THE DETERMINANTS OF ADULT EDUCATION: EVIDENCE FROM AN INTERNATIONAL STUDY

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ABSTRACT

We know that there is already quite a high level of adult education activities going on in Singapore. For example, the Adult Training Survey conducted by the Ministry of Manpower Singapore (MOM) reported a training participation rate of 48.5% among the resident labour force in the 12-month period ending June 2019 (MOM, 2020b). What we do not know is where Singapore stands internationally in terms of training participation. Using data from the Programme for the International Assessment of Adult Competencies (PIAAC), this paper compares Singapore's training participation rate among PIAAC participating countries. A logistic regression model is also employed to examine the determinants affecting training participation in the different countries. The dependent variable is whether the respondent has taken part in any of the formal (i.e. leading to a qualification) and non-formal (i.e. does not lead to a qualification) structured training activities in the last 12 months for job/work-related reasons. The explanatory variables are the usual human capital variables (i.e. highest qualification level and literacy proficiency scores), personal characteristics (i.e. age and gender) and employment variations (i.e. establishment size). A special interest in the PIAAC data is the availability of the respondents' skills proficiency scores, which allows an alternative measure of human capital besides the highest qualification attained. For comparison, we have included other Asian countries (South Korea, Japan), Nordic countries (Denmark, Finland, Norway Sweden), other European countries (United Kingdom, Germany, Netherlands) and the United States. Our study has identified some interesting international comparisons in training participation. Firstly, our study shows that participation in adult education varies across countries. In addition, while establishment size and literacy proficiency generally have a positive relationship with the participation in job/work-related structured training, these relationships also vary across countries. For example in Denmark, training participation rate is generally high even among adults with low literacy proficiency. On the other hand, adults in medium-sized establishments are more likely to participate in job/work-related structured training in Finland.

Keywords: training, adult education, PIAAC, skills.

INTRODUCTION

Training is a familiar word amongst the people in Singapore and more so to those in the workforce. Most are also familiar with SkillsFuture, a national movement to provide Singaporeans with opportunities to develop themselves throughout life, through various forms of training for work- or non-work related reasons (SkillsFuture Singapore, n.d.-a). It has also led to the formation of SkillsFuture Singapore (SSG), a statutory board under the Ministry of Education Singapore (MOE), to drive and coordinate the implementation of the national SkillsFuture movement. Under this movement, every Singaporean aged 25 and above were given monetary credit of S$500 from January 2016 under the SkillsFuture Credit scheme, to encourage individual ownership of skills development and lifelong learning (SSG, n.d.-b).

Since the launch of this scheme, we see that the training participation rate among the Singapore resident labour force reported by the Ministry of Manpower Singapore (MOM) has increased from 35.5% in 2015 to 48.5% in 2019 (MOM, 2020b). Similarly, the number of 'competent' individuals under the Singapore Workforce Skills Qualifications (WSQ) system has also increased from 267,655 in 2015 to 327,996 in 2018 (MOM, 2020a). WSQ is a national credential system that trains, develops, assess and certifies skills and competencies for the workforce. Training programmes developed under WSQ are validated by employers, unions and professional bodies (SSG, n.d.-c). These figures suggest that initiatives from the government has motivated more individuals to pursue training.

While the figures above illustrate that there is currently a high level of training participation in Singapore, we do not know where Singapore stands as compared to other countries. To understand this better, analysis will be done using data from the first cycle of the Programme for the International Assessment of Adult Competencies (PIAAC), an initiative of the Organisation for Economic Co-operation and Development (OECD). We will look at where Singapore stands in training participation among PIAAC participating economies/countries, and explore the determinants of training among these countries. Although the data from PIAAC might be slightly outdated, with the first round of data collection being conducted in 2011 to 2012, PIAAC still proves to be a valuable source of data for the following reasons: (a) the participation of numerous countries allows for international comparison, and (b) the availability of skills proficiency scores provides an alternative measure of human capital besides the highest qualification attained.

METHODOLOGY

Sample

PIAAC provides a unique opportunity to measure human capital via direct assessments. The major survey conducted as part of PIAAC is the Survey of Adult Skills, which measures adults' proficiency in literacy, numeracy, and problem solving in technology-rich environments (PS-TRE). Respondents were given either computer adaptive or pen and paper assessments to assess their proficiency in these domains. Adults who either (a) have no computer experience, (b) failed an ICT literacy test, or (c) opted out of the computer-based adaptive assessment, were given a paper-based assessment, and these adults do not have PS-TRE scores.

The survey also consists of a background questionnaire, which collects a range of information on factors that influence the development and maintenance of skills. These factors include education, social background, as well as engagement in literacy- and numeracy-related activities and the use of information and communications technology (ICT) at work and in everyday life.

For the first cycle of PIAAC, data was collected in three different rounds between 2011-2018, which was participated by 39 countries/economies. 24 participated in the first round in 2011 to 2012, 9 took part in the second round in 2014 to 2015, and 6 participated in the third round in 2017. For international comparisons, the international public use files (PUF) of all the other PIAAC participating countries/economies were used in our analyses.

In the United Kingdom, the data were collected in England and Northern Ireland, and results will be reported separately for England and Northern Ireland. For the United States, the

combined 2012/2014 PUF was used in this analysis, which contains data from the internationally comparable sample from the first and second rounds of PIAAC data collection in the United States and is formatted to conform to the OECD standards. The expanded national sample supports more accurate and reliable national estimates for some subgroups. The original 2012 data have been updated, reweighted, and revised with the release of this 2012/2014 dataset.

Singapore participated in 2014 to 2015 during the second round of data collection; 5468 Singapore citizens and permanent residents aged 16 to 65 were randomly selected to obtain a representative sample of the Singapore resident population. Our analyses incorporated sampling weights, which were calculated post-data collection, so that the weighted data would more closely represent the Singapore resident population.

Measures

Adult education

PIAAC collects information on participation in any formal and non-formal education and training activities during the 12 months prior to the survey. Non-formal education and training activities include (a) courses conducted through open or distance education, (b) organized sessions for on-the-job training or training by supervisors or co-workers, (c) seminars or workshops, and (d) other courses or private lessons. Courses conducted through open or distance education refer to those which are similar to face-to-face courses, but take place via postal correspondence or electronic media, linking instructors/teachers/tutors or students who are not together in a classroom. A training participation indicator was created for participation in any one of these formal and non-formal education and training activities.

Training participation

An indicator for training participation was created using PIAAC data, which is defined as the proportion of residents aged 16 to 65 who had engaged in some form of formal and/or non-formal education and training activities during the 12 months prior to the survey.

Participation in job/work-related structured training

The Adult Training Survey is conducted by MOM as a supplement to the annual Comprehensive Labour Force Survey, which collects information on participation in job/work-related structured training or education activities by the resident labour force during the 12 months prior to the survey. Job/work-related structured training or education refers to training that is related to a current or future job, which includes classroom training, private lessons, correspondence courses, workshops, seminars, structured on-the-job training, and e-learning. These are consistent with the formal and non-formal education and training activities surveyed in PIAAC.

To be consistent with the measures of training participation by MOM, a similar indicator for participation in job/work-related structured training or education activities was created using PIAAC data.

RESULTS

Training Participation Rate

The data from PIAAC shows that training participation rate among residents aged 16 to 65 varies hugely across countries, ranging from 24.0% in Jakarta (Indonesia) to 70.9% in New Zealand (Fig 1). The training participation rate among residents in Singapore is at 62.8%, ranking ninth among the 39 PIAAC participating countries/economies, higher than the OECD average of 53.8%. Training is most prevalent in Nordic countries as well as New Zealand and Netherlands, with a participation rate of at least 68% in these countries.

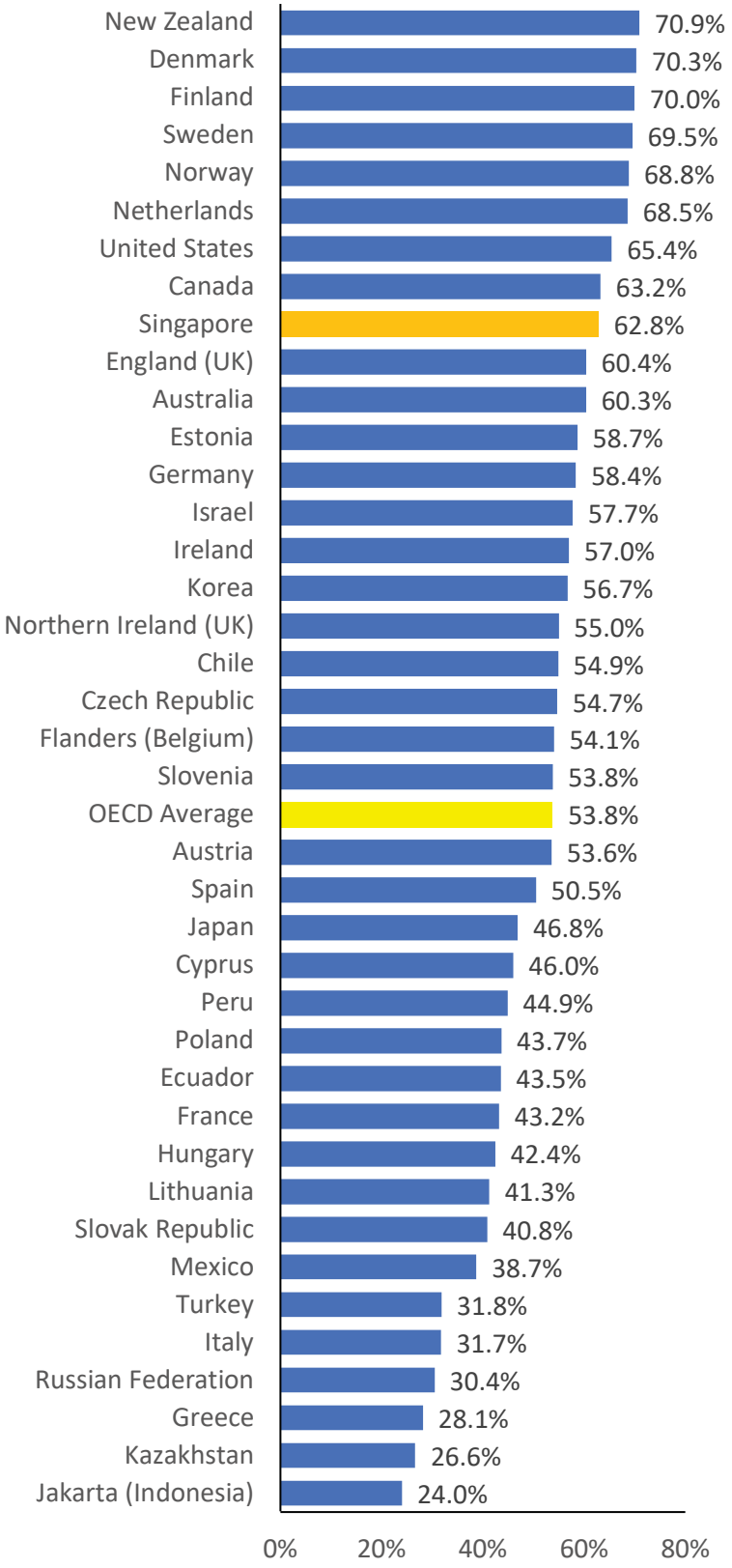


Figure 1. Participation Rate in Formal and/or Non-Formal Education and Training Activities among Residents, by Country.

Looking closer at the non-formal education and training activities, Fig 2 shows that Singapore has higher participation rates than the OECD average for all types of activities. On-the-job training or training by supervisors or co-workers (OJT) and seminars or workshops are the more popular types of non-formal education and training activity across all PIAAC participating countries/economies, and about one third of the residents in Singapore participated in these two types of activities.

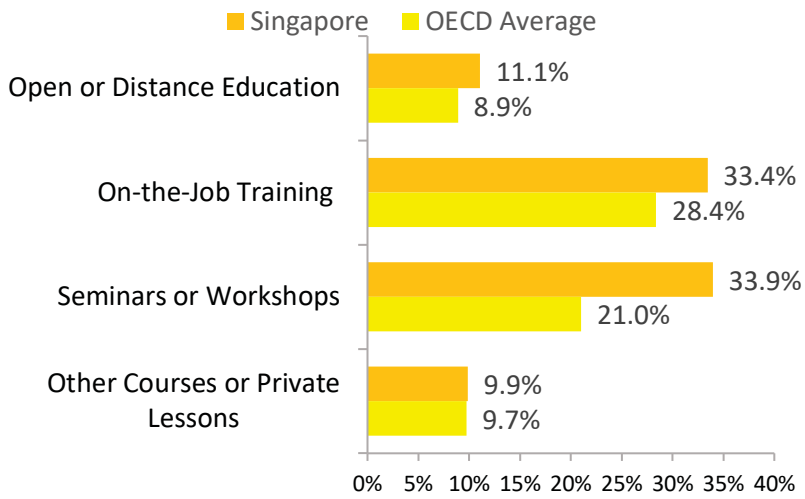


Figure 2. Participation Rate in Non-Formal Education and Training Activities among Residents, by Activity Type.

Participation in job/work-related structured training among the resident labour force (i.e. the indicator for training participation that is used by MOM) also varies largely across countries, ranging from 16.2% in Jakarta (Indonesia) to 71.1% in New Zealand (Fig 3); results for Canada and Norway were omitted as certain variables used to create the indicator for participation in job/work-related structured training were suppressed in the PUF of these countries. Singapore has a participation rate of 60.6%, ranking ninth among the 37 PIAAC participating countries/economies, well above the OCED average of 51.0%.

Similar to the trend observed for training participation among the residents, training for job/work-related reasons among the resident labour force is more prevalent in Nordic countries as well as New Zealand and Netherlands, with a participation rate of at least 65% in these countries.

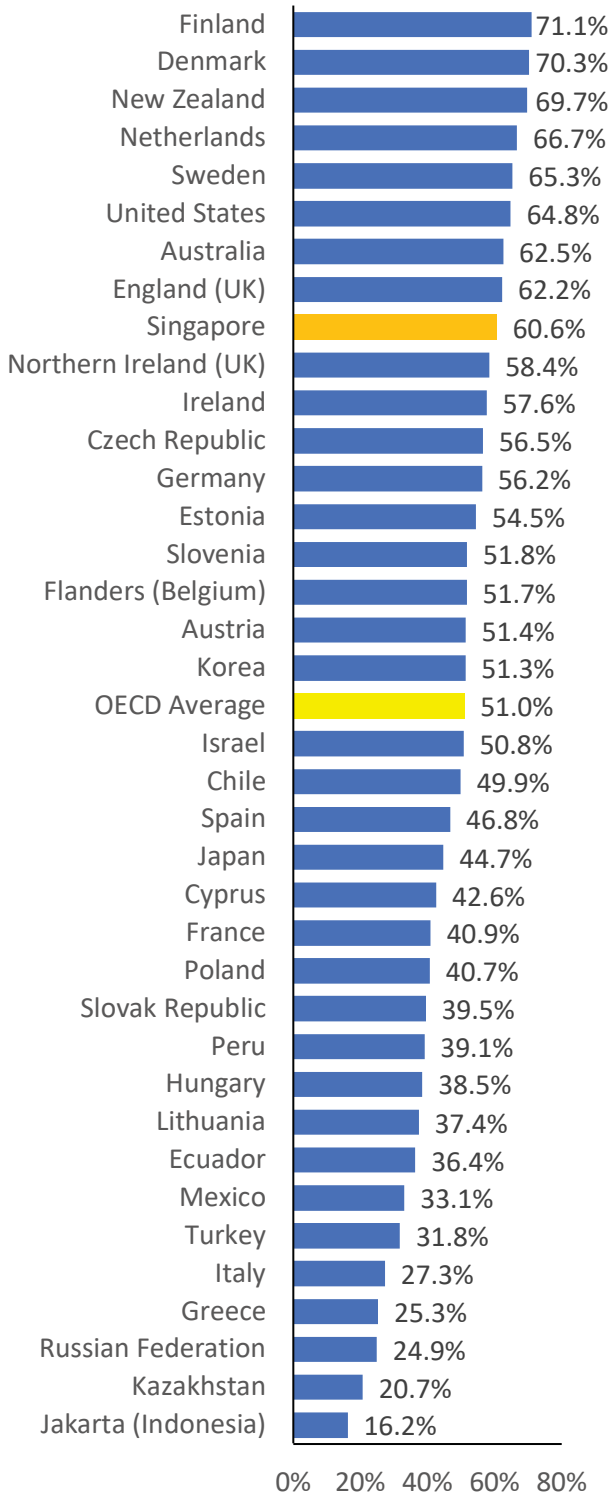


Figure 3. Participation Rate in Job/Work-Related Structured Training among Resident Labour Force, by Country.

Determinants of Training

A logistic regression model was employed to examine the determinants affecting training participation. The exploration of 'determinants' in this analysis was not based on any

particular theoretical model, but driven by the availability of useful data in PIAAC. The dependent variable was participation in job/work-related structured training. The explanatory variables are human capital variables i.e. highest qualification level and literacy proficiency scores, personal characteristics i.e. age group and gender, and employment variations i.e. establishment size. While PIAAC measures adults' proficiency in literacy, numeracy, and PS-TRE, this analysis only used literacy proficiency scores as an explanatory variable because (i) literacy and numeracy proficiency scores were found to be strongly correlated across all PIAAC participating countries/economies and (ii) not all respondents have PS-TRE scores. Furthermore, since establishment size was used as an explanatory variable, the analysis will only involve employed adults.

For comparison, we have included other Asian countries (South Korea, Japan), Nordic countries (Denmark, Finland, Norway Sweden), other European countries (United Kingdom, Germany, Netherlands) and the United States; these were all countries that had taken part in the first round of PIAAC data collection in 2011-2012. Separate logistic regressions were performed to identify the different determinants of training in the different countries. For simplicity in the reporting of results, the International Organization for Standardization (ISO) 3166-1 alpha-2 country codes and ISO 3166-2 country subdivision codes for United Kingdom will be used.

Results show that literacy proficiency scores and establishment size tend to have consistent and significant impacts on participation in job/work-related structured training among adults across countries (Table 1), which is consistent with the findings of previous studies (e.g. Thangavelu et. al., 2011; Waddoups, 2011; Grund & Martin, 2012; Stone, 2012).

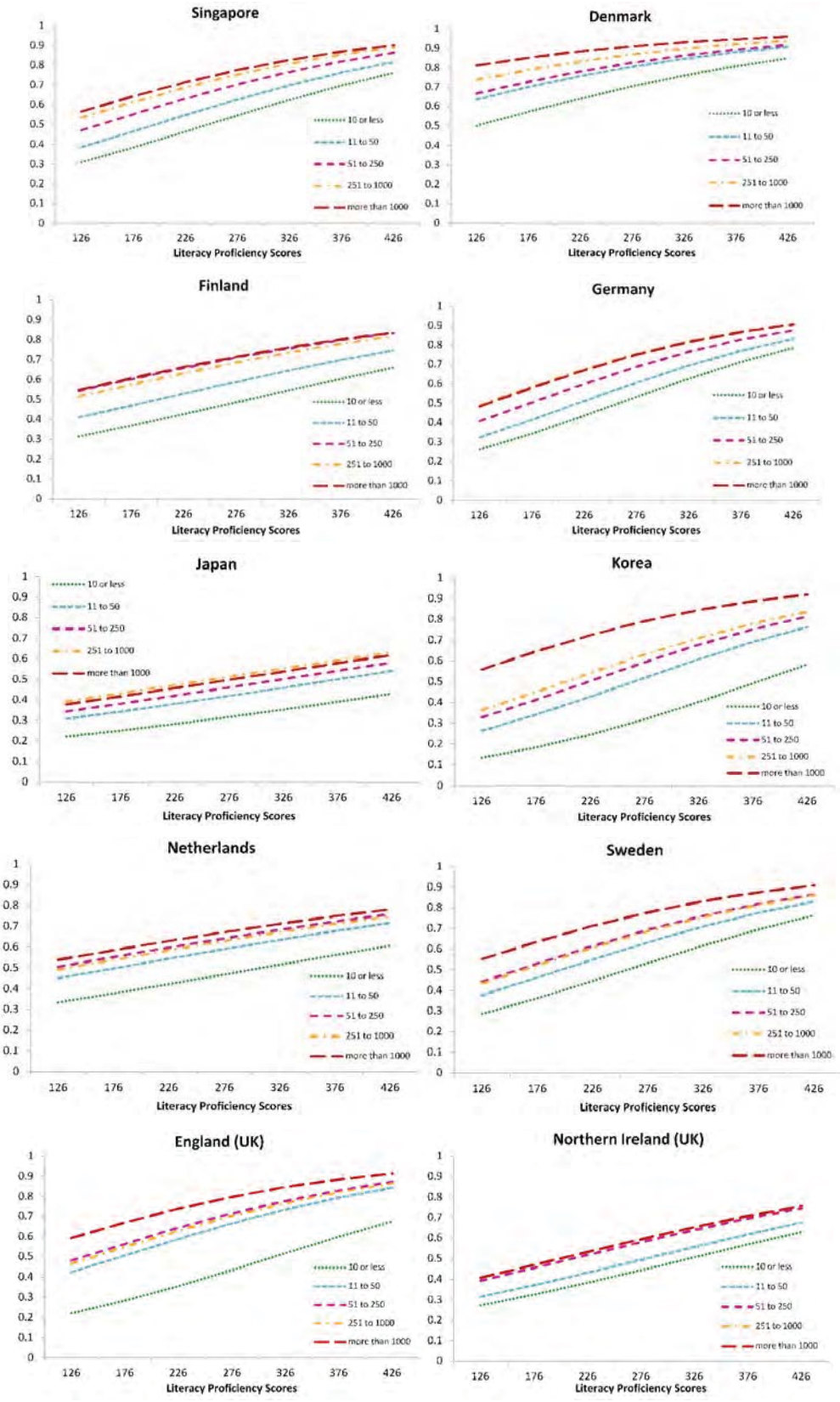
Controlling for the other effects, we used the estimated parameters to project how the probability of participation in job/work-related structured training changes as a result of increasing literacy proficiency scores and how these changes interact with establishment size. We can see that while establishment size and literacy proficiency generally have a positive relationship with the participation in job/work-related structured training, these relationships vary across countries (Fig 4).

Table 1. Determinants of Job/Work-Related Structured Training, by Country.

Country code / Variable	SG	DK	AX	DE	JP	KR	NL	SE	GB-ENG	GB-NIR	US
Literacy Proficiency	0.006***	0.005***	0.008***	0.003*	0.007***	0.004**	0.007***	0.007***	0.007***	0.005**	0.006***
Gender (ref: Male)											
Female	0.142*	0.074	-0.039***	-0.31***	0.012*	-0.104	0.060	0.160	-0.021	0.231*	0.043***
Age Group (ref: 16-24)											

25-34	-0.883***	-0.437*	-1.153***	-0.335+	-0.915***	0.022	-0.133	-0.376*	-0.66**	-0.588**	-0.755***
35-44	-1.052***	-0.325+	-1.095***	-0.426**	-0.871***	-0.125	-0.436**	-0.505**	-0.485*	-0.624**	-0.929***
45-54	-1.197***	-0.513**	-1.25***	-0.389**	-0.947***	0.073	-0.827***	-0.418*	-0.372+	-0.292	-1.041***
55-65	-1.384***	-0.585**	-1.795***	-0.752***	-1.115***	-0.389+	-1.019***	-0.731***	-0.663**	-0.511*	-1.008***
Highest Qualification (ref: Below Upper Secondary)											
Upper Secondary	0.422***	0.739***	0.775***	0.280+	0.817***	0.517***	0.253+	0.459***	0.572***	0.858***	0.826***
Tertiary	1.14***	1.503***	1.538***	1.118***	1.852***	1.172***	0.871***	0.974***	0.942***	1.291***	1.565***
Establishment Size (ref: 10 or less)											
11 to 50	0.557***	0.415***	0.303**	0.446***	0.834***	0.494***	0.333**	0.416***	0.950***	0.202	0.318*
51 to 250	0.691***	0.95***	0.662***	0.613***	1.140***	0.713***	0.678***	0.686***	1.182***	0.545***	0.580***
251 to 1000	1.029***	0.838***	0.993***	0.821***	1.293***	0.660***	0.932***	0.652***	1.121***	0.602**	0.525***
More than 1000	1.454***	0.97***	0.968***	0.760***	2.092***	0.845***	1.056***	1.128***	1.631***	0.606*	0.992***
Intercept	-0.719*	-1.385***	-2.016***	-1.671***	-2.779***	-1.165**	-1.618***	-1.796***	-2.093***	-1.612**	-1.611***
N	4593	3359	3489	3448	3283	3267	3432	2924	2905	2092	3993
Pseudo R^2	0.102	0.094	0.123	0.079	0.194	0.075	0.161	0.079	0.099	0.084	0.107

*+p<0.1 *p<0.05 **p<0.01 ***p<0.001*


Singapore
Denmark
Finland
Germany
Japan
Korea
Netherlands
Sweden
England (UK)
Northern Ireland (UK)
10 or less
11 to 50
51 to 250
251 to 1000
more than 1000
Literacy Proficiency Scores
126
176
226
276
326
376
426

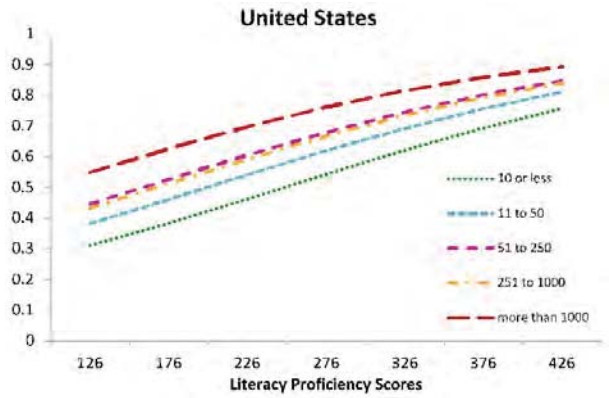


Figure 4. Probability of Participation in Job/Work-Related Structured Training by Establishment Size and Literacy Proficiency, by Country.

In Singapore, the size effect is clearly present, with greater distinction in training participation probability between adults working for small- and medium-sized establishments i.e. establishment size of 250 or less people, and less distinction in the probability between adults working for larger establishments i.e. more than 250 people. Employed adults who have higher proficiency in literacy skills (and therefore numeracy skills) are also more likely to participate in structured training activities for job/work-related reasons.

Although countries generally displayed a higher probability of participation in job/work related structured training among employed adults with higher proficiency in literacy, the impact of literacy proficiency on training participation is smaller in Japan and Netherlands, as evident in the flatter slope of their probability curves across all establishment sizes.

Interestingly, while employed adults in most countries are less likely to participate in job/work-related structured training when proficiency in literacy is low i.e. probability of less than 0.6 among adults with a literacy proficiency score of 126 points (this corresponds to a literacy proficiency level of less than level one in PIAAC, for which the score range is below 176 points) across all establishment sizes, Denmark displayed relatively higher probabilities of training participation at this low level of literacy proficiency, with a probability of 0.5 for an establishment size of 10 or less people and a probability range of 0.64 to 0.81 for larger establishments. There is also 'size convergence' on training participation whereby the probabilities are very (similarly) high regardless of the establishment size, ranging from 0.85 to 0.96 among adults with a literacy proficiency score of 426 points (this corresponds to a literacy proficiency level of level five, for which the score range is 376 points or higher)

Even though countries generally displayed a higher probability of participation in job/work related structured training among adults working for larger establishments, the impact of establishment size on the probability of training participation also varies across the other countries. For example, in Finland, adults working for medium-sized establishments (i.e. establishment size of 51 to 250 people) are more likely to participate in job/work-related structured training than adults working for larger establishments with a size of 251 to 1000 people. Conversely, in Japan, adults working for establishments with a size of 251 to 1000 people are more likely to participate in job/work-related structured training than adults working for establishments of any other sizes. Additionally, in South Korea and England (United Kingdom), while there is a less distinction in training participation probability between adults working for establishments with a size of 11 to 1000 people, there is a very wide

disparity in the training probability between adults working for very small establishments (i.e. establishment size of less than 10 people) and their counterparts working for very large establishments (i.e. establishment size of more than 1000 people).

CONCLUSIONS

The data on training participation shows that Singapore has done well in terms of formal and non-formal training and job/work-related training. However, when we look at the various training activities, there are two non-formal training activities that were less popular among all the countries. Further research and analyses could be done to understand more on the profile of these individuals to look at the underlying reasons for low participation.

From our analyses, we also identified that literacy proficiency is an important factor for training participation in Singapore (and elsewhere), but this association in Singapore is differentiated by establishment size, even at the very high level of literacy proficiency. Further analyses can be conducted by exploring the inclusion of other explanatory variables in the logistic regressions to see if the relationships with training participation changes.

Our analyses have also identified some very interesting international comparisons in training participation. However, the data available in PIAAC was not able to provide further explanations behind the patterns that we had observed e.g. training being more prevalent in Nordic countries as well as New Zealand and Netherlands, very high probability of training participation even among adults with low literacy proficiency scores in Denmark. Further desktop research can also be done on the different countries in order to find explanations for the patterns observed.

A follow-up on this topic can be done when data for the second cycle of PIAAC is available (estimated to be 2023 based on the current timeline reported by OECD), to track how Singapore and the other countries have fared after almost a decade, and to examine if the trends observed persist.

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