

○ **FEATURE  
ARTICLE**





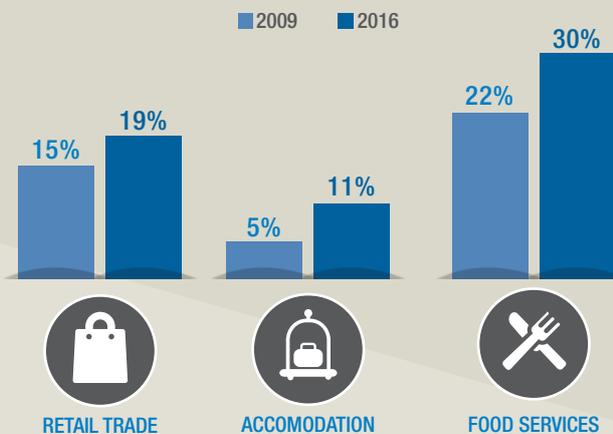
# FEATURE ARTICLE

## PART-TIME EMPLOYMENT AND THE PRODUCTIVITY OF FIRMS

### INTRODUCTION

Part-time employment has steadily increased across the years and a significant proportion of these workers are employed in the Retail Trade, Accommodation, and Food Services sectors.

INCIDENCE OF PART-TIME EMPLOYMENT AMONG EMPLOYED RESIDENTS



This study examines the relationship between part-time employment share and firm-level productivity in the three sectors.



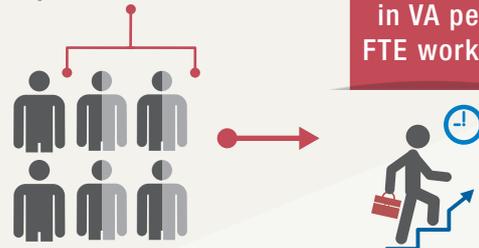
### FINDINGS

Overall, this study finds that the hiring of part-time workers has not been detrimental to the productivity of the firms in the three sectors.

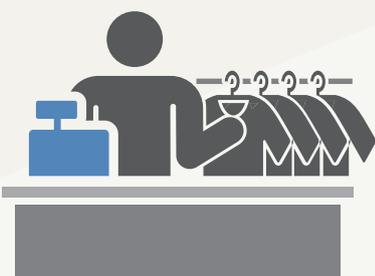
Specifically, when we consider the firms in the three sectors as a group, a 1 percentage point increase in a firm's part-time employment share is associated with a 0.17% increase in its value-added per full-time equivalent (FTE) worker on average.

+1%-pt  
in part-time share

+0.17%  
in VA per  
FTE worker



### POLICY TAKEAWAY



The results from the study are encouraging as they suggest that efforts to promote part-time work as a channel for workers who are unable to engage in full-time work to be active in the labour market would not have unintended consequences on the productivity of firms.



## EXECUTIVE SUMMARY

- Part-time employment has been on the rise in Singapore, with a significant proportion of the part-time workers employed in the Retail Trade, Accommodation and Food Services sectors. However, the impact of having a part-time workforce on a firm's productivity is uncertain. On the one hand, part-time workers could be less likely to go for training and may also lead to coordination problems within the firm, thus dampening productivity. On the other hand, the hiring of part-time workers may allow the firm to optimise processes and resources to meet variations in demand, thereby raising productivity. The objective of this study is thus to determine whether there is a positive or negative relationship between part-time employment and firm-level productivity in the Retail Trade, Accommodation and Food Services sectors.
- Our results show that there is a positive and statistically significant relationship between firms' productivity and their part-time employment share in the three sectors. Specifically, when we consider the firms in the three sectors as a group, we find that a one percentage-point increase in a firm's part-time employment share is associated with a 0.17% increase in its value-added per full-time equivalent<sup>1</sup> worker (our proxy for productivity) on average. However, when the firms in each sector are examined separately, a positive and statistically significant relationship between firms' productivity and part-time employment share was found only for the Retail Trade sector, suggesting that the hiring of part-time workers has been beneficial for the firms in this sector. On the other hand, statistically insignificant results were found for the Accommodation and Food Services sectors, suggesting that the hiring of part-time workers has not had an impact on the productivity of the firms in these two sectors.
- On balance, this study finds that the hiring of part-time workers has not been detrimental to the productivity of the firms in the three sectors. In fact, it may have a positive impact for firms in the Retail Trade sector.

*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.<sup>2</sup>*

## INTRODUCTION

An increasing proportion of the resident workforce in Singapore comprises part-time workers.<sup>3</sup> Between 2009 and 2016, the proportion of part-time workers out of all employed residents rose from 8.4% to 10.5%. In absolute terms, the number of part-time employed residents increased by 71,800 over the same period, from 156,200 residents to 228,000 residents (Exhibit 1).

The rise of the part-time workforce could be due to both supply and demand factors. On the supply side, there could be more Singaporeans preferring to work on a part-time basis due to lifestyle considerations, or because of care-giving responsibilities. On the demand side, companies facing labour shortage may find it useful to tap into the pool of part-time workers to overcome their labour constraints. Government initiatives, such as the Work-Life Grant<sup>4</sup> which provides funding and incentives for companies to offer flexible work arrangements (FWAs) comprising flexi-time, flexi-place and part-time work, may have also played a part in encouraging more companies to take on part-time workers. Common occupations that part-timers take up include food preparation & kitchen assistants, shop sales assistants, clerks, office cleaners and waiters.<sup>5</sup>

<sup>1</sup> A part-time worker is considered as 0.5 of a full-time worker in the computation of full-time equivalent workers.

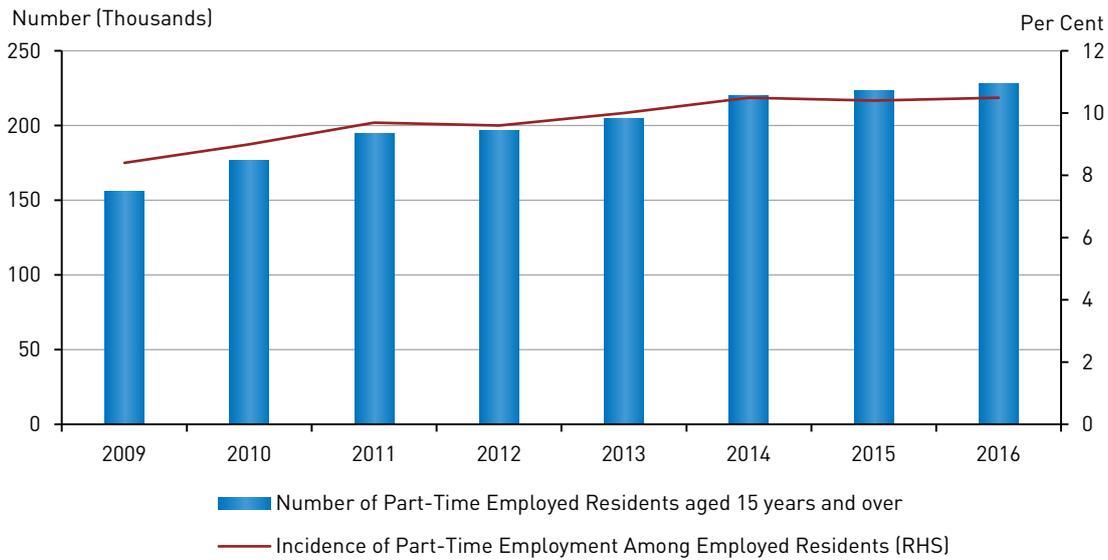
<sup>2</sup> We would like to thank Yong Yik Wei, Kenneth Yeow, Kenny Goh and Andy Feng for their suggestions and comments. We are also grateful to Tiffany Foo, Timothy Lin and Roy Hung for their contributions to the initial phase of this study. All errors belong to the authors.

<sup>3</sup> Part-time employment refers to employed persons where the normal hours of work is less than 35 hours per week.

<sup>4</sup> The Work-Life Grant was introduced to help employees better manage work and family responsibilities, and enhance the pro-family environment in Singapore. The Work-Life Grant consists of two components. The Developmental Grant helps companies take steps towards implementing FWAs and other work-life programmes, and to defray part of the costs incurred. The FWA Incentive encourages companies to support more employees on FWAs and to provide and sustain work-life friendly workplaces. (Source: Ministry of Manpower website)

<sup>5</sup> Source: MOM Labour Force Survey, 2016

**Exhibit 1: Incidence of Part-Time Employment Among Employed Residents, June 2009-2016**

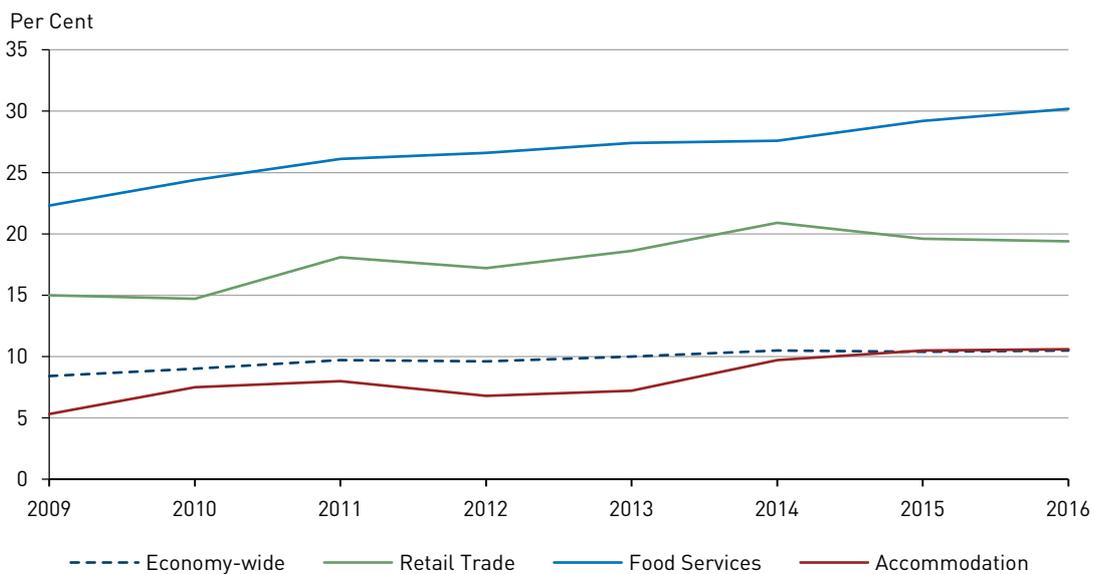


Source: Comprehensive Labour Force Survey, Manpower Research and Statistics Department, MOM

Of the 228,000 part-time employed residents in 2016, 61,600 (or 27%) were employed in the Retail Trade, Accommodation and Food Services sectors. These three relatively labour-intensive services sectors also tend to have rising part-time employment shares that have exceeded the economy average by 2016 (Exhibit 2), and productivity levels that tend to be below the economy average (Exhibit 3).

In view of the upward trend in part-time employment in the overall economy and in some of the more labour-intensive services sectors, it is pertinent to examine the impact of the part-time workforce on the productivity of firms. In this study, we aim to evaluate the relationship between the part-time employment share and productivity of firms in three labour-intensive services sectors with above-average and rising part-time employment shares – the Retail Trade, Accommodation and Food Services sectors.

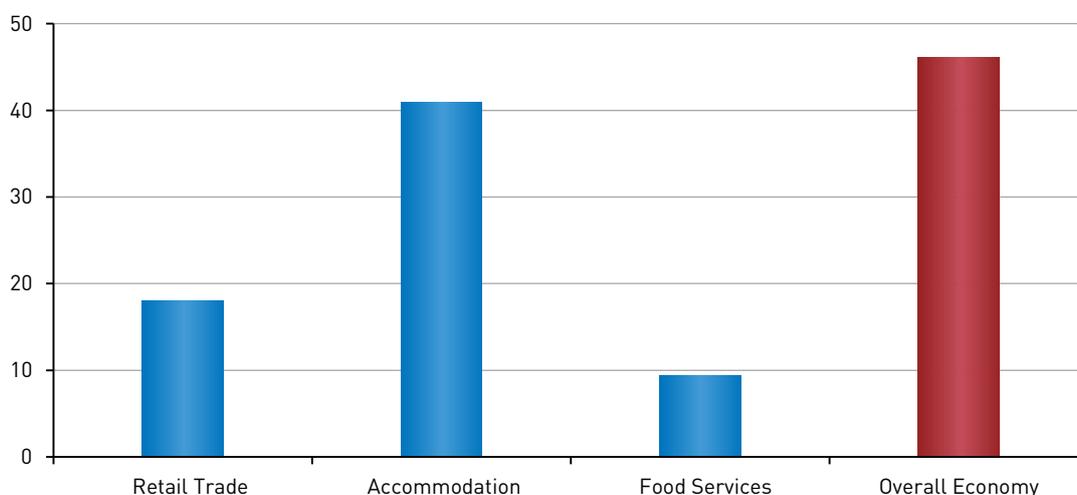
**Exhibit 2: Incidence of Part-Time Employment Among Employed Residents in the Retail Trade, Accommodation and Food Services Sectors, June 2009-2016**



Source: Comprehensive Labour Force Survey, Manpower Research and Statistics Department, MOM

### Exhibit 3: Average Productivity (Value-added per Actual Hour Worked) of the Retail, Accommodation and Food Services Sectors between 2009 and 2016<sup>6</sup>

Productivity (VA per actual hour worked) levels,  
Constant 2010 Dollars



Source: MTI Staff Estimates

## LITERATURE REVIEW

There are several channels through which part-time work may affect the productivity of a firm. On the one hand, human capital theory predicts a negative relationship as part-time workers tend to participate less in training. This could be because part-time employees work fewer hours, and may thus benefit less from training than full-time employees. At the same time, firms may also be less willing to train their part-time workers. Empirically, it has been observed that part-time employed workers in Singapore have a lower propensity to participate in training than their full-time employed counterparts.<sup>7</sup>

At the firm level, the hiring of part-time workers may also cause coordination and supervision problems (Lewis, 2003). For instance, when part-time workers rather than full-time workers are utilised, supervisors have to oversee more workers, which could lead to greater difficulties in communication and performance monitoring. Furthermore, compared to a full-time worker, it may be more challenging for part-time workers doing the same task to acquire mastery of the task or to establish long-term relationships with their clients (Edwards and Robinson, 2004).

On the other hand, the hiring of part-time workers may raise a firm's productivity if doing so allows the firm to optimise processes by deploying more workers during peak hours relative to non-peak hours. By having shift-based part-time work, the firm will also be able to extend its operating hours, leading to a more intensive use of capital.

Overseas empirical studies have found mixed results in terms of the impact of part-time employment on firms' productivity. Devicienti et al (2015) found part-time work to be detrimental to firms' productivity in Italy. This negative result was attributed to the communication and coordination inefficiencies created by part-time work. By contrast, Nelen et al (2013) found that Dutch pharmacies with a large part-time employment share were more productive than those with a large full-time employment share. This was because the firms had deployed the part-time workers in a way that allowed them to bridge the lunch breaks of their full-time colleagues, thus enabling the firms to increase their operating hours.

<sup>6</sup> The trends in Exhibit 3 hold even if we use real VA per worker as the measure of productivity.

<sup>7</sup> In 2016, full-timers (45%) had a higher training participation rate than part-timers (21%). Training participation rate is defined as the proportion of residents aged 15 to 64 in the labour force who had engaged in some form of work-related structured training or education activities over the 12-month period ending June. (Source: Labour Force in Singapore, 2016)

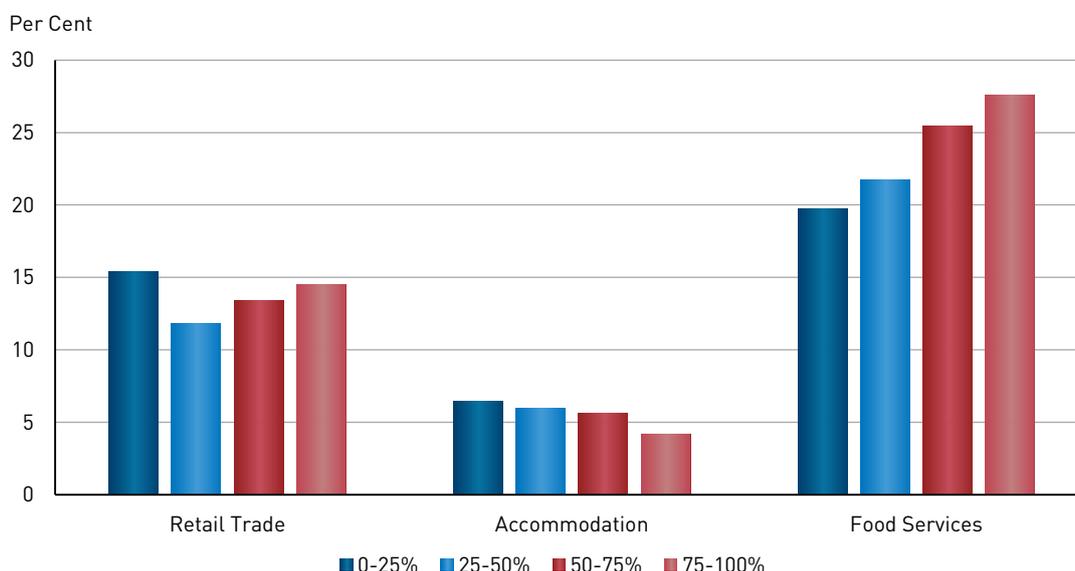
## DATA AND EMPIRICAL METHODOLOGY

To study the relationship between part-time employment and productivity at the firm level, this study uses data from the Department of Statistics' Annual Survey of Services, spanning the period of 2002 to 2015.<sup>8</sup> The dataset contains firm-level characteristics such as the revenue and number of full-time/part-time workers employed by the firm, as well as the industry the firm operates in, among others.

In this analysis, our measure of productivity at the firm level is the value-added (VA) per full-time equivalent (FTE) worker employed by the firm, where a part-time worker is considered to be half of a full-time worker. Our key explanatory variable is the share of part-time workers<sup>9</sup> out of the total FTE employment of the firm.

An examination of the data for the three sectors of interest shows that more productive firms employed a higher share of part-time workers in the Food Services sector, whereas the converse is true in the Accommodation sector (Exhibit 4). For the Retail Trade sector, the trend is mixed – while firms in the lowest productivity quartile had the highest share of part-time workers, those in the higher quartiles saw a positive relationship between productivity and their share of part-time workers.

**Exhibit 4: Average Part-Time Share of Total Full-Time Equivalent Employment by Productivity<sup>10</sup> Quartiles (2002-2015)**



Source: MTI Staff Estimates from DOS' Annual Survey of Services

Nonetheless, as there could be other factors such as ownership status and the extent of utilisation of machinery affecting the productivity of firms in these sectors, there is a need to account for their impact on productivity in order to isolate the impact of the part-time workforce.

To do so, we conduct a regression analysis that controls for the key characteristics of the firms. However, apart from observable characteristics like the utilisation of machinery, there is also a need to control for unobserved firm characteristics as not doing so could bias our results. For example, poor management practices resulting in low retention of workers – a factor which is not observed in the data – could lead to a higher share of part-time workers. At the same time, poor management quality may also lead to poorer worker engagement and development, in turn lowering firm productivity. Hence, if management quality is not controlled for in the regression analysis, the impact of part-time employment on productivity would be biased downwards as it would be picking up the negative relationship between productivity and the hiring of part-time workers caused by poor management quality.

<sup>8</sup> The survey covers larger firms (in terms of revenue) with certainty, while the remaining firms are selected on a sampling basis.

<sup>9</sup> In our study, a part-time worker is defined as an employee who works less than 35 hours in a normal week.

<sup>10</sup> Defined as nominal VA per full-time equivalent worker

To overcome this bias, we utilise the fixed effects regression specification below, which would control for the unobservable, time-invariant firm characteristics in addition to the observable characteristics:

$$\log\left(\frac{VA_{it}}{FTE_{it}}\right) = \beta_0 + \beta_1\left(\frac{PT_{it}}{FTE_{it}}\right) + \gamma X_{it} + \alpha_t year_t + \delta_i + \epsilon_{it}$$

Where:

$\frac{VA_{it}}{FTE_{it}}$  is the VA per FTE worker of firm  $i$  in year  $t$ ;

$\frac{PT_{it}}{FTE_{it}}$  is the part-time share of total FTE employment of firm  $i$  in year  $t$ ;

$X_{it}$  are the firm-level controls, including net machinery<sup>11</sup>, SME indicator<sup>12</sup>, local/foreign ownership, industry, machinery intensity<sup>13</sup>, and the foreign employment share;

$year_t$  is a vector of year dummies that captures effects that are common to all firms in the specific year;

$\delta_i$  denotes the firm fixed effects.

## RESULTS

Our findings from the regression analysis suggest that there is a positive and statistically significant relationship between productivity and part-time employment share at the firm level for firms in the Retail Trade, Accommodation and Food Services sectors (Exhibit 5). Specifically, we find that in these three sectors, a one percentage-point increase in part-time employment share is associated with a 0.17% increase in firms' productivity on average.

We next run separate regressions for firms in each of the three sectors to find out the impact of the part-time workforce on firms in each sector. We find that the positive result above is largely driven by firms in the Retail Trade sector (Exhibit 6).

The statistically significant positive impact that part-time employment has on the productivity of firms in the Retail Trade sector could possibly be due to the fact that having a part-time workforce allows the firms to optimise their processes to cater to peak-hour demand and/or to extend their operating hours, similar to what was found by Nelen et al (2013) for the Dutch pharmacy sector. On the other hand, statistically insignificant results were found for the Accommodation and Food Services sectors, suggesting that part-time employment has not had an impact on firms' productivity in these sectors.

**Exhibit 5: Regression Results**

Dependent variable: Log(VA/FTE)	
$\frac{PT_{it}}{FTE_{it}} (\beta_1)$	0.167*
Year effects	Yes
Firm fixed effects	Yes

\*, \*\* and \*\*\* indicate significance at the 90%, 95%, and 99% level, respectively

<sup>11</sup> Net machinery refers to the net book value of fixed assets on computers & peripheral equipment, telecommunications equipment and other machinery & equipment.

<sup>12</sup> SME refers to firms with annual sales turnover of not more than S\$100 million or employment size of not more than 200 workers.

<sup>13</sup> Machinery intensity is defined as the ratio of net machinery to total fixed assets.

**Exhibit 6: Regression Results**

Dependent variable: Log(VA/FTE)			
	Retail Trade	Accommodation	Food Services
$\frac{PT_{it}}{FTE_{it}} (\beta_1)$	0.199*	-0.0583	0.256
Year effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

\*, \*\* and \*\*\* indicate significance at the 90%, 95%, and 99% level, respectively

## CONCLUSION

In Singapore, part-time employment has been on the rise, and a significant proportion of the part-time workers are employed in the Retail Trade, Accommodation and Food Services sectors.

While the literature suggests an ambiguous relationship between part-time employment and productivity, this study finds that the hiring of part-time workers has not been detrimental to the productivity of firms in the Retail Trade, Accommodation and Food Services sectors. In fact, for the Retail Trade sector, employing part-time workers may be beneficial for firms in the sector as it potentially allows them to optimise their processes to cater to peak-hour demand and/or to extend their operating hours.

Overall, the results from the study are encouraging as they suggest that efforts to promote part-time work as a channel for workers who are unable to engage in full-time work (e.g., individuals with care-giving responsibilities) to be active in the labour market<sup>14</sup> would not have unintended consequences on the productivity of firms.

*Contributed by:*

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<sup>14</sup> Minister of State for Manpower highlighted during his Committee of Supply 2017 speech that “there is still room to improve employment of our female residents, especially in the area of part-time employment”.

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