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**FEATURE
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EVALUATION OF THE SKILLSFUTURE EARN AND LEARN PROGRAMME (ELP)

Study found positive wage returns for polytechnic graduates who enrolled in ELP

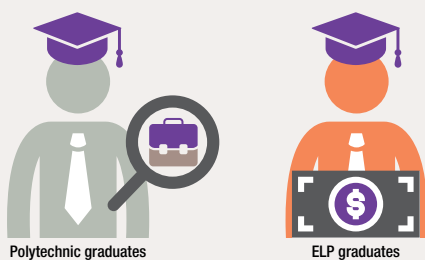
INTRODUCTION

The SkillsFuture Earn and Learn Programme (ELP) was introduced in 2015 to give fresh graduates from the polytechnics and Institute of Technical Education (ITE) a head start in their careers by placing them in a work-study programme. During the ELP, individuals work full-time for their employers and receive on-the-job training, while pursuing part-time courses. Individuals also receive competitive starting salaries during the ELP. This study empirically examines the wage returns to polytechnic graduates who enrolled in the ELP leading to an Advanced or Specialist Diploma (recently rebranded as SkillsFuture Work-Study Post-Diplomas), as compared to their peers who transited directly into employment after graduating from the polytechnics, as well as those who pursued a full-time degree from a Private Education Institution (PEI).



FINDINGS

ELP participants were observed to receive a higher starting wage after ELP graduation as compared to their peers who transited directly to employment after polytechnic graduation.

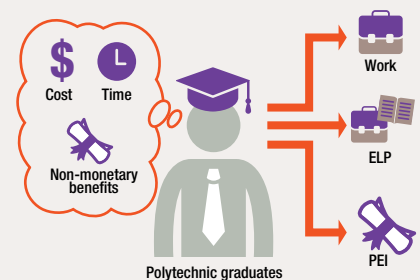


The wage premium that ELP graduates enjoyed over the polytechnic graduates appears to stabilise at about 10 per cent 19 months after ELP graduation, which was similar to the wage premium that PEI degree graduates enjoyed over the polytechnic graduates approximately one year after PEI graduation. However, the PEI graduates took twice as long to complete their programmes as compared to ELP graduates.



POLICY TAKEAWAY

In deciding whether to enrol in the ELP, pursue a PEI degree or transit directly into employment after graduating from polytechnic, an individual would need to consider the costs related to job search, opportunity cost in terms of earnings foregone while studying, course fees to be incurred, as well as the monetary and non-monetary benefits of an Advanced/Specialist Diploma compared to a PEI degree. The findings from this study can help polytechnic graduates better weigh the costs and benefits of the different pathways so that they can make a more informed decision.



EXECUTIVE SUMMARY

- ▶ The SkillsFuture Earn and Learn Programme (ELP) was introduced in 2015 to give fresh graduates from the polytechnics and Institute of Technical Education (ITE) a head start in their careers by placing them in a work-study programme. During the ELP, individuals work full-time for their employers and receive on-the-job training, while pursuing part-time courses. Individuals also receive competitive starting salaries throughout the programme.
- ▶ This objective of this study is to examine the wage returns to polytechnic graduates who enrolled in the ELP leading to an Advanced or Specialist Diploma (recently rebranded as SkillsFuture Work-Study Post-Diplomas), as compared to their peers who transited directly into employment after graduating from the polytechnics, as well as those who pursued a full-time degree from a Private Education Institution (PEI).
- ▶ Our findings suggest that ELP graduates received a higher starting wage compared to polytechnic graduates who transited directly to employment after graduation. Over time, the wage premium that ELP graduates enjoyed over their polytechnic counterparts narrowed and stabilised at around 10 per cent, 19 months after graduating from the ELP, suggesting that employers valued the human capital accumulated during the ELP. This ELP wage premium was also similar to the wage premium that PEI degree graduates had over the polytechnic graduates, even though the average time taken to complete the ELP was around half the time taken to obtain a PEI degree.

The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry (MTI), Ministry of Education (MOE), SkillsFuture Singapore (SSG), or the Government of Singapore.¹

INTRODUCTION

Introduced in 2015, the SkillsFuture Earn and Learn Programme (ELP) is a work-study programme aimed at giving fresh graduates from the polytechnics and Institute of Technical Education (ITE) a head start in their careers.² During the ELP, individuals work full-time for their employers, drawing a competitive salary while undergoing training. At the end of the ELP, individuals obtain industry-recognised Diplomas or certifications. For ELPs targeted at polytechnic graduates, these are typically Advanced or Specialist Diplomas. Similar to the apprenticeship programmes in countries such as the United Kingdom or Germany where apprentices receive compensation and training at the same time, the ELP entails facilitated learning in the classroom, structured on-the-job training and work-based projects to allow participants to deepen their skill sets at the workplace.

To incentivise employers to participate in the ELP, participating employers receive a grant of up to \$15,000 per participant placed on the ELP to defray the costs of developing and providing structured on-the-job training, as well as to encourage them to set out career progression pathways. Similarly, individuals successfully placed on the ELP receive a sign-on incentive of \$5,000.

In order to help graduating polytechnic students make more informed decisions about the pathway to take upon graduation, this study empirically examines the wage outcomes of three groups of polytechnic graduates, namely those who (i) participated in the ELP leading to an Advanced/Specialist Diploma (recently rebranded as SkillsFuture Work-Study Post-Diplomas); (ii) went on to obtain a full-time degree from a Private Education Institution (PEI); and (iii) transited into work directly after graduation.

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, as well as the MOE and SSG for their inputs to this study. All errors belong to the authors.

² The ELP has been introduced in 34 sectors, including Aerospace, Biomedical Sciences, Food Services, Games Development, Healthcare, Hotel, Infocomm Technology and Retail.

The rest of the article is organised as follows. We first conduct a brief review of the academic literature related to the employment outcomes of individuals who participated in work-study programmes and those who pursued a university degree. We then describe the data and methodology employed in our study, before reporting our findings. The final section concludes.

LITERATURE REVIEW

Various studies overseas have examined the returns to university education and apprenticeship training, and generally concluded that both have positive effects on the employment outcomes and earnings of individuals.

Broadly, the wage premium from pursuing an undergraduate degree has been found to range from 20 per cent to 48 per cent, with the premium varying depending on the course taken (Sloane & O'Leary, 2005) and the quality of the educational institution (Brewer et al., 1999). The wage premium has also been found to persist despite higher university participation rates that have led to an increase in the inflow of degree graduates into the workforce over time (Walker & Zhu, 2008; Elias & Purcell, 2010).

Similarly, firm-based apprenticeships and on-the-job training programmes have been found to lead to wage premiums ranging from 2 to 4 per cent, although there is significant heterogeneity in the premium received depending on when an individual participates in training (Feinstein et al., 2003) and the amount of education received prior to the training (Monk et al., 2008). Studies have also found that apart from wage returns, apprenticeships and on-the-job training lead to other positive effects on the employment outcomes of participants as the human capital gained from such industry-specific experiences is typically applicable and relevant to their future employment (Ryan, 1998; Parey, 2016). These include longer job durations and lower unemployment rates.

While there have been studies that directly compared the wage returns from apprenticeship or on-the-job training with that from vocational schooling (Alet & Bonnal, 2011; Riphahn & Zibrowius, 2015), little work has been done to compare the wage returns from apprenticeship or on-the-job training with that from a university education. Moreover, estimates on the wage returns to vocational schooling based on studies done overseas might not be directly applicable to Singapore due to differences in education systems (e.g., vocational schooling in other countries may be different from what polytechnic students in Singapore are exposed to).

As far as we are aware, this is the first study that seeks to estimate the wage returns to the ELP and compare that to the returns from other pathways that polytechnic graduates in Singapore might take upon graduation (i.e., transiting directly into employment or pursuing a full-time degree in a PEI).

DATA AND SUMMARY STATISTICS

To compare the wage outcomes of the polytechnic graduates who took different pathways, data on ELP graduates and a sample of polytechnic and PEI graduates were obtained from the Ministry of Education (MOE) and SkillsFuture Singapore (SSG), and merged with individual-level administrative data (e.g., monthly wages and employment history) from the Ministry of Manpower (MOM).³ The sample of PEI and polytechnic graduates used for the study was selected from the same polytechnic graduating cohorts as the ELP graduates using a stratified sampling method to ensure that their polytechnic course distributions are similar to the ELP graduates'.

As the ELP was introduced in 2015, there were only about 480 ELP graduates⁴ by 2017. Most of these ELP graduates came from the polytechnic graduating cohorts of 2013 to 2016 since participants must enrol in the ELP within three years of graduation from the polytechnics, or their Operationally Ready Date in the case of National Servicemen, in order to qualify for the \$5,000 ELP sign-on incentive. We find that males are generally underrepresented among the ELP graduates from the more recent polytechnic graduating cohorts (i.e., 2015 onwards) as National Service (NS) would have delayed their entry into the ELP.

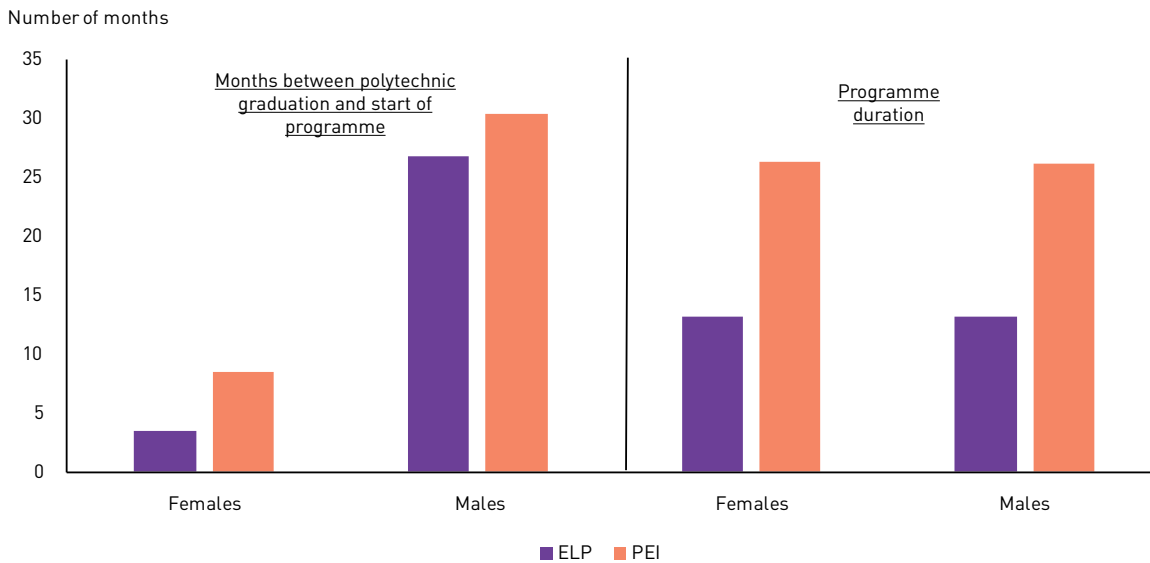
³ The sample pool only included Singapore Citizens (SCs) and Permanent Residents (PRs), and excluded polytechnic graduates who went on to pursue studies in Autonomous Universities (AUs).

⁴ A small percentage of ELP graduates – less than 4 per cent – subsequently furthered their studies in the AUs.

An examination of the data shows that the average number of months between polytechnic graduation and entry into the ELP was shorter as compared to that between polytechnic graduation and entry into the PEI programme, at 3.5 months and 8.5 months respectively for females (Exhibit 1). This is likely because the ELP semesters are better synchronised with polytechnic graduation, unlike the case for PEIs. Similarly, for males, the duration between polytechnic graduation and the start of the ELP (26.8 months) was shorter as compared to that for the PEI programme (30.4 months), although both durations were longer than that experienced by females because of NS.

As for the duration of the programme, the ELP took 13.1 months to complete on average,⁵ whereas a PEI degree took 26.1 months to complete on average (Exhibit 1).

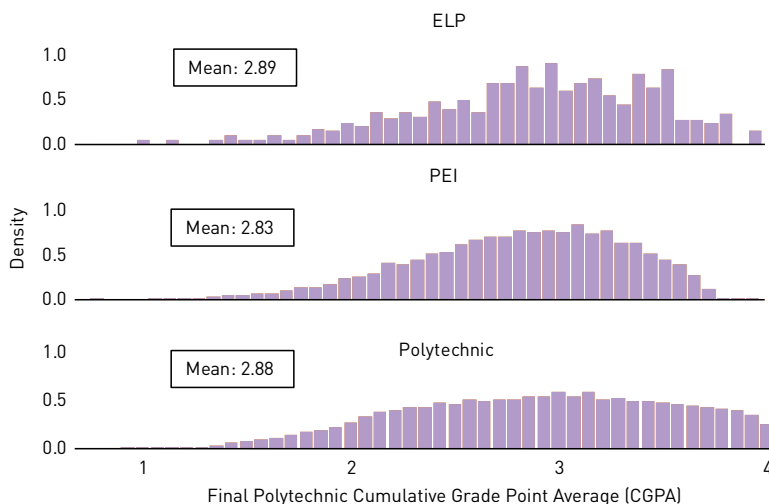
Exhibit 1: Average duration (i) between polytechnic graduation, and start of ELP and PEI, and (ii) of ELP and PEI programmes, by gender



Source: Authors' calculation, based on data from MOE, MOM and SSG

In terms of prior academic attainment, the data shows that the distributions of the final polytechnic cumulative grade point average (CGPA) for ELP graduates and also the sample of PEI and polytechnic graduates are similar (Exhibit 2). This suggests that there is no selection of polytechnic graduates by academic performance into the different pathways, i.e., ELP, PEI or directly into employment.

Exhibit 2: Distribution of final polytechnic cumulative grade point average by group type



Source: Authors' calculation, based on data from MOE, MOM and SSG

5 By design, ELPs typically last between 12 and 18 months.

In terms of wages, the average starting salary of ELP graduates one month after ELP graduation was around \$2,900 (Exhibit 3), and remained approximately the same six months after graduation. In comparison, their peers who transitioned directly into employment upon graduating from the polytechnics and those who graduated from PEIs had lower average starting salaries one month after graduation, although they saw an increase in their salaries of around \$500 and \$600 respectively six months after graduation. This is likely because ELP participants were full-time employees from the time they commenced the ELP, whereas a significant proportion of polytechnic and PEI graduates could have been holding on to part-time jobs one month after graduation with some transitioning to full-time jobs only six months later.

Exhibit 3: Average 1-month and 6-month post-graduation wages

	Average wage 1 month post-graduation	Average wage 6 months post-graduation
ELP	\$2,943	\$2,894
PEI	\$1,914	\$2,526
Polytechnic	\$1,175	\$1,698 ⁶

Source: Authors' calculation, based on data from MOE, MOM and SSG

METHODOLOGY

In order to isolate the effect of the different pathways taken by individuals upon polytechnic graduation on their wage outcomes, it is important to compare the wage outcomes of polytechnic graduates who are similar except for their eventual decision to enrol in ELP, PEI or transit directly into work. We do so in two ways.

We first match the ELP graduates to polytechnic graduates who transitioned directly into work based on their observable characteristics (e.g., age, gender, year of polytechnic graduation, and polytechnic course) using propensity score matching (PSM).⁷ PSM is similarly carried out between the ELP graduates and PEI graduates to find a group of PEI graduates who are similar in characteristics to the ELP graduates. Individuals who are not matched are excluded from the subsequent analysis. This step thus allows us to obtain matched samples of PEI and polytechnic graduates who have characteristics that are similar to the ELP graduates and also to each other.⁸

However, apart from observable characteristics, polytechnic graduates who participated in the ELP may also differ from those who pursued a PEI degree or those who transitioned directly into work in terms of *unobservable* characteristics such as their intrinsic motivations and preferences. For example, polytechnic graduates who have a stronger preference to start their career rather than continue their studies or who prefer hands-on learning experiences outside a classroom environment may systematically choose to participate in the ELP, rather than pursue a PEI degree. Differences in the wage outcomes of ELP graduates vis-à-vis PEI graduates may then reflect differences in these unobserved characteristics rather than the effect of participation in the ELP or PEI programme. To reduce such selection bias, we also match the ELP graduates to PEI and polytechnic graduates based on the part-time wages⁹ earned during their polytechnic studies (i.e., before polytechnic graduation), as we posit that the presence or absence of part-time wages would serve as a rough proxy for an individual's preferences with respect to academic learning and the desire to gain work experience.

⁶ The average six-month post-graduation wage for polytechnic graduates was lower than the median full-time salary reported in the Graduate Employment Survey, likely due to the inclusion of polytechnic graduates who may still be in part-time employment in our sample.

⁷ The assumption is that observable pre-treatment variables (e.g., CGPA, polytechnic courses, part-time employment during polytechnic studies) would contribute to an individual's decision to enter the ELP. PSM will first assign each individual a propensity score based on these variables and then match each ELP graduate with the polytechnic and PEI graduates based on their respective propensity scores.

⁸ We run statistical analyses to ensure that the characteristics (or covariates) of the PEI and polytechnic graduates are also similar.

⁹ Individuals are defined to have worked part-time as long as they have at least one wage drawn before polytechnic graduation.

By using the final matched sample of ELP, PEI and polytechnic graduates in our subsequent analyses, the differences in the wage outcomes of the three groups of graduates can be attributed to the different pathways taken. Specifically, we use the following ordinary least squares (OLS) regression on the final matched sample to estimate the wage premium that ELP graduates have over polytechnic graduates, as well as the wage premium that PEI graduates have over polytechnic graduates:

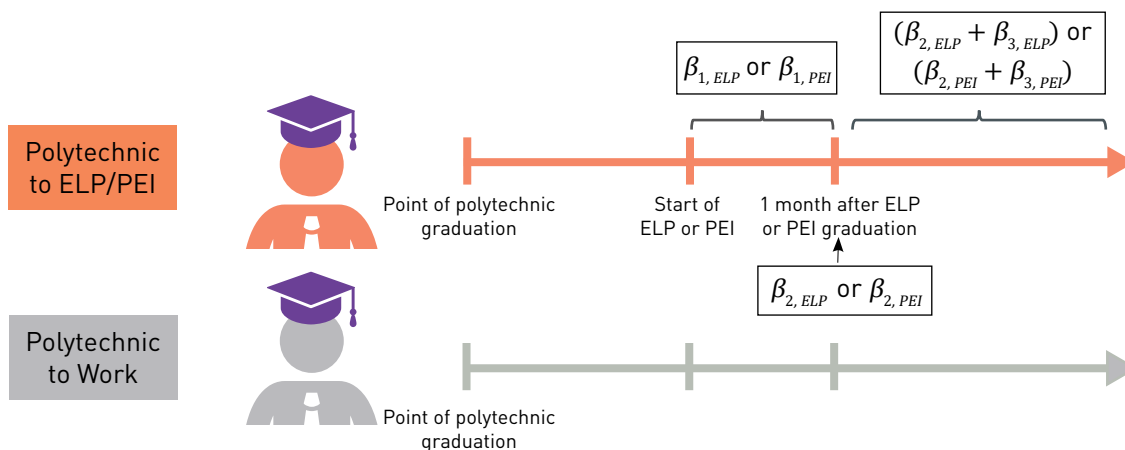
$$Y_{it} = \beta_0 + \beta_{1,ELP} \text{During ELP}_{it} + \beta_{1,PEI} \text{During PEI}_{it} + \beta_{2,ELP} \text{Post ELP}_{it} + \beta_{2,PEI} \text{Post PEI}_{it} + \beta_{3,ELP} \{ \text{Post ELP}_{it} \times i.\text{period}_{it} \} + \beta_{3,PEI} \{ \text{Post PEI}_{it} \times i.\text{period}_{it} \} + \beta_4 \text{industry}_{it} + \beta_5 \gamma_t + \beta_6 \delta_i + \epsilon_{it} \quad (1)$$

where:

- Y_{it} denotes the natural log of wage of individual i in time t ;
- During ELP_{it} and During PEI_{it} are dummy variables that take on a value of 1 in the year-months that individual i is in the ELP or PEI programme, and 0 otherwise;
- Post ELP_{it} and Post PEI_{it} are dummy variables that take on a value of 1 in the year-months after individual i has graduated from the ELP or PEI programme, and 0 otherwise;
- period_{it} indicates the number of months after individual i has graduated from his/her respective programme - 1;
- industry_{it} denotes the industry individual i is working in at time t ;
- γ_t denotes individual time-fixed effects which capture the changes in macroeconomic conditions affecting an individual's wage;
- δ_i denotes a vector of time-invariant individual characteristics that would affect the wages of individual i (e.g., age, gender, year of polytechnic graduation, polytechnic CGPA);
- ϵ_{it} is the error that captures the unobservable factors that determine Y_{it} .

There are several coefficients of interest: (i) $\beta_{1,ELP}$ and $\beta_{1,PEI}$ refer to the average effect that the ELP and PEI programme have on wages during the respective programmes as compared to the wages received by polytechnic graduates; (ii) $\beta_{2,ELP}$ and $\beta_{2,PEI}$ refer to the average effect that the ELP and PEI programme have on wages one month after the respective programmes as compared to the wages received by polytechnic graduates; and (iii) $\beta_{3,ELP}$ and $\beta_{3,PEI}$ provide the additional effects of the ELP and PEI programme on wages over time. Exhibit 4 provides a visual illustration of the coefficients of interest in this study. The findings are reported in the next section.

Exhibit 4: Visual representation of coefficients of interest



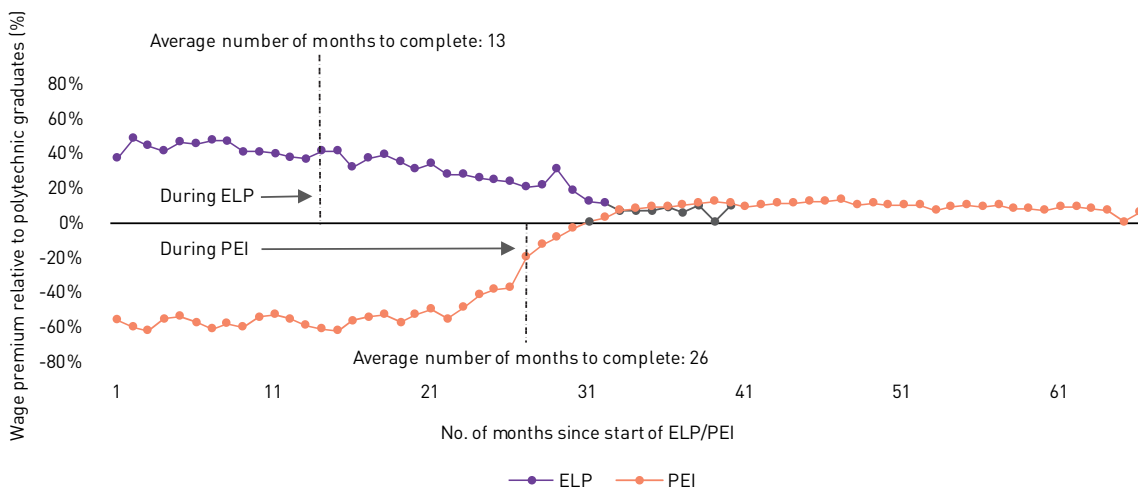
RESULTS AND DISCUSSION

Our findings suggest that ELP graduates enjoyed a starting wage premium relative to polytechnic graduates. Specifically, we find that relative to polytechnic graduates, ELP graduates earned 44 per cent more during the programme and 41 per cent more one month after graduating from the programme (Exhibit 5).¹⁰ According to the employer learning and statistical discrimination hypothesis, as employers have limited information about the quality and actual productivity of new employees, they tend to offer starting wages that reflect the expected productivity of employees based on easily-observable characteristics such as education (Farber & Gibbons, 1996; Altonji & Pierret, 2001; Arcidiacono et al., 2010). In this context, employers might have used application to the ELP as a proxy for the graduates' expected productivity and hence paid them higher starting wages.

Over time, however, we find that the wage premium for ELP graduates narrowed. While this could in part be due to the effect of learning by employers of ELP graduates, the narrowing of the wage premium was more likely to be due to the wages of polytechnic graduates catching up. Specifically, unlike ELP graduates, polytechnic graduates might take time to transit to full-time employment and/or find better job matches after graduation, thereby taking a longer time to earn higher wages. Our data provides some evidence of this as the average wages of polytechnic graduates in our sample is observed to increase from \$1,200 one month after polytechnic graduation to \$1,700 six months after polytechnic graduation.

We next examine whether the wages of polytechnic graduates eventually caught up with the wages of ELP graduates. Preliminary evidence shows that even though the ELP wage premium narrowed over time, it stabilised at around 10 per cent, 19 months after ELP graduation.¹¹ Since there is empirical evidence that employers learn fairly quickly (Lange, 2007), the sustained wage premium over the polytechnic graduates was likely to reflect the higher productivity of ELP graduates, possibly due to the human capital that they had accumulated during the ELP.

Exhibit 5: Estimated wage premium of ELP/PEI graduates relative to polytechnic graduates over time



Notes: Since this was a log-linear specification, coefficients for the treatment period and one-month post-treatment were transformed using $(e^{\beta_{1,ELP}} - 1)$ & $(e^{\beta_{1,PEI}} - 1)$ and $(e^{\beta_{2,ELP}} - 1)$ & $(e^{\beta_{2,PEI}} - 1)$ respectively to obtain the estimated effects. The wage differential at each subsequent month post treatment for the treatment group relative to the control group was approximated by the following formula: $(e^{\beta_{2,ELP} + \beta_{1,ELP}} - 1)$ and $(e^{\beta_{2,PEI} + \beta_{1,PEI}} - 1)$ for ELP and PEI graduates respectively. The lines and markers in grey indicate that $(\beta_{2,ELP} + \beta_{3,ELP})$ or $(\beta_{2,PEI} + \beta_{3,PEI})$ for a given month was statistically insignificant at the five per cent level.

10 This three percentage-points difference in the wage premium experienced during the ELP and that experienced one month after graduation is statistically insignificant.

11 The wage premium for ELP graduates remained at about 10 per cent, 27 months after graduation, although the premium from the 20th month onwards is statistically insignificant at the five per cent level, likely due to the smaller number of wage observations as time passes (i.e., most ELP graduates would not have wage observations beyond 20 months as the ELP was only introduced in 2015).

Furthermore, we find that the ELP wage premium at 19 months after ELP graduation was similar to the wage premium that PEI graduates earned over their polytechnic counterparts, which was estimated to stabilise at around 10 per cent approximately one year after PEI graduation (Exhibit 5).¹² It is worth highlighting that even though both the ELP and PEI wage premiums relative to polytechnic graduates converged to around 10 per cent, PEI graduates would have taken longer to realise this benefit as they would have taken twice as long to complete their full-time programmes (26.1 months) compared to ELP graduates (13.1 months). Moreover, PEI graduates would have experienced negative wage premiums compared to their polytechnic counterparts during the PEI programme, whereas ELP graduates would have earned positive wage premiums during the ELP. In addition, PEI graduates would likely have incurred course fees for their PEI programmes, unlike ELP participants who would have received employer sponsorship for their course fees.

CONCLUSION

Our study finds encouraging results for the ELP, a work-study programme which was introduced in 2015. In particular, there is evidence to suggest that the ELP has a positive effect on wages, with the ELP participants enjoying a wage premium over polytechnic graduates during the ELP and after graduating from the ELP. We also find some indicative evidence that even though the ELP wage premium narrows over time, possibly due to employment changes among polytechnic graduates leading to their wages catching up with the wages of ELP graduates, the premium stabilises at around 10 per cent. The sustained ELP wage premium suggests that employers value the human capital that ELP graduates accumulate during the ELP. The ELP wage premium of 10 per cent is also similar to the wage premium enjoyed by PEI graduates over their polytechnic counterparts, even though the average time taken to complete the ELP is around half the time taken to obtain a PEI degree.

While these early results are encouraging, MOE and SSG should continue to monitor the outcomes of the ELP over time. In particular, given that the ELP is a new programme, our study was only able to observe the wage outcomes of ELP graduates over a relatively short period of time. As more data becomes available, there is scope to examine whether the wage premium obtained by the ELP graduates and hence, the benefits of participating in the ELP, are sustained over the longer term. There is also scope to examine the non-wage outcomes of the ELP, e.g., probability of unemployment, in future extensions of the study.

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¹² From the 17th month after ELP/PEI graduation onwards, the ELP wage premium relative to the polytechnic graduates is not statistically different from the PEI wage premium relative to the polytechnic graduates.

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