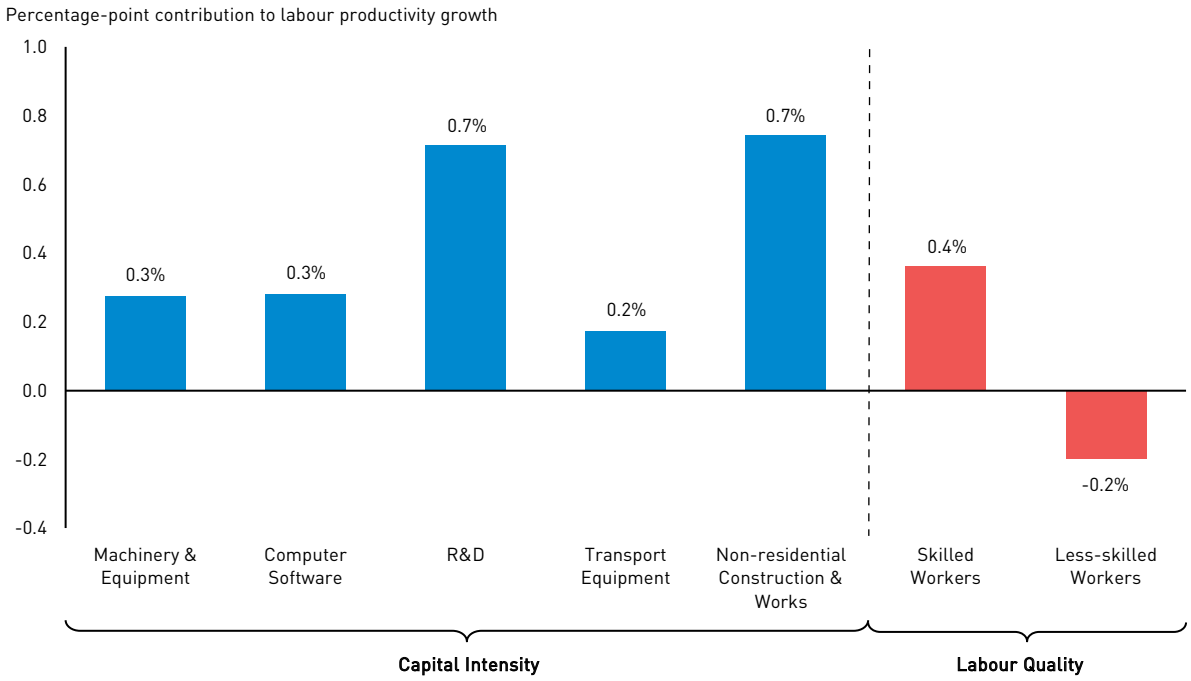
Similarly, labour quality improvements supported productivity growth over this period, with a contribution of 0.2 percentage-point per year. This was driven by a robust increase in hours worked by skilled workers which outpaced that of less-skilled workers (Exhibit 7).

15 *The contributions of capital intensity, labour quality and TFP may not sum to overall productivity growth because ownership of dwellings and taxes on products are excluded in the productivity decomposition. TFP computed in this growth accounting analysis is also not directly comparable to the Multifactor Productivity series released by the Department of Statistics because of differences in the decomposition method used. For instance, this analysis (i) uses total VA for goods and services producing industries instead of GDP, (ii) uses finer categories of capital inputs, (iii) uses hours worked instead of employment as a measure of the quantity of labour inputs, and (iv) takes into account skilled and less-skilled workers.*

16 *Repeating the decomposition analysis for the period of 2010 to 2019 (i.e., excluding the rebound year of 2010), it is found that capital intensity remains the key driver of productivity growth (i.e., 2.2 per cent per annum), contributing 2.4 percentage-points to productivity growth each year. The contribution of labour quality to productivity growth remains the same (0.2 percentage-point each year). By contrast, the TFP contribution to productivity growth moderated to -0.4 percentage-point each year. As TFP is computed as a residual in the decomposition, it is highly sensitive to changes in VA. As such, the slowdown in economic growth in recent years would have contributed to a dampening of TFP growth that more than offset the increase in TFP recorded in the earlier years.*

17 *An earlier MTI study found positive returns from investing in R&D, with a 1 per cent increase in R&D stock in a firm leading to a 0.135 per cent increase in productivity on average (see Teo et al., 2019).*

Exhibit 7: Contribution of Capital Intensity and Labour Quality to Labour Productivity Growth, 2009-2019



Source: MTI Staff Estimates

Summary

Based on growth accounting analysis, this study finds that overall labour productivity growth between 2009 and 2019 was driven primarily by an increase in capital intensity. All capital types contributed positively to productivity growth, with non-residential construction & works and R&D capital stock supported by Government investments over the years. Labour quality improvements also contributed to productivity growth, as the increase in hours worked by skilled workers outpaced that of less-skilled workers. Likewise, TFP contributed positively to productivity growth for the decade as a whole.

5. CONCLUSION

Singapore's labour productivity (VA per AHW) grew strongly by 2.8 per cent per annum between 2009 to 2019, achieving the 2 to 3 per cent per annum growth target set by the ESC. Over the decade, Singapore's productivity growth performance exceeded that of most advanced economies. Using shift-share analysis, overall productivity growth over this period was found to be driven by within-sector productivity improvements, especially in the outward-oriented sectors. While productivity growth over the decade was weighed down slightly by a net shift in AHW and employment shares from more productive sectors towards less productive ones, there are signs that this shift effect has improved over time. Supplementing the shift-share analysis with growth accounting analysis, overall labour productivity growth was found to be supported by improvements in capital intensity, labour quality and TFP between 2009 and 2019.

Our strong labour productivity performance over the past decade can be attributed in large part to our economic restructuring efforts, which aim to raise productivity and transform our industries through innovation and internationalisation, as well as national initiatives such as SkillsFuture, which aims to upskill our workers and support lifelong learning. In addition, Government investments in R&D through the RIE Plans, as well as Government support (e.g., Productivity Solutions Grant and SMEs Go Digital programme) to encourage firms to adopt productivity and digitalisation solutions, have helped to build up the capital stock in the economy.

To achieve sustained productivity gains over the longer term so that Singapore can remain globally competitive and Singaporeans can enjoy higher wages, it is imperative for us to press on with our industry transformation and restructuring efforts to bring about productivity improvements across all sectors, especially the domestically-oriented ones, and restructure the economy towards more productive sectors. In line with this, the Government will continue to help firms to invest in innovation, automation and technology, as well as equip Singaporeans with the skills to enter productive growth sectors.

Contributed by:

Benjamin Toh, Economist
Jessica Ting, Economist
Economics Division
Ministry of Trade and Industry

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