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Korea's Age-Skill Profile from PIAAC: Features and Puzzles

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Korea's Age-Skill Profile from PIAAC: Features and Puzzles[1]

Abstract

This paper estimates Korea's age-skill profiles in comparison with other OECD countries such as Japan, Germany, USA, UK and Finland, using the PIAAC data, the recent skill competence survey of adult workers from OECD countries. According to this survey, Korean worker's skill level is slightly lower than the OECD average among the workers older than mid-30s. This is puzzling considering the stellar performance of Korean young students in another international academic competence test such as PISA. We attempt to feature the age effects on skill formation among OECD countries during the work life-cycle sorting out cohort effects by using the PISA data for the youth or by using the educational achievement and environment data as well as the on-the-job learning variables for the adult workers. We find that the skill levels of Korean workers decline much faster with aging compare to other comparison countries. Such fall happens particularly during the earlier stage of work life, which is not observed in other countries. We argue that such age effects on skill formation for Korea are likely to be related with Korea's education system and on-the-job learning environments and incentives at work place.

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1. Introduction

It is well-known that Korean students' performance belongs to the top group in the international competence test such as OECD's PISA(Programme for International Student Assessment),which tests the fifteen-year-old students from the OECD member countries in three areas of reading, mathematics and science every three year period since 2000.Recently, OECD implementedsimilar test for adultsduring the period of 2011-2012, which is called "PIAAC(Programme for the International Assessment of Adult Competencies),"where the competence or skill levels of the 16 to 65 year old adultsare measuredin the three areas of literacy, numeracy and problem solving in technology-rich environment skills. Surprisingly, the performance of Korea's adult population in the PIAAC test was quite disappointing. In contrast to the stellar performance of the Korean youth in PISA, Korean adults' skilllevels turned out to be slightly lower than the OECD averages.Furthermore, the gap between Korean skill level and OECD average widens as the population gets older.This paper is motivated by this puzzling fact and attempts to explore the features of the Korean adult skill levels from the PIAAC data.In particular, this paper focuses on establishing empirical patterns of age-skill profile after controlling for a rich set of confounding factors rather than establishing the causal relationship. However, this paper would provide a benchmark study so as to infer a set of policy implications for Korean education system and labor market.

It would be difficult to establish a solid causal inference about the relationship between skill levels and age simply from observing that the skill level decreases in age from

the PIAAC. Such observation may indicate that the skill level deteriorates as people get older, which can be interpreted as the “depreciation” of human capital stock with age for some reasons. However, this may also indicate that the young generations are more skilled than the old generations. That is, it might indicate that there has been improvement in skill across cohorts during the Korea’s development process. To distinguish between the two possible interpretations, we need to use panel data. The PIAAC, however, is a cross-sectional data at this moment so that the empirical pattern about the cross-sectional age-skill profile from the PIAAC does not clearly tells us about the precise interpretation.

From the policy maker’s point of view, however, the two interpretations would deliver very different policy implications. With the second “generational” difference interpretation, such profile indicates a progress and the policy makers would reinforce the current economic development behind such positive changes. With the first “age” difference interpretation, it would be important what factors are behind such “depreciation.” Policy makers would figure out why Korean adult skill levels deteriorate rather than improve despite the increase in years of work. This can be a problem particularly for Korea, where the seniority wage payment system is the main compensation scheme in labor market. For some reasons, adult workers may not continue to accumulate their human capital at the work place.Considering the outstanding performance of Korean youth in PISA, such deterioration could have started during the upper secondary or college schooling period, perhaps because the education system relying on rote learning. Therefore, the policy implications from this possible interpretation seem to be huge.

Unfortunately, however, it is difficult to draw any firm conclusions about this, simply because of the data availability. Thus, we attempt to utilize another useful features of PIAAC to draw some critical, though not conclusive, inference about the age-skill profile of Korean adults. First, PIAAC reports a very rich set of socioeconomic characteristics which can capture important part of the cohort effects. Thus, we estimate the "conditional" age-skill profile of Korean adults after controlling for such cohort effects as much as possible. Second, although currently available PIAAC does not allow the variation in time dimension, it allows the international comparison so that we can tell if the shape of Korea's age-skill profile is Korea-specific or universal one. Utilizing these two features of PIAAC, we try to establish the "age effects" of the skill variation among Korean adults.

Furthermore, by closely examining the patterns of the age-skill profile from PIAAC and by using other external data sources, this paper provides the potential reasons behind such age effects. For example, this paper explores the possibility that problemsin education may result in such fallin skills of the old compared to the young by comparing the test outcomes between PISA and PIAAC. Then,we also studyif the diminishing skills occurs after controlling for age group influences such as academic attainment level and education quality or due to the lack of learning incentives at the work place.

In fact, we do find some circumstantial evidence illustrating the problems in the quality of higher education and also in the learning incentives of the Korean adult workers. This may be related to Korea's excessive emphasis on rote learning and the students' academic achievement in the short run, and the lack of motivation to learn in universities or at work

place in the long run. Furthermore, it turns out that Korean adult workers have weak readiness to learn andnot enough task discretion, which maymake Korean adults find skill accumulation difficult.

This paper consists of the following sections. Section 2 describes PIAAC data, which is the main data used, and raises problems of Koreans' skills indicated by PIAAC data. Section 3 utilizes PISA data together with PIAAC data to overcome the limitation of cross-sectional PIAAC data and to empirically show the possibility of lowering skills between the ages of 17 to 22 being related to low quality of university education and rote elementary and secondary education. Section 4analyzes diminishing skills of 25 to 65 years old Korean adults, and finds out how "education variables" which influences skill differences among age groups and includes variables like educational attainment, quality of education and educational environment, and "on-the-job learning variables" such as readiness to learn, task discretion and learning at work that changes by aging. This illustrates the problem in Korean adults' learning after labor market entry and discuss the likeliness of falling skills level due to aging. Section 5 concludes.

2. Description of PIAAC Data

OECD's PIAAC datais the survey of skills among the 16-65 year oldadults in 22 OECD member countries and two OECD partner countries.It was conducted for the period from August 2011 to March 2012. The survey assesses skills in three areas: numeracy, literacy

and problem solving in technology-rich environment(PSTRE). In addition to the skill test results, PIAAC includesvarious socioeconomic characteristicssuch as demography, educational background of the respondents and their parents, job information and skill usage questions, which allowsus to study the relationship between skills and those characteristics.

Total of 24 countries(and sub-nationalregions) participated PIAAC 2011-2012 with total number of respondents of 166,000. This paper uses 21 countries, excluding Russia, Australia and Cyprus due to the data collection quality and data availability issues. Korean PIAAC survey was conducted by Statistics Korea, the national statistical office of the government of Korea,and the implementing agency was the Korea Research Institute of Vocational Education and Training(KRIVET). The sample size of Korean PIAAC is 6,667, which were selected based on the 2010 Census. One member of household was randomly selectedfor each 8,830 resident households in Koreaby the stratified three-stage cluster sampling.

The three areas of skillsassessed by the PIAAC, numeracy, literacy and problem solving in technology-rich environment, are mainly the information-processing skills. They are defined in OECD Skills Outlook (2013, p. 59) such that:

1. Numeracy: ability to access, use, interpret and communicate mathematical information and ideas in order to engage in and manage the mathematical demands of a range of situations in adult life;

2. Literacy: ability to understand, evaluate, use and engage with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential; and

3. PSTRE: ability to use digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks.

Each panel of Figure 1 compares the average score of Korean adults with the OECD average of each skill area across age groups. Korea's age profiles of the three skills show similar patterns such that: Korean worker's skill level is higher than the OECD average for the 16-24 years-old workers, but it becomes lower thanthe OECD average for the age groups older than the 25-34 age group, with widening gap over age.

Figure 1. Average PIAAC Score of Korea and OECD Average PIAAC Score

Figure 1.1.Numeracy

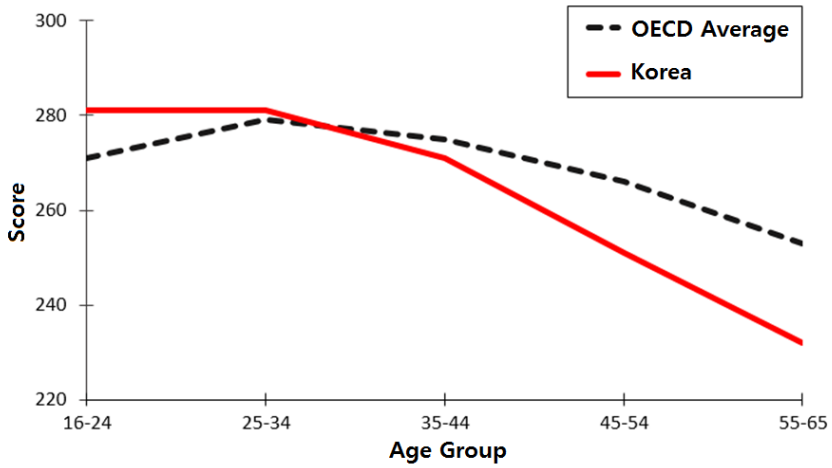


Figure 1.2. Literacy

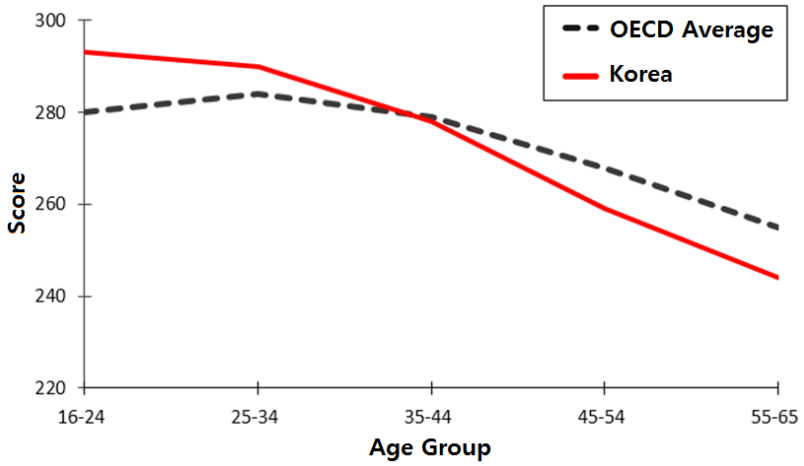
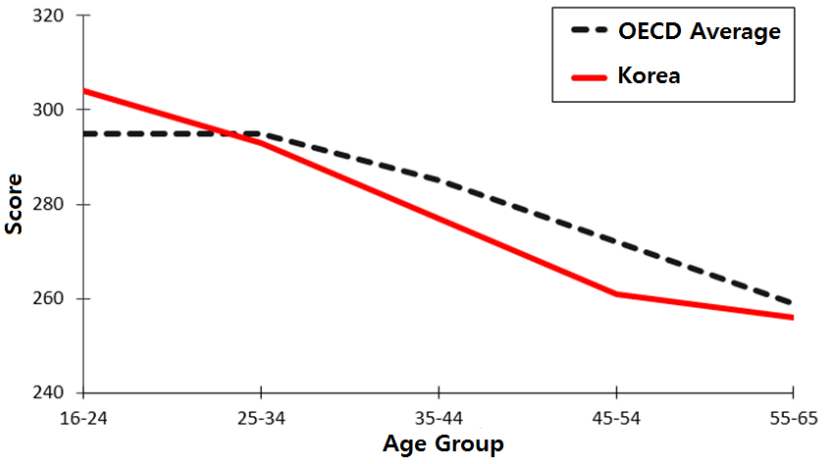


Figure 1.3. PSTRE



Source: PIAAC

Another interesting pattern is that Korean skill levels for numeracy and literacy fall monotonically and rapidly over age, while those of the OECD average first increase between 16-24 and 25-34 age groups, and then start to fall only after 35-44 age group. We will pay attention first to the youth group in the following section, which shows the contrasting performance of Korean workers compared to other age groups.

3. Skill and Learning of Korean Youth

In PISA, which assesses fifteen years old students since 2000, Korea together with Finland has always shown high academic achievement scores. However, comparing the PIAAC scores between the 25-34 age group and the 16-24 age group, Korean average has decreased whereas OECD average contrastingly increased in the same age group, as is shown in Figure 1.

PISA and PIAAC are both competency assessments organized by OECD, but its fundamental characteristics are different. PISA assesses fifteen year olds on reading, mathematics and science areas. It started in 2000 and the survey has been conducted every three years. PISA assessment is based on the contents that are learned in schools, so it generally consists of academic questions. In contrast, PIAACassesses on numeracy, literacy and PSTRE using the questions that are used in everyday life and at the work place.

The PISA has assessed five cohorts of 15 year-olds from 2000 to 2012, in comparison, PIAAC has been conducted once but across wider age range from 16 to 65.Thus, there is an overlapping age groups of 17-28 year-oldpeople who took both PIAAC and PISA tests. For example, the 26-28 age group in PIAAC corresponds to the PISA 2000 cohort, and the 23-25 age group in PIAAC corresponds to the PISA 2003 cohort. The PISA reading assessment is the similar area of the PIAAC literacy test and the PISA mathematics area is similar to the PIAAC numeracy test. Utilizing these features of PISA and PIAAC, we may compare the four PIAAC age groups of 26-28, 23-25, 20-22, and 17-19 with the PISA cohorts of 2000, 2003, 2006, and 2009, respectively, in terms of theirliteracy-reading and numeracy-mathematics scores, in order to partially sort out the age effects from cohort effects for these youth groups.[2]

For the purpose of concrete comparison, we compare the Korean results with those offive major countries such as Germany, Japan, USA, UK(England and Northern Ireland, PISA includes Wales also), and Finland. Figure 2 plots the standardized PIAAC scores against the standardized PISA scores of the all four PISA cohorts for Korea ("KOR"), Germany ("DEU"), Japan ("JAP"), USA ("USA"), UK ("GBR"), and Finland ("FIN"). The scores are standardized by cohort for each survey because of the scale difference between PIAAC score and PISA score so that Figure 2 compares the relative positions of the four cohorts for the six countries. Figure 2.1 plots the standardized PIAAC Numeracy score divided by the standardized PISA Math score. Figure 2.2 plots the standardized PIAAC Literacy score

[2]Forthe purpose of consistent comparisonbetween Section 3 and the following Section 4, the sample of youth groupsin this section consists of the native-born 17-28 years old males.

divided by the standardized PISA Reading score. This way we normalize PIAAC score by the PISA score. In this sense, we at least partially control the cohort effects. Thus, the movements of the arrow in the figure, which indicates the direction of movements of the age groups, capture the age effects of the PIAAC score among the young workers.

Figure 2.1 shows that Korean young worker's PIAAC numeracy score (relative to the PISA math score) is behind those of Germany, Japan and Finland, while it is above those of USA and the UK. Furthermore, we can tell that Korean PIAAC numeracy score is declining over age (relative to the PISA math score), compared with Germany, Japan and Finland. Finland shows the opposite pattern. The PIAAC numeracy score (relative to the PISA math score) rises fast with aging.

Figure 2.2 illustrates similar pattern is observed for the PIAAC literacy score (relative to the PISA reading score) for Korea. The only difference about the literacy score from the numeracy score is that now Germanscore is behind Korean score. However, the rapid fall in PIAAC literacy score (relative to the PISA reading score) from the 17-19 age group to 20-22 age group is salient only for Korea out of the six countries.

Considering the specific age groups and the outstanding performance of Korean students in PISA, such large drop of both numeracy and literacy PIAAC scores of Korea from the 17-19 age group to 20-22 age group may represent some problems of the high school and college education of Korea. To further explore this possibility, we re-organize the data for each age group only among students. Figure 3 compares the scatter diagrams of the PIAAC numeracy score normalized by the PISA score across age groups among students

from all sample countries. Figure 4 displays similar information for the PIAAC literacy score. Fitting trend line is displayed for each sub-figure in Figures 3 and 4, which shows that there is a strong positive correlation between the PIAAC and PISA scores.

As shown in Figure 3.1, the PIAAC numeracy score of Korean students is plotted at the North-east corner for the 17-19 age group, i.e. Korean students of this youngest group in the sample show the best performance in both PISA and PIAAC in terms of numeracy. However, Korea'snumeracy score dramatically declines for the 20-22 age group, even below the fitting trend line. Such position of being below the fitting trend line remains the same for the older 23-25 and 26-28 age groups, i.e. no recovery either during or after the university education. Note that the Korea's position is at the East-bound for all age groups, which means that the PISA scores of Korean students were all outstanding when they were in middle school (age 15). This clearly illustrates that the fall in Korean students' numeracy skill happened after they graduate from high school and such decline is maintained afterwards.

We observe similar patterns about Korea's PIAAC literacy score (normalized by the PISA reading score) from Figure 4. The only exception is that the literacy score for the 23-25 age group is aligned with the fitting trend line. The rest of the qualitative features of the literacy score remain the same as the numeracy score.

Figure 2. Comparison of PIAAC Score against PISA Score for the Young Workers

Figure 2.1.PIAAC Numeracy/PISA Math

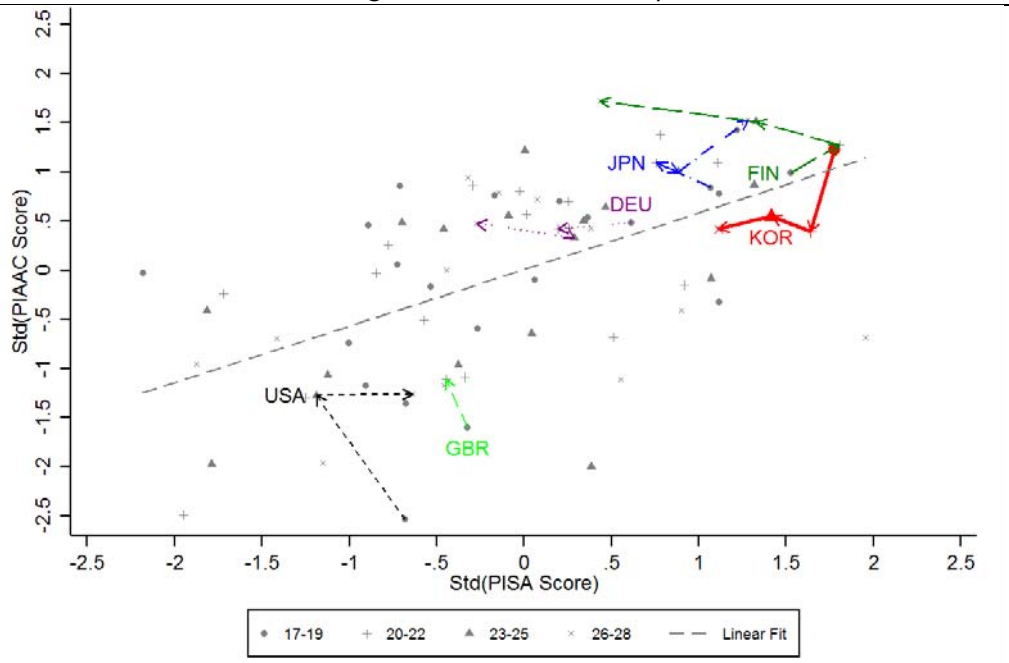
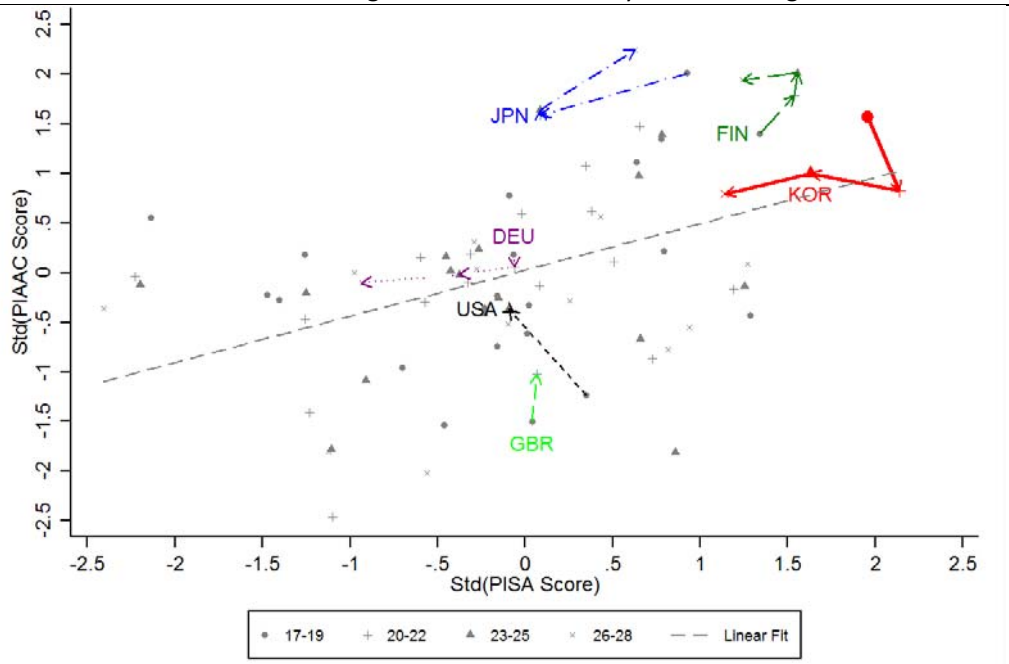


Figure 2.2.PIAAC Literacy/PISA Reading



Note: Country average scores are standardized by PISA cohorts(or three year age groups in PIAAC)
Connected lines begin from 17-19 year olds and end at 26-28 year olds, except GBR.
Source: Authors' calculation from PIAAC and PISA

Figure 3. Comparison of PIAAC Numeracy Score against PISA Math Score for the Students	
Figure 3.1.17-19 year olds: High school and university students	Figure 3.2. 20-22 year olds: University students

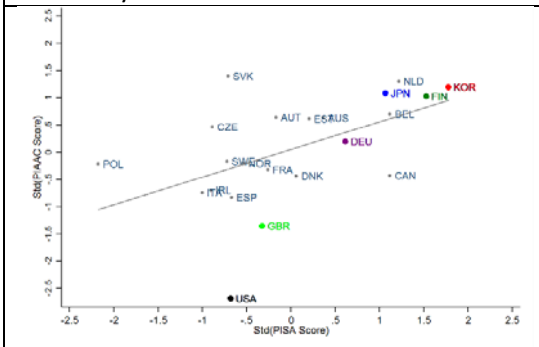
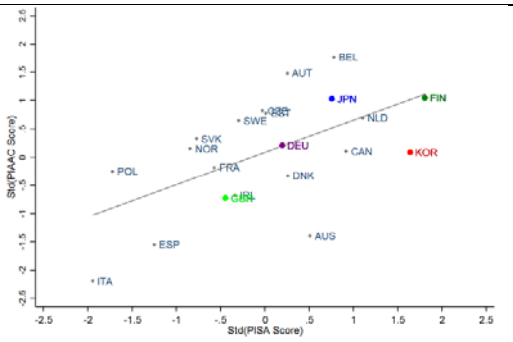

	

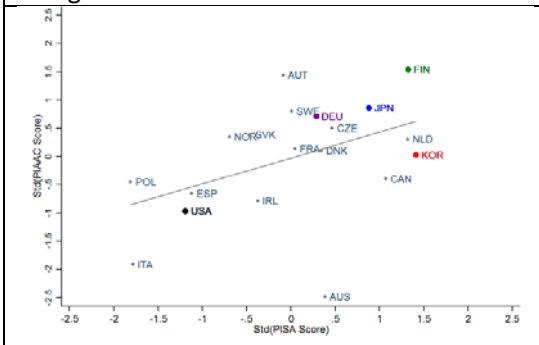
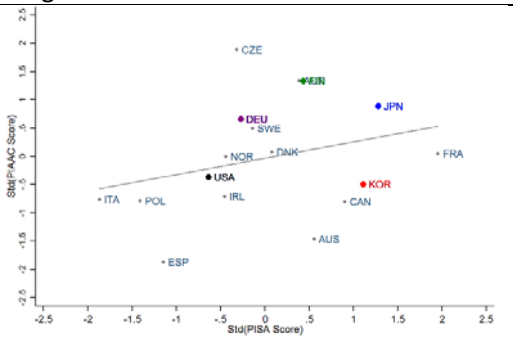
Figure 3.3. 23-25 year olds: University students and graduates	Figure 3.4. 26-28 year olds: University students and graduates
	

Figure 4. Comparison of PIAAC Literacy Score against PISA Reading Score for the Students	
Figure 4.1.17-19 year olds: High school and university students	Figure 4.2. 20-22 year olds: University students

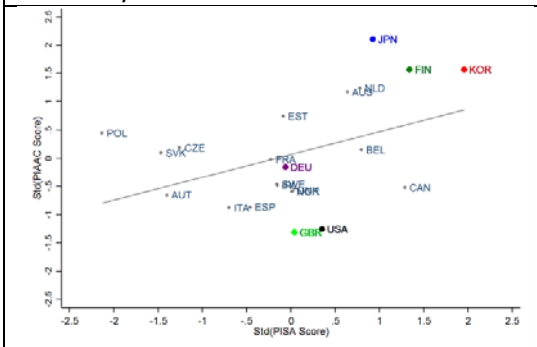
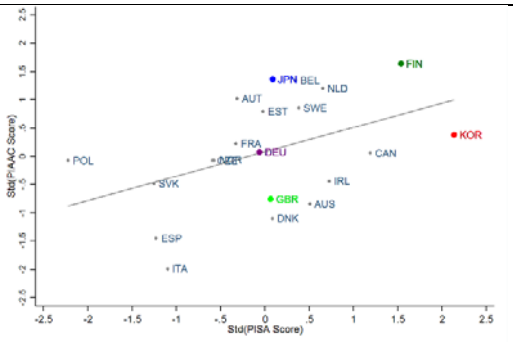
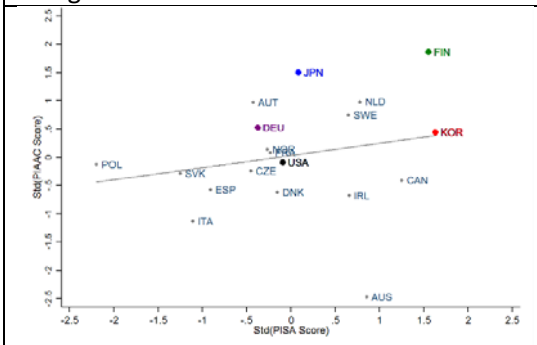
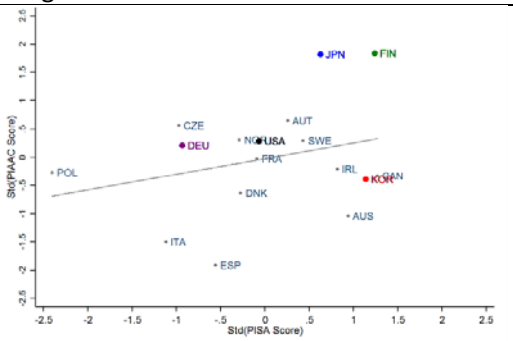

	

Figure 4.3. 23-25 year olds: University students and graduates	Figure 4.4. 26-28 year olds: University students and graduates
	

In fact, theissues about the decreasing quality of university education were already raised by Lee, Jeong and Hong(2014) who compare the wage distributions across schooling groups and the changes in wage inequality over time. They show that the degradation of the wage of the university graduates started to happen after the rapid expansion of the universities at the bottom in the mid-1990s.

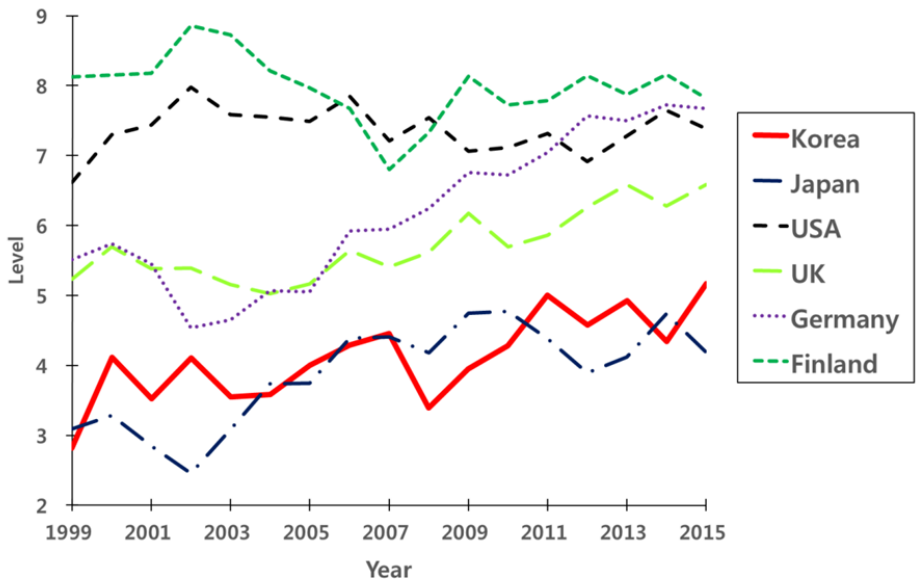
Another empirical fact that may indicate the problem of skill accumulation from the university education in Korea comes from the World Competitiveness Report by International Institute for Management Development(IMD).This international survey reports a 'university competitiveness' index which is one outcome of Executive Opinion Survey on executives in high management to measure how much the human resource in the country is ready for competitive economy[3]. Figure 5 shows the recent trends of major countries of comparison from 1999 to 2015.[4] Here, Korea's university competitiveness has low score along with Japan. There have been some improvements in the recent years, but still relatively low compared to other major countries.

Major drop of numeracy and literacy skills of the students, however, happens between the 17-19 age group and the 20-22 age group. This indicates that more important problem may exist in high school education system, which emphasizes the academic achievement for college entrance preparation for the short time period by rote learning, as is addressed

[3]For more information on World Competitiveness Report, refer to IMD World Talent Report 2014.
[4]The index is calculated with questions scaled from 1 to 6, then converted into 0 to 10 scale.

in Lee and Kim (2014). This kind of education may damage the ability for the skill acquisition that is needed in everyday life and at the work place.

Figure 5. IMD University CompetitivenessIndex



Source: World Competitiveness Online

In summary, we attempt to sort out the age effects on skill acquisition for the young workers and students by combining the PIAAC data and the PISA data for the overlapping cohorts. We find that despite the stellar performance of Korean young students (middle schoolers) at the PISA tests, the numeracy and literacy skill levels of the same cohort Korean youth fall between the 17-19 age group and the 20-22 age group, and remain lower than the OECD sample fitting trend lines afterward. We argue that such puzzling changes seem to be related to Korea's high school education and university education system.

4. Age-Skill Profiles and LearningMotives of Korean Adult Workers

We explore the skill levels of the young Koreans (the 17-28 age group), where we attempt to utilize common availability of both PISA and PIAAC data for the same cohorts. This section analyzes the age-skill profiles of the main body of the workforce, i.e. the 25-65 age group. We focus on the male sample whose labor market participation behavior is much more stable than women. Foreign-born are excluded because the countries of comparison, such as USA, Germany and UK, have no small population of immigrants. This may distort comparison with Korea, where proportion of immigrants is very small, due to specific characteristics of immigrants.

The feature of this group of people represents the main characteristics of the labor force of each national economy, hence we study the age-skill profile of this workforce group. However, for this age group, we cannot use the method of controlling for the cohort effects as we did in the previous section because of the lack of the overlapping cohorts between PISA and PIAAC data. Therefore we use different strategy of controlling for the cohort effects to isolate the age effects from the cross-sectional age profile from the PIAAC data. The PIAAC survey collected very rich set of socioeconomic characteristics of the respondents and their family background. Table 1 provides the list of PIAAC variables which are sued for the analysis in this section. We also control the cohort effects by adding the changing educational environment data such as teacher-pupil ratios across cohorts as well as across countries.

Main dependent variables are the "standardized"PIAAC scores in numeracy, literacy and PSTRE, as Hanushek et al. (2015) used in their study on PIAAC scores as skill measures.[5]Standardization is made across all sample countries, hence a unit of change of each score indicates the same change in skills across all sample countries in consideration andeach standardized PIAAC scorehas mean 0 and standard deviation 1.

We use 10-year interval age group to have enough sample to utilize the variation of other characteristics within each age group. We consider the following socioeconomic characteristics and family background that are used to control the cohort effects in skill formation. Some control variables were referred from Fuchs(2004). The list includes respondents' educational attainment, parents' educational attainment, and the number of books at home when respondents were 16 years old. To account for the differences in educational system, respondents' and parents' educational attainment variables are taken from the variables often used in OECD studies. Number of books at home when they were 16 years old was used to represent family environment on education. Originally, this variable was a category variable with inconsistent scale. To reduce the number of control variables and keep consistency in the interpretation of this variable, it was used as continuous variable by taking median values of each category. Finally, computer usage

[5] It is difficult to perform the precisein case of the PSTRE score because of the large number of non-responses (recorded as 'opt out' or 'failed'). In the OECD reports, competency levels are used in place of actual score. If score needs to be used, then non-response respondents' scores can be imputed with the lowest PSTRE score of each country or with scores of people having similar background characteristics. However, we decided to use PSTRE score in order to minimize possible errors in imputation and in a compatible manner with the other two skill measures.

variable is used to distinguish between paper-based and computer-based assessments, which also indicates whether the respondent is comfortable with using computer.

Table 1. List of PIAAC Variables

Variable	Explanation
Std(Skills)	Standardized PIAAC scores for each skill: numeracy, literacy and PSTRE. Standardized within the international sample with mean 0 and standard deviation 1.
AgeGrp	10 year age groups. 2 = 25-34 years old, 3 = 35-44 years old, 4 = 45-54 years old, 5 = 55-65 years old
RespEdu	Respondent's highest educational attainment in three categories. 1 = Below lower secondary, 2 = Upper secondary, 3 = Above college
PntEdu	Parents' highest educational attainment in three categories. 1 = Both parents below lower secondary, 2 = At least one parent with upper secondary, 3 = Both parents above college degree
Books16	Number of books at home when the respondent was 16 years old. Categorical variable substituted with median value of each category. Unit is 100 books.
CompUse	Computer usage for PIAAC assessments. 0 = Participated in paper-based assessment, 1 = Participated in computer-based test

We use severalregression models to estimate the age-skill profiles of each skill among adults, sequentially controlling for the cohort effect from the above confounding factors. Model A1estimates the country-specific unconditional age-skill profile as in equation (A1), where subscripts *i* and *k*index individuals and countries, respectively. Model A2estimates the country-specific conditional age-skill profileby controlling for educational achievement andeducational family background that can influence the skill formation as in equation (A2).

$$\mathrm{Std(Skill)_{ik}} = \beta_{0k} + \beta_{1k} AgeGrp + \epsilon_{ik} \quad (A1)$$

$$\text{Std(Skill)}_{\text{ik}} = \beta_{0k} + \beta_{1k}AgeGrp + \beta_{2k}RespEdu + \beta_{3k}PntEdu \quad (A2)$$
$$+\beta_{4k}Books16 + \beta_{5k}CompUse + \epsilon_{ik}$$

Reference age group of the age group variable *AgeGrp* is the youngest 25-34 age group. Note that *CompUse*is automatically omitted when the skill is about PSTRE because there are no paper-based assessments for the PSTRE test.

Model A3 controls for the quality of education using UNESCO teacher-to-pupil ratio. This is done to take into account the differences in education quality across cohorts. Based on teacher-to-pupil ratio in primary, lower and upper secondary education and the starting age of each education program taken from the UNESCO Institute of Statistics data, teacher-to-pupil ratio is designated to each respondent by his highest educational attainment. Therefore, we calculate the average teacher-to-pupil ratiosfor each educational attainment group within each age group are calculated, and then each of the average teacher-to-pupil ratios is assigned to the respondent's age group and education level.[6]

$$\text{Std(Skill)}_{\text{ik}} = \beta_{0k} + \beta_{1k}AgeGrp + \beta_{2k}RespEdu + \beta_{3k}PntEdu \quad (A3)$$
$$+\beta_{4k}Books16 + \beta_{5k}CompUse + \beta_{6k}TPRatio$$
$$+ \epsilon_{ik}$$

[6] The earliest available year of the teacher-to-pupil ratio UNESCO data is 1971, andnot all countries provide such information. When there are no data for the teacher-to-pupil ratio for some cohorts and for some countries, they are dropped from the regression Model A3. Out of 49,656 respondents in the PIAAC sample, only 31,905 respondents are used for Model A3. In case of Korea, 2,335 out of 2,584 respondents are used in Model A3.

Descriptive statistics of the variables used in Models A1, A2 and A3 are reported in Table 2, where the frequencies are reported for categorical variable, and the mean and standard deviation are reported for continuous variables.

This paperreports the results of five major countries of Germany, Japan, USA, UK(England and Northern Ireland), and Finland in comparison with Korea, although we include all 21 available countries in our estimation. Each of the five comparison countries has its own labor market characteristics distinct from Korea. For example, German labor market consistsmostly of workers from small and medium enterprises, which contrasts with Korean economy which is governed by conglomerate companies. Japan has similar labor market structure and work practice as Korea so that the comparison of Korea with Japan may sort out Korean labor market features isolated from such cultural and work practice characteristics. USA is considered as an economy with themost flexible labor market. UK labor market is known to have the highest labor market participation rate of highly skilled workers compared to all other OECD countriesaccording to OECD(2013c). Finnish labor market is equipped with the workers provided by the best primary and secondary education system among OECD member countries.

Table 2. Descriptive Statistics of the Variables in Regression Models

	All Sample			Korea		
Categorical	TotalObs	Category	%	TotalObs	Category	%
AgeGrp	49,656	2	22.7	2,584	2	23.7
		3	24.1		3	26.1
		4	25.9		4	28.0
		5	27.3		5	22.2
RespEdu	47,907	1	18.3	2,584	1	16.2

		2	46.7		2	37.6
		3	35.0		3	46.2
PntEdu	46,850	1	39.9	2,552	1	62.2
		2	38.7		2	24.5
		3	21.4		3	13.3
Continuous	Observations	Mean	Std. Dev.	Observations	Mean	Std. Dev.
Books16	49,317	1.096	1.357	2,581	0.855	1.152
CompUse	49,548	0.746	0.435	2,584	0.679	0.467
TPRatio	31,905	16.37	5.841	2,335	28.57	9.074

Figures 6 to 8 displaythe estimated age-skill profiles of each skill of numeracy, literacy and PSTRE for Korea in comparison with the four countries using Models A1to A3, respectively. Horizontal axis marks 10-year age groups and vertical axis represents the estimates of the country-specific coefficient (β_1)across age groups.[7] Since the reference group is the 25-34 age group, the value on vertical axis refers to the difference between the selected age group and the 25-34 age group, i.e. the age premium of skill. Full estimation results of Models A1to A3 for Korea are reported in Tables 3 to 5. For the comparison countries, full estimation results are reported in Tables A.1 to A.15 in Appendix.

The unconditional age-numeracy skill profiles in Figure 6.1 suggest that Korean workers' numeracy skill decreases the fastest with aging compared with other major countries. However, after controlling for the educational achievement and educational environment variables, the gaps in age profiles between Korea and other comparison countries become smaller as Figures 6.2 and 6.3 show. This implies that there indeed exist cohort effects for the age-skill profile. Furthermore, controlling for such cohort effects from

[7]The dot markers on the profile linesin Figures 6 to 8 (as well as in the following Figures 12 to 14) indicate that the corresponding estimates are significant with 10% significance level.

the differences in educational achievement and educational environment, the numeracy skill of Korean workers does not seem to decrease fast. In fact, the numeracy skill level is maintained between the 45-54 age group and the 55-65 age group for Korea, while it decreases for Japan and Finland.

However, a common feature which remains the same with or without controlling for the educational variables is that the numeracy skill declines between 25-34 age group and the 35-44 age group in Korea, Finland and USA, while it increases in in Japan and UK or remain constant in Germany.

From Figures 7.1 to 7.3, we observe similar patterns of age profile for the literacy skill. However, after controlling for both educational achievement and environment variables (i.e. Model A3), it is only Korea where the literacy skill declines rapid and monotonically from 25-34 age group to 35-44 and again to 45-54 age group. Figure 8.3 shows the same pattern is observed for the PSTRE skill.

Figure 6. Age Profile of PIAAC Numeracy Score

Figure 6.1. Model A1

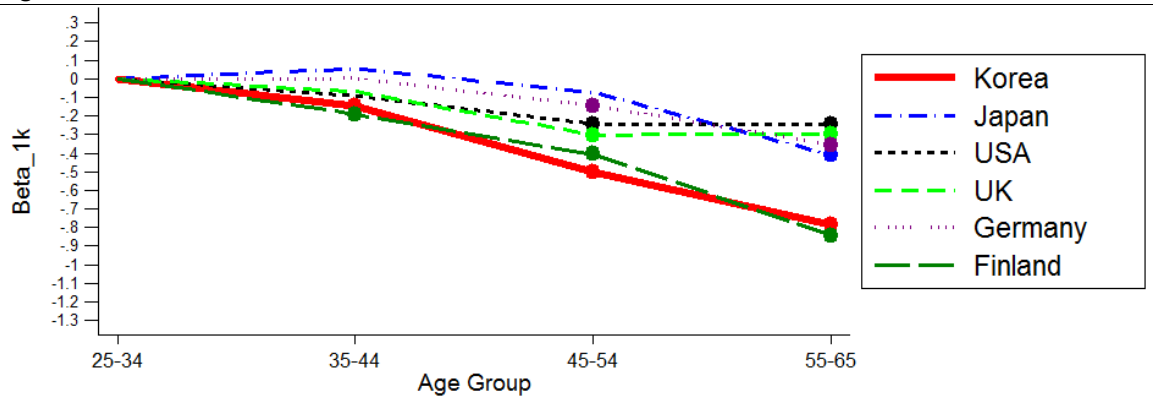


Figure 6.2. Model A2

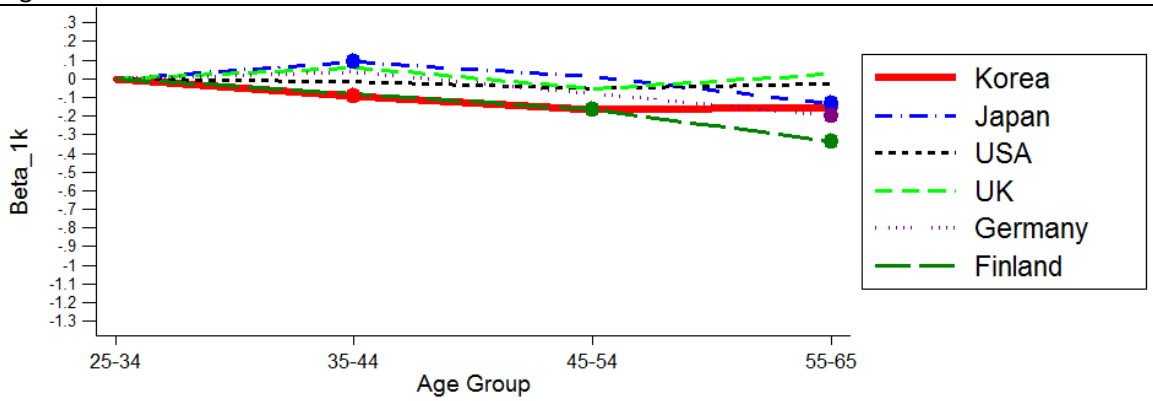
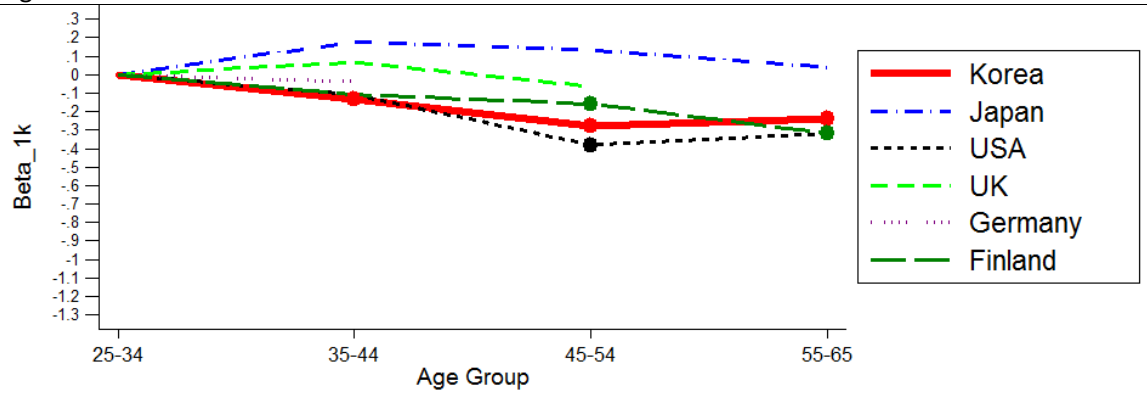


Figure 6.3. Model A3



Source: Authors' calculation from PIAAC

Figure 7. Age Profile of PIAAC Literacy Score

Figure 7.1. Model A1

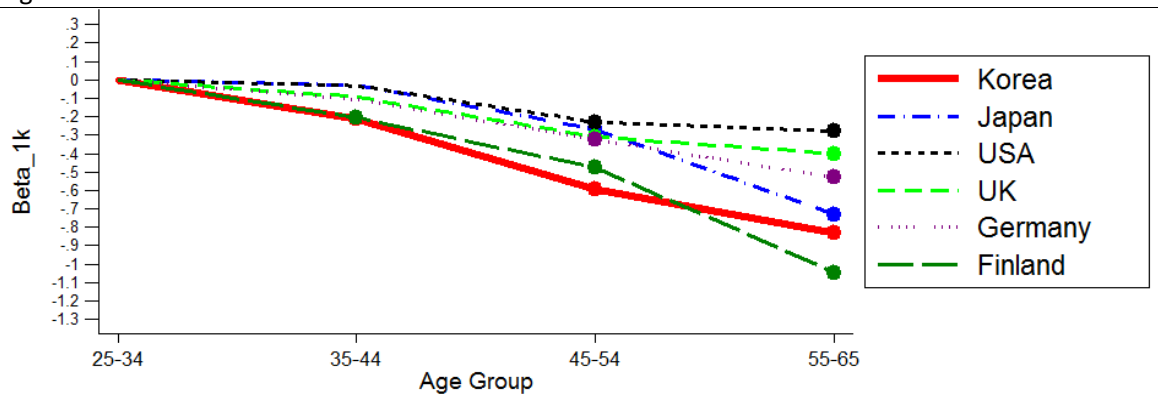


Figure 7.2. Model A2

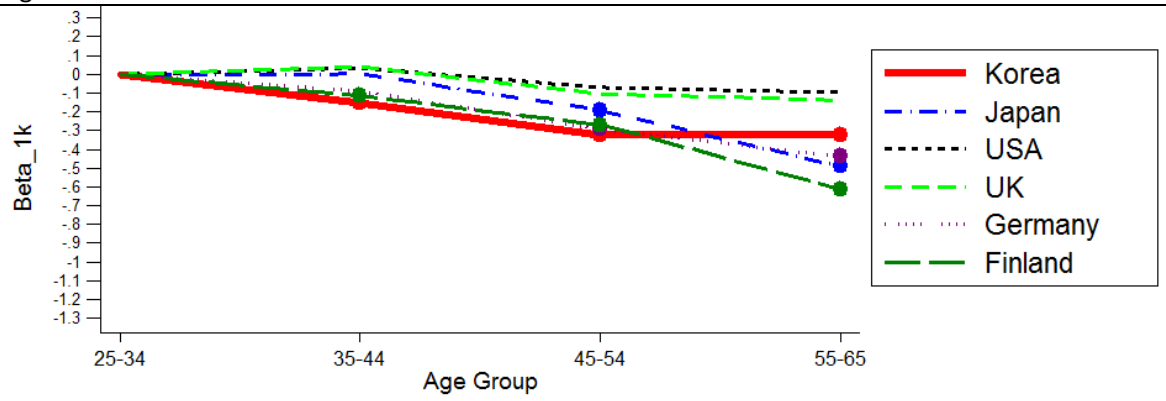
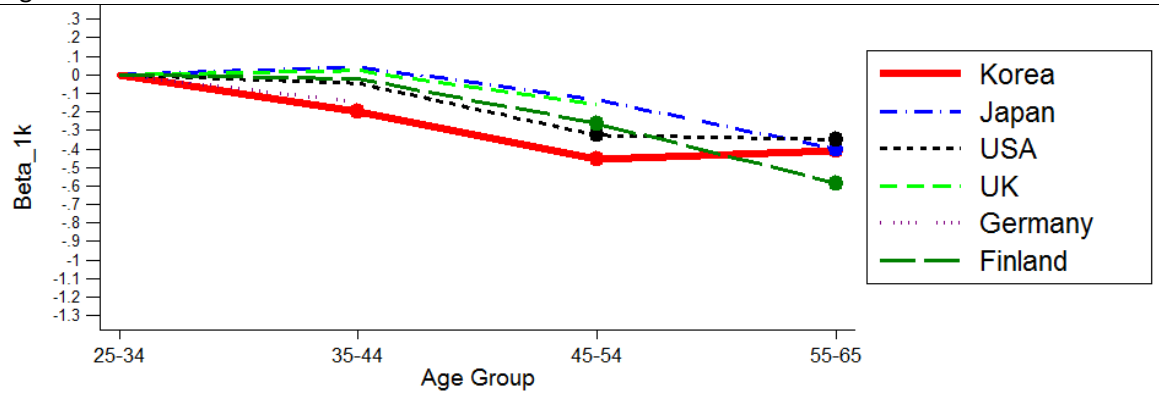


Figure 7.3. Model A3



Source: Authors' calculation from PIAAC

Figure 8. Age Profile of PIAAC PSTRE Score

Figure 8.1. Model A1

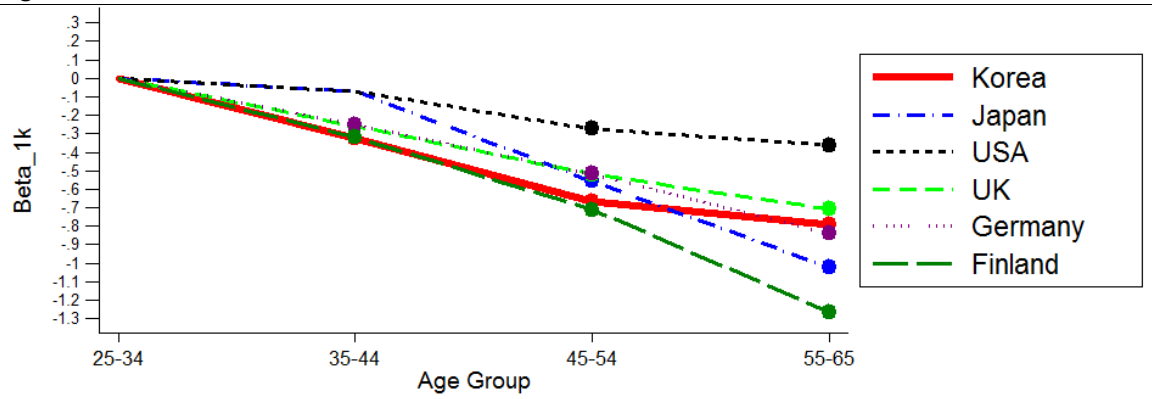


Figure 8.2. Model A2

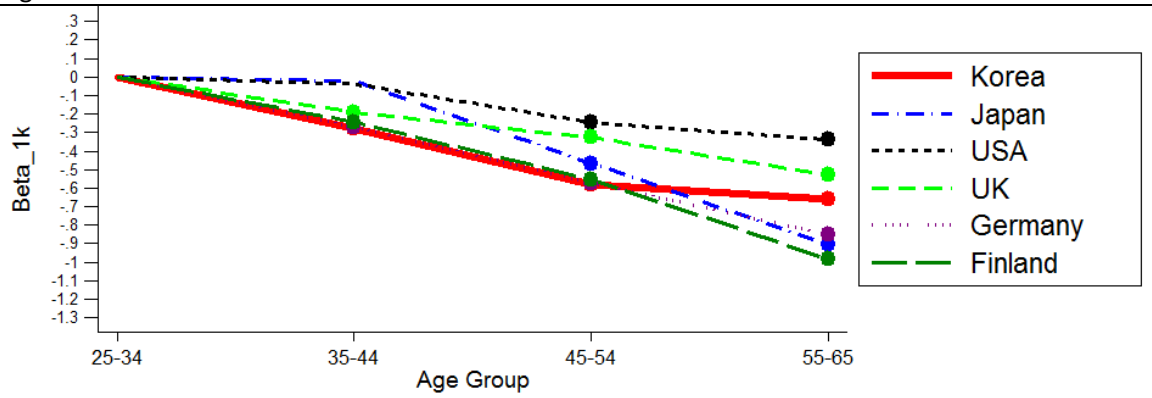
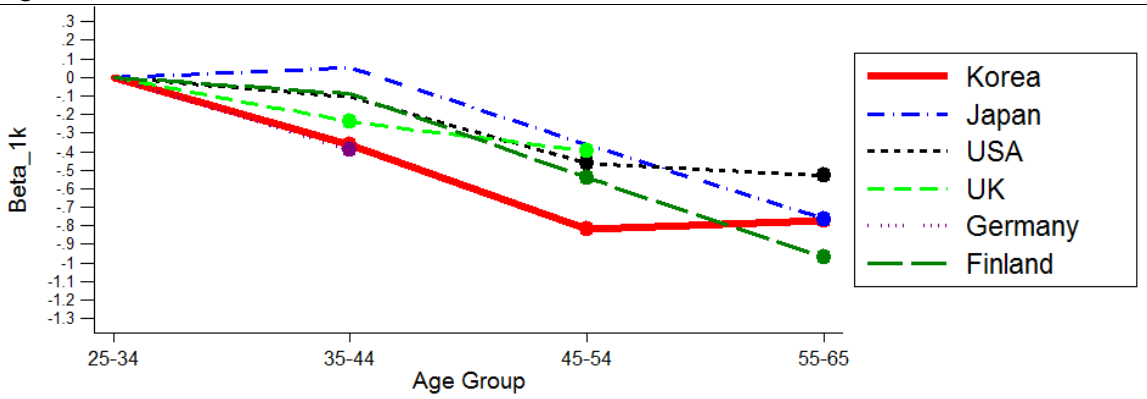


Figure 8.3. Model A3



Source: Authors' calculation from PIAAC

The population of our sample is the main body of the workforce. For them, skill acquisition is important also at the work place. Therefore, there may well be somewhat important effects on the skill accumulation due to the differences in learning environments and incentives at the work place. In PIAAC data, there are three critical variables that are related to this learning aspect of workers from the work organization point of view. They are(i) 'readiness to learn,'(ii) 'task discretion at work,' and (iii) 'learning at work' indices.[8]The 'readiness to learn'index measures how enthusiastic the worker is about learning.The 'task discretion'index measures the degree of worker's own discretion in performing the assigned job task. The 'learning at work'index measures how active skill accumulation activities are at work.

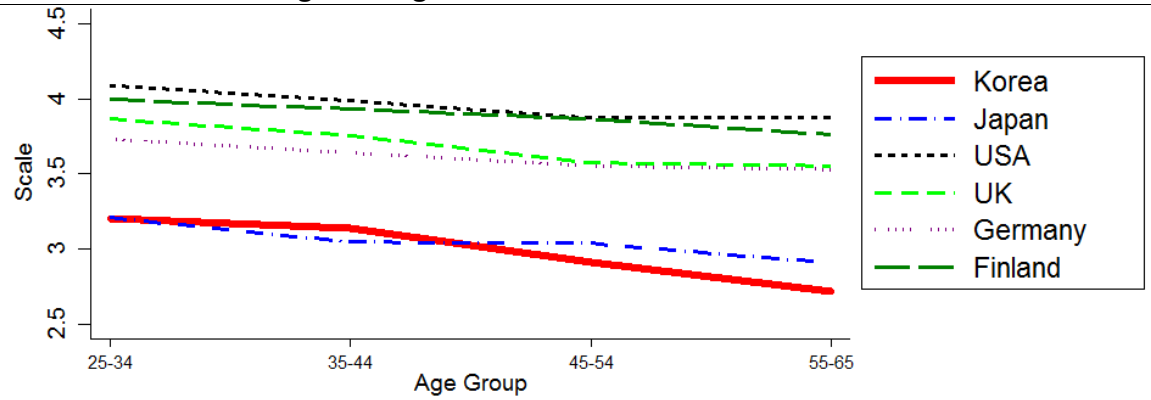
Figures 9 to 11 display the age profiles of the above three on-the-job learning indices of the 6 countries including Korea. The readiness to learn and learning at work indices

[8](i) 'Readiness to learn' index is a summative rating of the following set of questions:
To what extent do the following statement apply to you?
- When I hear or read about new ideas, I try to relate them to real life situations to which they might apply.
- I like learning new things.
- When I come across something new, I try to relate it to what I already know.
- I like to get to the bottom of difficult things.
- I like to figure out how different ideas fit together.
- If I don't understand something, I look for additional information to make it clearer.
(ii) 'Task discretion' index is a summative rating of the following set of questions:
To what extent can you choose or change:
- the sequence of your tasks?
- how you do your work?
- the speed or rate at which you work?
Answers to the above questions are in scale from 1 to 5: 1 Not at all, 2 Very little, 3 To some extent, 4 To a high extent, 5 To a very high extent.
(iii) 'Learning at work' index is a summative rating of the following set of questions:
- How often do you learn new work-related things from co-workers or supervisors?
- How often does your job involve learning-by-doing from the tasks you perform?
- How often does your job involve keeping up to date with new products or services?
The questions are answered in scale from 1 to 5: 1 Never, 2 Less than once a month, 3 Less than once a week, 4 At least once a week, 5 Everyday.

decline with aging for all six countries. The age profile of task discretion is moderately hump-shaped, peaking either around 35-44 age group (for Korea, USA, and UK) or around 45-54 age group (for Japan). The task discretion index slightly decreases with aging in Finland, but increases with aging in Germany.

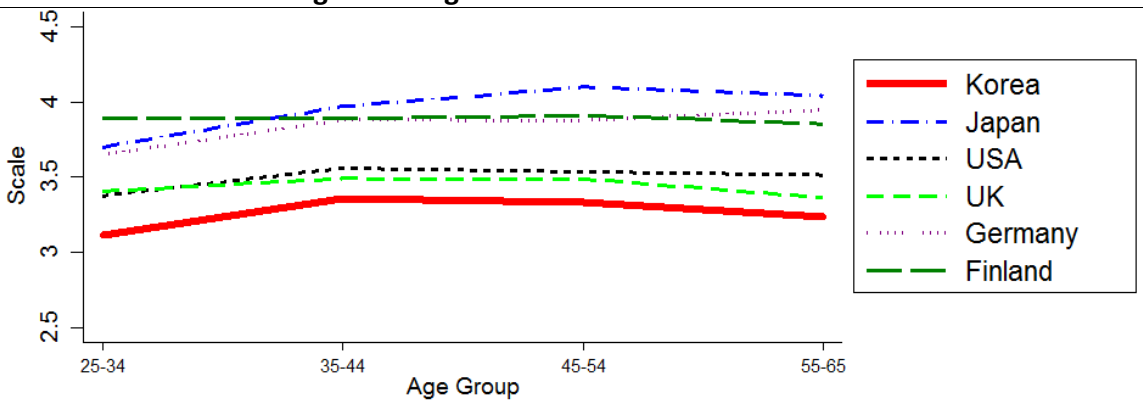
Strikingly, Korea's learning indices are the lowest among the six countries virtually for all age groups and for all three kinds of indices. That is, the on-the-job learning is very weak in Korean work place, although Korea emphasizes education so much during schooling years. This clearly indicates a serious problem from the perspective of national human capital building. Furthermore, the declining speed of the readiness to learn and learning at work indices is the fastest in Korea among the comparison countries.

Figure 9. Age Profile of Readiness to Learn Index



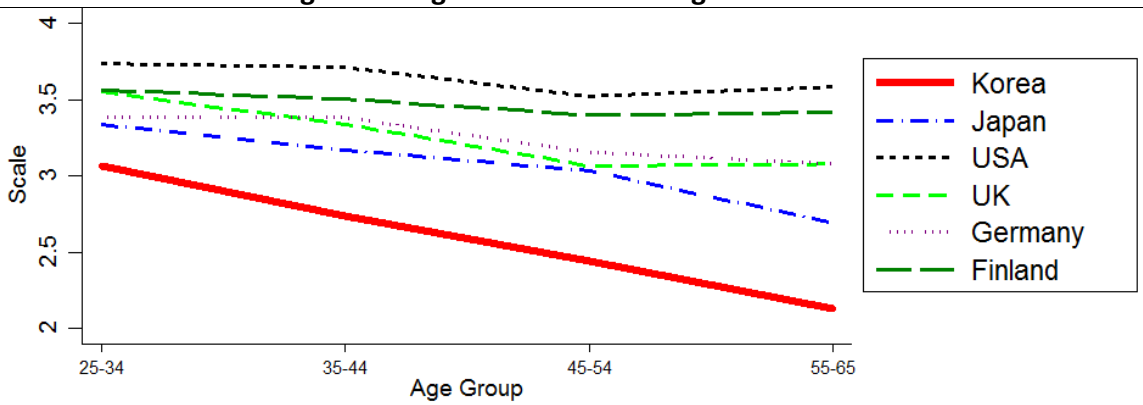
Source: PIAAC

Figure 10. Age Profile of Task Discretion Index



Source: PIAAC

Figure 11. Age Profile of Learning at Work Index



Source: PIAAC

Given the above cross-country differences in the age profile of the on-the-job learning indices, we estimate another three regression models by adding theabove three on-the-job learning variables to the previous Models A1, A2, and A3, calling them Models B1, B2, and B3, the equations of which are expressed in (B1), (B2), and (B3), respectively, as follows.

$$\begin{aligned}\text{Std(Skill)}_{\text{ik}} = {} & \beta_{0k} + \beta_{1k} AgeGrp \\ & + \beta_{7k} Ready + \beta_{8k} Task + \beta_{9k} LearnWork \\ & + \epsilon_{ik}\end{aligned} \tag{B1}$$

$$\begin{aligned}\text{Std(Skill)}_{\text{ik}} & \\ = {} & \beta_{0k} + \beta_{1k} AgeGrp + \beta_{2k} RespEdu \\ & + \beta_{3k} PntEdu \\ & + \beta_{4k} Books16 + \beta_{5k} CompUse \\ & + \beta_{7k} Ready + \beta_{8k} Task + \beta_{9k} LearnWork \\ & + \epsilon_{ik}\end{aligned} \tag{B2}$$

$$\begin{aligned}\text{Std(Skill)}_{\text{ik}} & \\ = {} & \beta_{0k} + \beta_{1k} AgeGrp \\ & + \beta_{2k} RespEdu \beta_{3k} PntEdu \\ & + \beta_{4k} Books16 + \beta_{5k} CompUse \\ & + \beta_{6k} TPRatio \\ & + \beta_{7k} Ready + \beta_{8k} Task + \beta_{9k} LearnWork \\ & + \epsilon_{ik}\end{aligned} \tag{B3}$$

Full estimation results of Models B1to B3 for Korea are reported in Tables 3 to 5, in comparison with the Models A1 to A3 results. For the comparison countries, full estimation results of Models B1to B3 are similarly reported in Tables A.1 to A.15 in Appendix.

It turns out that the most influential variable on the skill formation isthe 'readiness to learn' variable, whichhas statistically significant positive impacts on skills consistentlyfor all three types of skills and for all estimation models. The 'task discretion' variable is also important for numeracy and literacy skills but not for the PSTRE. The 'learning at work' variable does not show meaningful effects on skills, except numeracy and PSTRE skills in ModelB1.[9]Therefore, it is indeed possible that learning variables, particularly via readiness to learn, would affect the age profile of skill formation.[10]

Figures 12 to 14 illustrate the estimated age-skill profiles of the six countries from Models B1, B2 and B3for the numeracy, literacy and PSTRE, respectively. Let's focus on the age-skill profiles estimated from the most extensive regression model, Model B3, which are displayed in Figures 12.3, 13.3, and 14.3. These figures clearly show that the main features that we found from the Model A3 remain the same. In fact they are reinforced in a sense that the differences of Korean age-skill profiles from other comparison countries become

[9]The weak significance of the 'learning at work' index may be due to the tight correlation among the three on-the-job learning indices. Thus, we check the possibility of multi-collinearity among the three learning indices by performing the pairwise correlation analysis and variance influence factor analysis and found no such concerns.The pairwise correlation matrix and variance influence factors are provided in Tables A.16 and A.17 in Appendix.

[10]However, the item "likes to learn new things" asked as a part of readiness to learn index may reflect characteristics formed during earlier years of education, not necessarily influenced by the incentives in the labor market or organizational structure of work places after labor market entry. Therefore, the possibility of aging effect of learning needs to be carefully interpreted when using these learning indices.

more salient. That is, the decreases in skills are monotonic and the steepest in Korea for the age range [25, 54] and the skill levels either remain constant or slightly increase afterward. These patterns apply to all three different types of skills of numeracy, literacy, and PSTRE, which may indicate that such rapid fall in skills for Korea's prime-age workers (distinct from other countries) is not likely to be related with micro-level job characteristics, but likely to be related with some macro factors such as education system or work practice and corporate culture. However, this simply is a tentative inference, which would require deeper empirical analyses with more extensive data to confirm.

Figure 12. Age Profile of PIAAC Numeracy Score with Learning Indices

Figure 12.1. Model B1

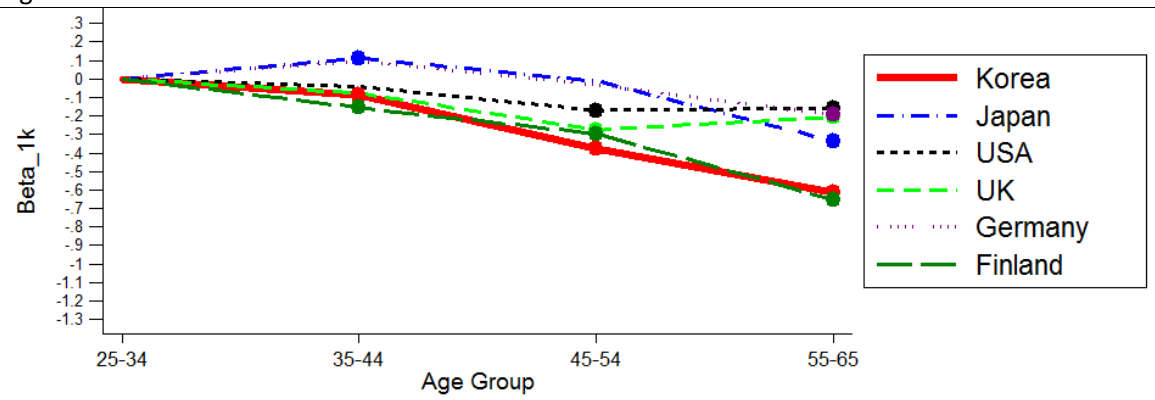


Figure 12.2. Model B2

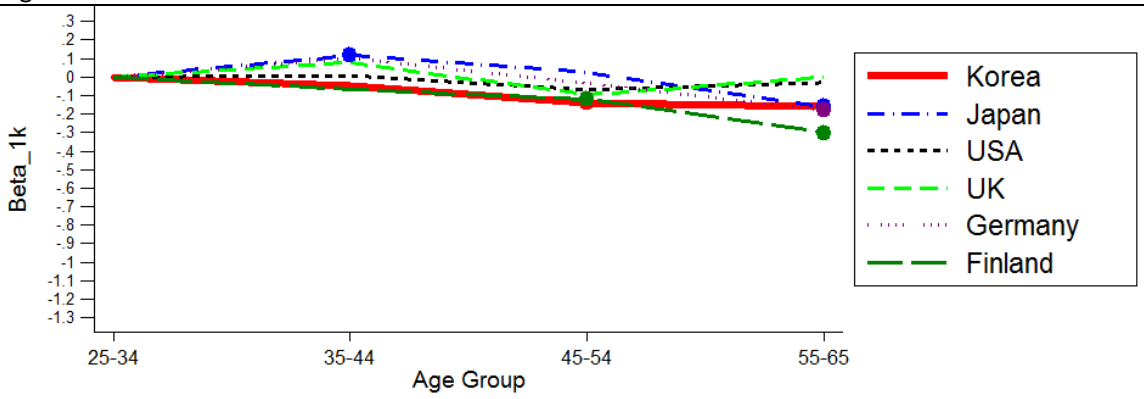
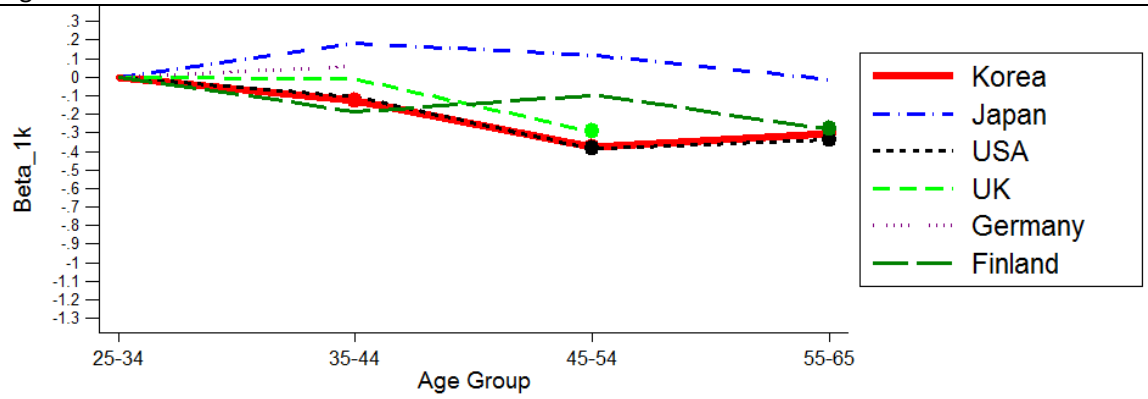


Figure 12.3. Model B3



Source: Authors' calculation from PIAAC

Figure 13. Age Profile of PIAAC Literacy Score with Learning Indices

Figure 13.1. Model B1

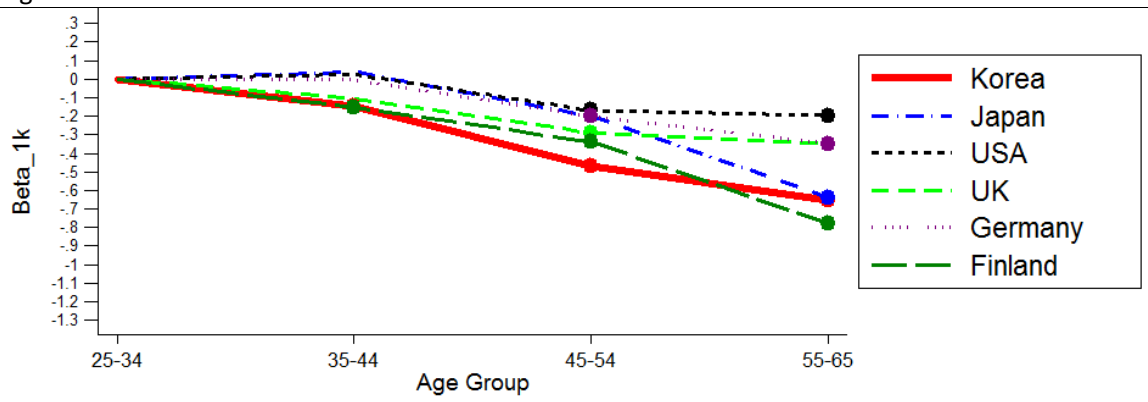


Figure 13.2. Model B2

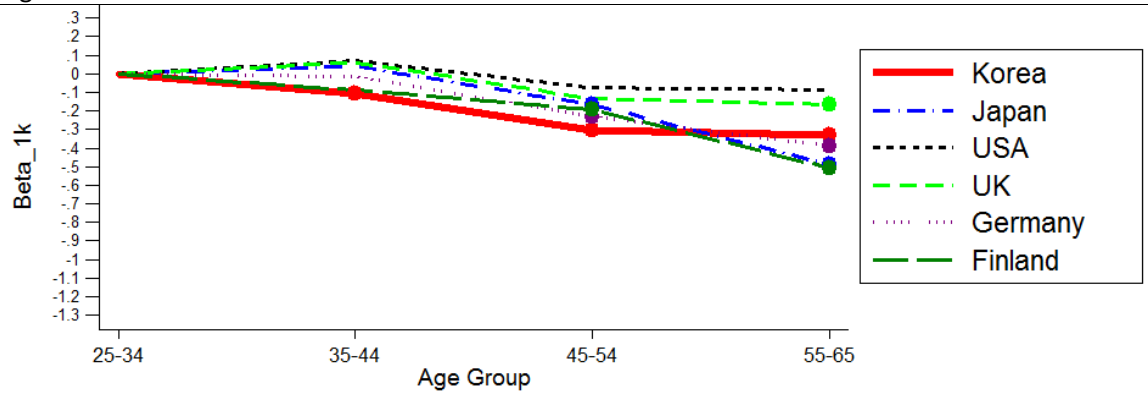
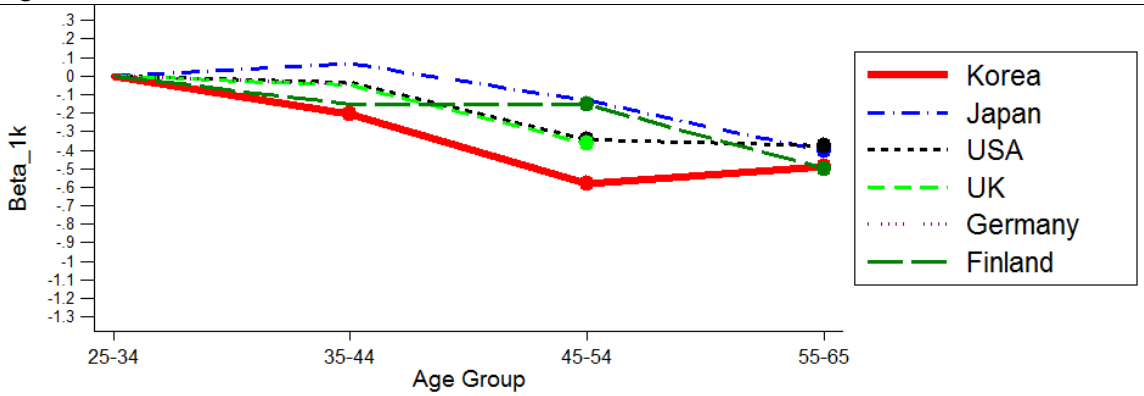


Figure 13.3. Model B3



Source: Authors' calculation from PIAAC

Figure 14. Age Profile of PIAAC PSTRE Score with Learning Indices

Figure 14.1. Model B1

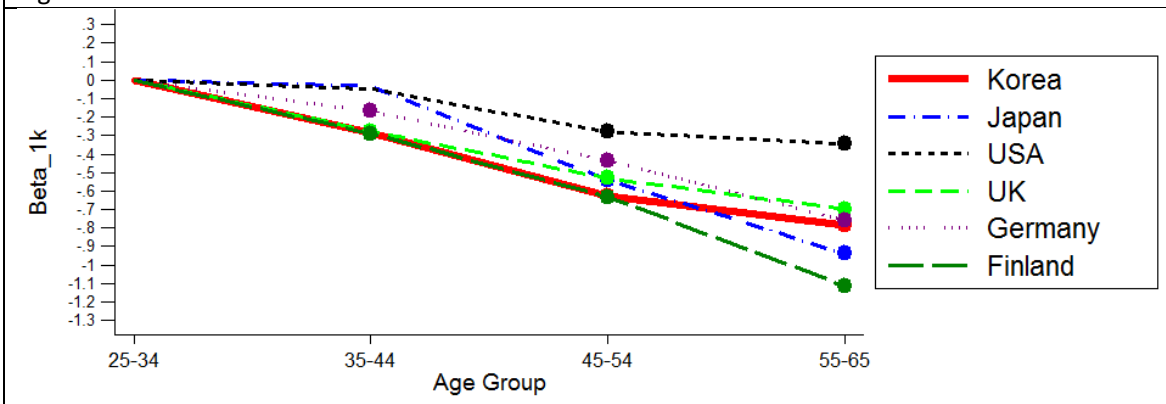


Figure 14.2. Model B2

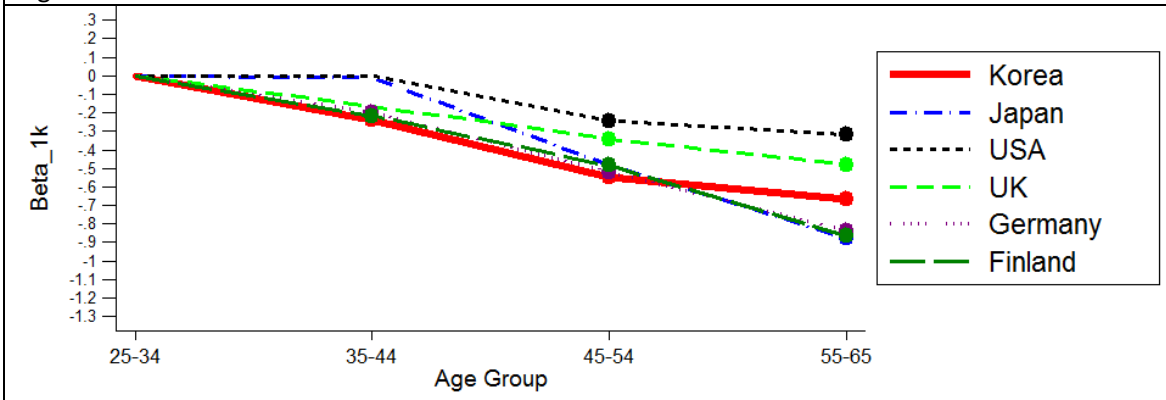
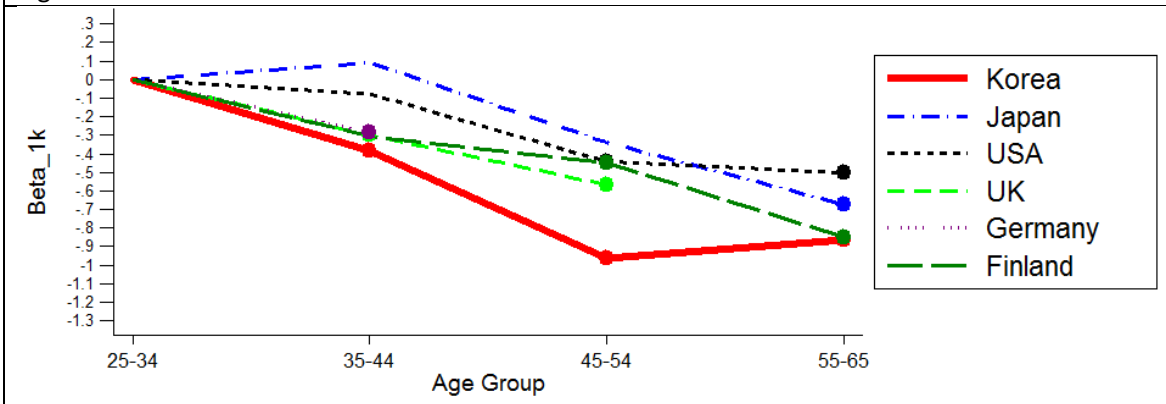


Figure 14.3. Model B3



Source: Authors' calculation from PIAAC

Table 3. Results of PIAAC Numeracy Score Regression for Korea

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.149***	-0.086*	-0.092*	-0.046	-0.132**	-0.127*
		(0.052)	(0.051)	(0.050)	(0.052)	(0.064)	(0.070)
	45-54	-0.502***	-0.376***	-0.165***	-0.139***	-0.280**	-0.375***
		(0.046)	(0.048)	(0.051)	(0.052)	(0.123)	(0.137)
	55-65	-0.784***	-0.613***	-0.150**	-0.162**	-0.238**	-0.305**
		(0.056)	(0.066)	(0.065)	(0.073)	(0.115)	(0.127)
RspEdu	2			0.502***	0.429***	0.620***	0.611***
				(0.059)	(0.062)	(0.131)	(0.142)
	3			0.875***	0.794***	1.025***	1.039***
				(0.061)	(0.064)	(0.157)	(0.166)
PntEdu	2			0.034	0.023	0.030	0.020
				(0.044)	(0.045)	(0.044)	(0.045)
	3			0.122**	0.106**	0.124**	0.109**
				(0.053)	(0.050)	(0.054)	(0.051)
Books16				0.078***	0.062***	0.075***	0.060***
				(0.014)	(0.015)	(0.015)	(0.015)
CompUse				0.383***	0.317***	0.378***	0.327***
				(0.046)	(0.050)	(0.048)	(0.052)
TPRatio						0.007	0.014*
						(0.007)	(0.008)
Ready			0.208***		0.092***		0.084***
			(0.019)		(0.019)		(0.019)
Task			0.072***		0.028*		0.028*
			(0.017)		(0.015)		(0.016)
LearnWork			0.039**		-0.016		-0.027
			(0.020)		(0.018)		(0.018)
R2		0.117	0.188	0.353	0.345	0.297	0.291
N		2,584	2,277	2,552	2,254	2,309	2,065

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Results of PIAAC Literacy Score Regression for Korea

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.209***	-0.144***	-0.155***	-0.109**	-0.197***	-0.203**
		(0.054)	(0.056)	(0.052)	(0.055)	(0.074)	(0.081)
	45-54	-0.594***	-0.467***	-0.327***	-0.304***	-0.453***	-0.582***
		(0.051)	(0.056)	(0.056)	(0.060)	(0.159)	(0.164)
	55-65	-0.834***	-0.652***	-0.321***	-0.330***	-0.407***	-0.488***
		(0.059)	(0.063)	(0.070)	(0.072)	(0.131)	(0.134)
RspEdu	2			0.556***	0.476***	0.669***	0.680***
				(0.067)	(0.067)	(0.152)	(0.155)
	3			0.947***	0.846***	1.093***	1.123***
				(0.067)	(0.067)	(0.179)	(0.177)
PntEdu	2			0.087**	0.065	0.085*	0.064
				(0.043)	(0.043)	(0.044)	(0.044)
	3			0.154***	0.122**	0.157***	0.126**
				(0.054)	(.056)	(0.055)	(0.057)
Books16				0.089***	0.065***	0.085***	0.063***
				(0.016)	(0.017)	(0.017)	(0.017)
CompUse				0.065	-0.023	0.059	-0.011
				(0.045)	(0.047)	(0.046)	(0.049)
TPRatio						0.008	0.017*
						(0.009)	(0.009)
Ready			0.219***		0.130***		0.120***
			(0.020)		(0.019)		(0.020)
Task			0.076***		0.043***		0.041**
			(0.016)		(0.015)		(0.016)
LearnWork			0.033		-0.008		-0.018
			(0.021)		(0.019)		(0.019)
R2		0.131	0.202	0.313	0.315	0.26	0.263
N		2,584	2,277	2,552	2,254	2,309	2,065

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Results of PIAAC PSTRE Score Regression for Korea

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.322***	-0.282***	-0.281***	-0.240***	-0.362***	-0.380***
		(0.057)	(0.060)	(0.057)	(0.061)	(0.081)	(0.085)
	45-54	-0.667***	-0.624***	-0.581***	-0.547***	-0.820***	-0.963***
		(0.075)	(0.081)	(0.078)	(0.084)	(0.177)	(0.192)
	55-65	-0.792***	-0.784***	-0.657***	-0.666***	-0.771***	-0.861***
		(0.097)	(0.101)	(0.100)	(0.102)	(0.127)	(0.132)
RspEdu	2			0.229	0.203	0.455**	0.597***
				(0.140)	(0.148)	(0.203)	(0.210)
	3			0.644***	0.627***	0.921***	1.108***
				(0.131)	(0.139)	(0.234)	(0.243)
PntEdu	2			0.107**	0.084	0.106*	0.083
				(0.054)	(0.054)	(0.054)	(0.055)
	3			0.206***	0.159**	0.206***	0.156**
				(0.067)	(0.067)	(0.069)	(0.069)
Books16				0.068***	0.043**	0.066***	0.041*
				(0.021)	(0.021)	(0.021)	(0.021)
CompUse							
TPRatio						0.015	0.026**
						(0.011)	(0.011)
Ready			0.205***		0.144***		0.154***
			(0.031)		(0.029)		(0.029)
Task			0.029		0.005		0.005
			(0.024)		(0.024)		(0.025)
LearnWork			0.057*		0.028		0.025
			(0.029)		(0.029)		(0.029)
R2		0.112	0.156	0.223	0.243	0.215	0.239
N		1,708	1,558	1,694	1,547	1,665	1,521

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

5. Conclusion

It is well-known that Korean young students' performance has been truly outstanding in the international academic competency test such as PISA. Recently OECD collected another survey PIAAC for the purpose of comparing international competency of the adult population skills in terms of numeracy, literacy and problem-solving in technology-rich environment among OECD member and partnership countries. In the first round of the PIAAC(theyear 2011-2012 period), the youngest cohort (17-19age group) of Koreansindeed achieved similar top performance as in PISA. However, the Korean skill scores in PIAAC drop significantly for the 20-22 age group, and remain off the trend until the age 28. Furthermore, from the full estimation of the age-skill profiles of the main body of the workforce (age 25-65 male native workers) controlling for the educational variables (in terms of both achievement and environment) as well as the on-the-job learning variables, we found that the Korean workers' skill levels fall sharply from age 25 to age 54, i.e. during the prime time of the work life cycle, compared with other major OECD members such as Japan, Germany, USA, UK and Finland. We found that such declining skills with aging is mainly due to the drop of skill levels between the [25,34] and [35,44] age groups, while the skill levels are either maintained or increasing in the above comparison countries.

A surprising part of our findings is that such steeply decreasing patterns of Korean age-skill profiles remain robust after we control for the cohort effects by conditioning on the rich set of socioeconomic variables and cohort-specific educational environments variables. That is, such patterns are very likely to be the age effects rather than the cohort effects.

Although we cannot establish the rigorous causality about what are behind such patterns in this paper because of the lack of the required data to do so, we utilize other sources of data and background knowledge about Korean economy to argue that the most plausible reasons behind such puzzling shape of the Korean age-skill profiles seem to be related with the educational system and the work practice and corporate culture at the work places. For example, the over-emphasis on improving academic achievement during the short time span (hence relying on rote learning) and the quality problem of university education can be the reasons behind such skill deterioration, i.e. from stars to mediocre as workers get aged. Furthermore, we found that for the learning variables such as readiness to learn, task discretion and the learning at work that would affect the learning environments and incentives of the workers at the work place, the level of Korean worker's learning belongs to the bottom group among OECD members for every learning index and for all age groups. There seem to be serious problems in on-the-job learning among Korean workers either because of the earlier experience of schooling or because of the Korean culture and the structure of work organization at work sites.

If there are indeed unusual aging effects in skill formation in Korea, as the results of this paper suggest, Korean education system and the corporate organizational culture of Korean firms need to be under serious scrutiny and the reforms about those issues must be prioritized by the policymakers.If such problems continue to prevail in Korean education system and labor market, they would critically damage the national human capital formation and hence the long-run growth potentials of Korean economy. Recently, there

are concernsabout Korean economy's slowdown and even about the 'zero growth' because of the demographiccompositional changes in the workforce population. Although important part of the slowdown is part of the natural process of development approaching toward the steady state, it is also possible that improvement in human capital formation and the enhancing the institutional factors in education and labor market system would promote the long-run growth. However, if policy and institutional reforms to fix the above problems are not performed, Korean economy may actually slip into the zero growth steady state and be trapped there.

Finally, this paper invites future studies and data collection which would establish rigorous causal inferences to identify whither the reforms about Korean education system and organizational work practices should go.

Bibliography

Lee, Ju-Ho, HyeokJeong and Seongchang Hong (2014), “Is Korea Number One in Human Capital Accumulation?: Education Bubble Formation and its Labor Market Evidence.” *KDI School Working Paper Series* 14-03. http://ssrn.com/abstract=2476160.

Lee, Ju-Ho, and Yong-seong Kim (2014),*A New Direction in Human Capital Policies for Korea*.KDI, 2014 (in Korean).

Korea Research Institute for Vocational Education and Training. *2014 Conference on PIAAC*. Seoul National University, Seoul, Korea, August 28, 2014. Sejong: Korea Research Institute for Vocational Education and Training, 2014.

Fuchs, Thomas, and LudgerWoessmann (2004), “What Accounts for International Differences in Student Performance? A Re-examination using PISA Data." *IZA Discussion Papers* 1287. Institute for the Study of Labor (IZA).

Hanushek, Eric A., Guido Schwerdt, Simon Wiederhold, and LudgerWoessmann. “Returns to Skills around the World: Evidence from PIAAC.” *European Economic Review* 73 (2015): 103-130.

Mincer, Jacob (1974),*Schooling, Experience, and Earnings*. National Bureau of Economic Research, Inc. Books. 1974.

OECD (2013 a),*Technical Report of the Survey of Adult Skills*. OECD Publishing. http://www.oecd.org/site/piaac/_Technical%20Report_17OCT13.pdf.

OECD (2013 b),*The Survey of Adult Skills: Reader's Companion*. OECD Publishing. http://dx.doi.org/10.1787/9789264204027-en.

OECD (2013 c),*OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*. OECD Publishing. http://dx.doi.org/10.1787/9789264204256-en. OECD.

UNESCO (2015), UNESCO Statistics,http://stats.uis.unesco.org (Last accessed August 24 2015).

World Competitiveness Online (2015),https://worldcompetitiveness.imd.org (Last accessed August 19 2015).

Appendix

Table A.1Results of PIAAC Numeracy Score Regression for Japan

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	0.055	0.112**	0.089*	0.116**	0.177	0.182
		(0.055)	(0.054)	(0.053)	(0.050)	(0.127)	(0.129)
	45-54	-0.073	-0.011	0.012	0.026	0.135	0.119
		(0.063)	(0.065)	(0.059)	(0.061)	(0.180)	(0.186)
	55-65	-0.410***	-0.337***	-0.134**	-0.162**	0.039	-0.013
		(0.060)	(0.070)	(0.064)	(0.064)	(0.215)	(0.216)
RspEdu	2			0.413***	0.394***	0.050	0.079
				(0.080)	(0.076)	(0.385)	(0.386)
	3			0.840***	0.799***	0.246	0.313
				(0.084)	(0.083)	(0.709)	(0.713)
PntEdu	2			0.039	0.013	0.034	0.010
				(0.047)	(0.051)	(0.047)	(0.051)
	3			0.108*	0.073	0.102*	0.068
				(0.060)	(0.067)	(0.060)	(0.066)
Books16				0.071***	0.062***	0.071***	0.062***
				(0.016)	(0.016)	(0.016)	(0.016)
CompUse				0.279***	0.211***	0.263***	0.198***
				(0.052)	(0.055)	(0.054)	(0.056)
TPRatio						-0.038	-0.029
						(0.053)	(0.053)
Ready			0.288***		0.157***		0.154***
			(0.033)		(0.030)		(0.028)
Task			0.042*		0.016		0.013
			(0.023)		(0.022)		(0.022)
LearnWork			0.002		-0.029		-0.028
			(0.024)		(0.024)		(0.025)
R2		0.049	0.126	0.257	0.272	0.206	0.221
N		2,058	1,871	1,916	1,748	1,820	1,669

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.2Results of PIAAC Numeracy Score Regression for USA

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.092	-0.041	-0.016	0.007	-0.108	-0.106
		(0.079)	(0.082)	(0.067)	(0.077)	(0.075)	(0.088)
	45-54	-0.243***	-0.170**	-0.052	-0.068	-0.380***	-0.386***
		(0.078)	(0.078)	(0.074)	(0.082)	(0.130)	(0.133)
	55-65	-0.244***	-0.157*	-0.027	-0.030	-0.318***	-0.337***
		(0.080)	(0.083)	(0.075)	(0.085)	(0.118)	(0.130)
RspEdu	2			0.536***	0.596***	0.474***	0.563***
				(0.080)	(0.104)	(0.125)	(0.138)
	3			1.188***	1.212***	1.301***	1.335***
				(0.103)	(0.126)	(0.147)	(0.156)
PntEdu	2			0.263***	0.172*	0.252***	0.063
				(0.080)	(0.101)	(0.090)	(0.111)
	3			0.418***	0.294***	0.395***	0.168
				(0.085)	(0.107)	(0.093)	(0.111)
Books16				0.090***	0.099***	0.084***	0.087***
				(0.024)	(0.025)	(0.024)	(0.027)
CompUse				0.660***	0.617***	0.593***	0.513***
				(0.075)	(0.104)	(0.086)	(0.111)
TPRatio						0.069***	0.075***
						(0.019)	(0.021)
Ready			0.210***		0.037		0.048
			(0.053)		(0.045)		(0.050)
Task			0.160***		0.053		0.075**
			(0.032)		(0.034)		(0.033)
LearnWork			-0.069**		-0.085***		-0.078**
			(0.035)		(0.031)		(0.036)
R2		0.010	0.058	0.360	0.332	0.325	0.302
N		1,596	1,278	1,524	1,236	1,250	1,030

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.3Results of PIAAC Numeracy Score Regression for UK

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.069	-0.076	0.061	0.079	0.068	-0.010
		(0.089)	(0.096)	(0.089)	(0.095)	(0.113)	(0.120)
	45-54	-0.302***	-0.275***	-0.054	-0.096	-0.065	-0.294*
		(0.076)	(0.083)	(0.078)	(0.083)	(0.147)	(0.175)
	55-65	-0.296***	-0.206**	0.025	0.000	※	※
		(0.078)	(0.085)	(0.085)	(0.092)		
RspEdu	2			0.408***	0.345***	0.562**	0.175
				(0.084)	(0.092)	(0.219)	(0.263)
	3			0.792***	0.632***	0.925***	0.626***
				(0.087)	(0.100)	(0.133)	(0.162)
PntEdu	2			0.212***	0.242***	0.272***	0.265***
				(0.067)	(0.073)	(0.081)	(0.088)
	3			0.326***	0.354***	0.384***	0.393***
				(0.088)	(0.095)	(0.112)	(0.120)
Books16				0.121***	0.100***	0.095***	0.079***
				(0.019)	(0.020)	(0.025)	(0.026)
CompUse				0.660***	0.424***	0.592***	0.395***
				(0.085)	(0.094)	(0.134)	(0.150)
TPRatio						0.001	-0.025
						(0.021)	(0.024)
Ready			0.387***		0.209***		0.193***
			(0.054)		(0.049)		(0.060)
Task			0.098***		0.052*		0.065*
			(0.032)		(0.031)		(0.038)
LearnWork			-0.045*		-0.083***		-0.075**
			(0.026)		(0.027)		(0.035)
R2		0.017	0.120	0.328	0.300	0.332	0.300
N		2,833	2,089	2,327	1,724	1,473	1,224

Note:

1) ( ) includes standard errors calculated by jackknife method.

2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

3) ※indicates variables that were automatically omitted due to lack of information on teacher-to-pupil ratio.

Table A.4Results of PIAAC Numeracy Score Regression for Germany

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	0.002	0.097	0.036	0.102	-0.038	0.059
		(0.078)	(0.086)	(0.073)	(0.078)	(0.101)	(0.100)
	45-54	-0.143**	-0.031	-0.079	-0.033	※	※
		(0.066)	(0.069)	(0.057)	(0.058)		
	55-65	-0.354***	-0.194**	-0.197***	-0.180**	※	※
		(0.071)	(0.086)	(0.077)	(0.088)		
RspEdu	2			0.589***	0.510***	0.768***	0.730***
				(0.116)	(0.135)	(0.208)	(0.258)
	3			1.102***	0.997***	1.386***	1.284***
				(0.120)	(0.141)	(0.228)	(0.268)
PntEdu	2			0.219**	0.230**	0.324*	0.347*
				(0.095)	(0.101)	(0.183)	(0.188)
	3			0.333***	0.337***	0.504**	0.555***
				(0.103)	(0.107)	(0.196)	(0.198)
Books16				0.078***	0.077***	0.080***	0.073***
				(0.017)	(0.016)	(0.024)	(0.023)
CompUse				0.631***	0.428***	0.731***	0.537***
				(0.080)	(0.077)	(0.186)	(0.140)
TPRatio						※	※
Ready			0.304***		0.147***		0.172**
			(0.045)		(0.041)		(0.076)
Task			0.117***		0.061**		0.012
			(0.027)		(0.024)		(0.045)
LearnWork			0.064**		-0.030		-0.023
			(0.030)		(0.026)		(0.045)
R2		0.022	0.103	0.306	0.297	0.272	0.304
N		1,845	1,574	1,727	1,486	667	593

Note:

1) ( ) includes standard errors calculated by jackknife method.

2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

3) ※indicates variables that were automatically omitted due to lack of information on teacher-to-pupil ratio.

Table A.5Results of PIAAC Numeracy Score Regression for Finland

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.192***	-0.155**	-0.081	-0.066	-0.108	-0.186
		(0.068)	(0.065)	(0.063)	(0.062)	(0.281)	(0.313)
	45-54	-0.406***	-0.296***	-0.165***	-0.120*	-0.157**	-0.097
		(0.055)	(0.060)	(0.059)	(0.065)	(0.072)	(0.081)
	55-65	-0.843***	-0.653***	-0.337***	-0.301***	-0.317***	-0.280***
		(0.063)	(0.069)	(0.070)	(0.073)	(0.078)	(0.082)
RspEdu	2			0.354***	0.401***	0.337***	0.366***
				(0.072)	(0.090)	(0.113)	(0.130)
	3			0.956***	0.939***	0.958***	0.951***
				(0.079)	(0.099)	(0.127)	(0.145)
PntEdu	2			0.070	0.063	0.080	0.072
				(0.044)	(0.048)	(0.056)	(0.063)
	3			0.167**	0.181**	0.214**	0.218**
				(0.070)	(0.080)	(0.088)	(0.100)
Books16				0.077***	0.061***	0.071***	0.056**
				(0.017)	(0.020)	(0.020)	(0.023)
CompUse				0.437***	0.303***	0.469***	0.351***
				(0.062)	(0.078)	(0.077)	(0.098)
TPRatio						-0.001	-0.001
						(0.013)	(0.016)
Ready			0.321***		0.149***		0.110**
			(0.043)		(0.042)		(0.047)
Task			0.059*		0.026		0.039
			(0.031)		(0.028)		(0.034)
LearnWork			0.005		-0.025		0.000
			(0.033)		(0.034)		(0.040)
R2		0.116	0.125	0.325	0.289	0.270	0.251
N		2,206	1,715	2,157	1,683	1,432	1,093

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.6Results of PIAAC Literacy Score Regression for Japan

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.028	0.039	0.002	0.041	0.043	0.067
		(0.053)	(0.055)	(0.052)	(0.054)	(0.129)	(0.123)
	45-54	-0.268***	-0.198***	-0.191***	-0.167***	-0.136	-0.133
		(0.064)	(0.068)	(0.062)	(0.065)	(0.168)	(0.163)
	55-65	-0.731***	-0.637***	-0.491***	-0.489***	-0.401*	-0.406**
		(0.060)	(0.071)	(0.065)	(0.066)	(0.208)	(0.198)
RspEdu	2			0.308***	0.296***	0.102	0.093
				(0.083)	(0.078)	(0.357)	(0.346)
	3			0.743***	0.703***	0.433	0.438
				(0.090)	(0.087)	(0.660)	(0.648)
PntEdu	2			0.110**	0.080	0.108**	0.078
				(0.049)	(0.051)	(0.049)	(0.051)
	3			0.110*	0.059	0.107*	0.055
				(0.064)	(0.067)	(0.062)	(0.066)
Books16				0.082***	0.073***	0.082***	0.073***
				(0.016)	(0.016)	(0.016)	(0.016)
CompUse				0.135**	0.088	0.125**	0.078
				(0.053)	(0.057)	(0.055)	(0.058)
TPRatio						-0.017	-0.011
						(0.049)	(0.048)
Ready			0.263***		0.156***		0.157***
			(0.029)		(0.026)		(0.025)
Task			0.013		-0.008		-0.009
			(0.022)		(0.021)		(0.021)
LearnWork			-0.010		-0.037		-0.039
			(0.024)		(0.024)		(0.025)
R2		0.126	0.173	0.283	0.287	0.233	0.234
N		2,058	1,871	1,916	1,748	1,820	1,669

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.7Results of PIAAC Literacy Score Regression for USA

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.032	0.026	0.033	0.070	-0.046	-0.035
		(0.080)	(0.085)	(0.071)	(0.083)	(0.078)	(0.092)
	45-54	-0.229***	-0.169**	-0.070	-0.075	-0.326**	-0.343**
		(0.075)	(0.075)	(0.074)	(0.081)	(0.129)	(0.133)
	55-65	-0.278***	-0.196**	-0.097	-0.086	-0.349***	-0.376***
		(0.080)	(0.084)	(0.083)	(0.093)	(0.121)	(0.129)
RspEdu	2			0.512***	0.560***	0.489***	0.576***
				(0.079)	(0.099)	(0.133)	(0.152)
	3			1.130***	1.124***	1.245***	1.276***
				(0.092)	(0.109)	(0.153)	(0.171)
PntEdu	2			0.269***	0.237**	0.242***	0.135
				(0.076)	(0.100)	(0.080)	(0.116)
	3			0.432***	0.365***	0.395***	0.246*
				(0.081)	(0.111)	(0.093)	(0.129)
Books16				0.087***	0.094***	0.084***	0.083***
				(0.026)	(0.028)	(0.027)	(0.030)
CompUse				0.437***	0.394***	0.364***	0.293**
				(0.079)	(0.108)	(0.092)	(0.126)
TPRatio						0.059***	0.070***
						(0.020)	(0.023)
Ready			0.197***		0.045		0.038
			(0.051)		(0.044)		(0.054)
Task			0.170***		0.072**		0.086***
			(0.032)		(0.033)		(0.032)
LearnWork			-0.094***		-0.103***		-0.103**
			(0.035)		(0.034)		(0.040)
R2		0.015	0.068	0.316	0.296	0.276	0.262
N		1,596	1,278	1,524	1,236	1,250	1,030

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.8Results of PIAAC Literacy Score Regression for UK

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.093	-0.104	0.040	0.062	0.023	-0.049
		(0.088)	(0.094)	(0.090)	(0.099)	(0.108)	(0.125)
	45-54	-0.308***	-0.290***	-0.104	-0.134	-0.159	-0.364**
		(0.076)	(0.085)	(0.082)	(0.090)	(0.145)	(0.186)
	55-65	-0.401***	-0.348***	-0.138	-0.164*	※	※
		(0.080)	(0.089)	(0.091)	(0.099)		
RspEdu	2			0.491***	0.451***	0.578***	0.260
				(0.086)	(0.093)	(0.213)	(0.278)
	3			0.842***	0.726***	0.957***	0.721***
				(0.091)	(0.102)	(0.131)	(0.165)
PntEdu	2			0.251***	0.309***	0.327***	0.325***
				(0.070)	(0.074)	(0.091)	(0.092)
	3			0.358***	0.423***	0.439***	0.459***
				(0.098)	(0.104)	(0.118)	(0.124)
Books16				0.113***	0.096***	0.092***	0.082***
				(0.019)	(0.020)	(0.026)	(0.027)
CompUse				0.289***	0.039	0.178	-0.035
				(0.090)	(0.095)	(0.128)	(0.157)
TPRatio						-0.007	-0.030
						(0.020)	(0.024)
Ready			0.337***		0.160***		0.127**
			(0.051)		(0.045)		(0.057)
Task			0.101***		0.064**		0.078**
			(0.033)		(0.031)		(0.038)
LearnWork			-0.047*		-0.075***		-0.067*
			(0.027)		(0.028)		(0.035)
R2		0.024	0.105	0.290	0.289	0.309	0.295
N		2,833	2,089	2,327	1,724	1,473	1,224

Note:

1) ( ) includes standard errors calculated by jackknife method.

2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

3) ※indicates variables that were automatically omitted due to lack of information on teacher-to-pupil ratio.

Table A.9Results of PIAAC Literacy Score Regression for Germany

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.107	-0.004	-0.089	-0.015	-0.148	-0.042
		(0.078)	(0.081)	(0.070)	(0.071)	(0.104)	(0.103)
	45-54	-0.324***	-0.200***	-0.292***	-0.230***	※	※
		(0.065)	(0.070)	(0.054)	(0.058)		
	55-65	-0.529***	-0.347***	-0.439***	-0.388***	※	※
		(0.069)	(0.083)	(0.071)	(0.084)		
RspEdu	2			0.523***	0.436***	0.783***	0.742***
				(0.122)	(0.149)	(0.247)	(0.283)
	3			1.033***	0.942***	1.381***	1.303***
				(0.121)	(0.148)	(0.259)	(0.286)
PntEdu	2			0.233**	0.243**	0.217	0.255
				(0.106)	(0.113)	(0.180)	(0.179)
	3			0.366***	0.366***	0.446**	0.491**
				(0.106)	(0.114)	(0.201)	(0.196)
Books16				0.107***	0.102***	0.093***	0.080***
				(0.020)	(0.019)	(0.027)	(0.027)
CompUse				0.251***	0.056	0.334	0.144
				(0.087)	(0.083)	(0.212)	(0.169)
TPRatio						※	※
Ready			0.351***		0.197***		0.270***
			(0.048)		(0.046)		(0.086)
Task			0.095***		0.039		0.004
			(0.027)		(0.027)		(0.045)
LearnWork			0.055*		-0.030		-0.041
			(0.031)		(0.029)		(0.052)
R2		0.041	0.112	0.269	0.278	0.208	0.255
N		1,845	1,574	1,727	1,486	667	593

Note:

1) ( ) includes standard errors calculated by jackknife method.

2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

3) ※ indicates variables that were automatically omitted due to lack of information on teacher-to-pupil ratio.

Table A.10Results of PIAAC Literacy Score Regression for Finland

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.206***	-0.153**	-0.116*	-0.087	-0.021	-0.152
		(0.067)	(0.065)	(0.061)	(0.061)	(0.336)	(0.360)
	45-54	-0.477***	-0.338***	-0.269***	-0.192***	-0.263***	-0.155**
		(0.052)	(0.056)	(0.059)	(0.061)	(0.072)	(0.079)
	55-65	-1.045***	-0.779***	-0.611***	-0.508***	-0.584***	-0.499***
		(0.064)	(0.070)	(0.076)	(0.084)	(0.080)	(0.088)
RspEdu	2			0.453***	0.469***	0.428***	0.488***
				(0.068)	(0.092)	(0.122)	(0.143)
	3			1.073***	1.009***	1.066***	1.079***
				(0.080)	(0.101)	(0.135)	(0.155)
PntEdu	2			0.077	0.083	0.114*	0.124*
				(0.052)	(0.051)	(0.067)	(0.068)
	3			0.191**	0.206**	0.240**	0.233**
				(0.077)	(0.090)	(0.094)	(0.108)
Books16				0.101***	0.084***	0.090***	0.076***
				(0.017)	(0.020)	(0.020)	(0.023)
CompUse				0.137*	-0.054	0.141*	-0.021
				(0.070)	(0.089)	(0.081)	(0.105)
TPRatio						-0.005	0.001
						(0.015)	(0.017)
Ready			0.368***		0.203***		0.174***
			(0.050)		(0.050)		(0.057)
Task			0.069*		0.034		0.047
			(0.035)		(0.034)		(0.042)
LearnWork			0.006		-0.016		0.012
			(0.034)		(0.035)		(0.043)
R2		0.157	0.157	0.332	0.300	0.267	0.260
N		2,206	1,715	2,157	1,683	1,432	1,093

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.11Results of PIAAC PSTRE Score Regression for Japan

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.070	-0.031	-0.022	-0.011	0.051	0.091
		(0.073)	(0.074)	(0.075)	(0.077)	(0.195)	(0.202)
	45-54	-0.557***	-0.541***	-0.466***	-0.482***	-0.363	-0.340
		(0.084)	(0.084)	(0.090)	(0.088)	(0.274)	(0.279)
	55-65	-1.024***	-0.939***	-0.906***	-0.878***	-0.764**	-0.673*
		(0.099)	(0.107)	(0.104)	(0.111)	(0.335)	(0.349)
RspEdu	2			0.301**	0.306*	-0.007	-0.127
				(0.152)	(0.158)	(0.599)	(0.601)
	3			0.733***	0.732***	0.220	0.018
				(0.147)	(0.156)	(1.072)	(1.085)
PntEdu	2			0.054	-0.005	0.040	-0.024
				(0.094)	(0.096)	(0.093)	(0.096)
	3			0.203**	0.140	0.189**	0.120
				(0.095)	(0.096)	(0.094)	(0.095)
Books16				0.065**	0.059**	0.064**	0.057**
				(0.026)	(0.026)	(0.026)	(0.026)
CompUse							
TPRatio						-0.034	-0.045
						(0.078)	(0.080)
Ready			0.240***		0.170***		0.182***
			(0.049)		(0.049)		(0.049)
Task			-0.009		-0.025		-0.025
			(0.038)		(0.038)		(0.037)
LearnWork			-0.001		-0.029		-0.024
			(0.032)		(0.033)		(0.033)
R2		0.143	0.15	0.234	0.229	0.217	0.214
N		1,407	1,312	1,335	1,244	1,318	1,230

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.12Results of PIAAC PSTRE Score Regression for USA

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.071	-0.049	-0.038	-0.002	-0.106	-0.077
		(0.098)	(0.100)	(0.084)	(0.092)	(0.101)	(0.108)
	45-54	-0.274***	-0.280***	-0.246***	-0.243**	-0.463***	-0.442***
		(0.097)	(0.100)	(0.090)	(0.104)	(0.159)	(0.158)
	55-65	-0.361***	-0.345***	-0.339***	-0.317***	-0.530***	-0.502***
		(0.105)	(0.110)	(0.104)	(0.116)	(0.158)	(0.168)
RspEdu	2			0.569***	0.540***	0.534***	0.549***
				(0.132)	(0.163)	(0.185)	(0.203)
	3			1.204***	1.127***	1.277***	1.220***
				(0.138)	(0.170)	(0.193)	(0.216)
PntEdu	2			0.504***	0.443***	0.466***	0.357***
				(0.082)	(0.110)	(0.090)	(0.128)
	3			0.630***	0.544***	0.589***	0.441***
				(0.091)	(0.122)	(0.093)	(0.125)
Books16				0.070**	0.071**	0.066**	0.066**
				(0.030)	(0.031)	(0.031)	(0.033)
CompUse							
TPRatio						0.048*	0.045
						(0.025)	(0.029)
Ready			0.176***		0.067		0.063
			(0.058)		(0.054)		(0.065)
Task			0.160***		0.083*		0.112**
			(0.040)		(0.043)		(0.043)
LearnWork			-0.090**		-0.079*		-0.076
			(0.045)		(0.046)		(0.049)
R2		0.021	0.059	0.238	0.224	0.223	0.211
N		1,307	1,105	1,271	1,082	1,095	933

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.13Results of PIAAC PSTRE Score Regression for UK

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.259***	-0.276***	-0.191**	-0.165	-0.240*	-0.300**
		(0.087)	(0.092)	(0.095)	(0.106)	(0.127)	(0.149)
	45-54	-0.519***	-0.531***	-0.327***	-0.341***	-0.396**	-0.566**
		(0.075)	(0.082)	(0.081)	(0.091)	(0.187)	(0.237)
	55-65	-0.709***	-0.698***	-0.529***	-0.479***	※	※
		(0.086)	(0.097)	(0.104)	(0.118)		
RspEdu	2			0.381***	0.286**	0.359	0.102
				(0.104)	(0.120)	(0.263)	(0.346)
	3			0.758***	0.580***	0.801***	0.584***
				(0.100)	(0.118)	(0.153)	(0.207)
PntEdu	2			0.323***	0.355***	0.421***	0.350***
				(0.077)	(0.076)	(0.097)	(0.099)
	3			0.452***	0.503***	0.557***	0.499***
				(0.114)	(0.113)	(0.130)	(0.136)
Books16				0.096***	0.075***	0.063**	0.047*
				(0.022)	(0.022)	(0.027)	(0.028)
CompUse							
TPRatio						-0.016	-0.034
						(0.025)	(0.031)
Ready			0.370***		0.268***		0.228***
			(0.055)		(0.063)		(0.074)
Task			0.103***		0.075**		0.107**
			(0.033)		(0.037)		(0.046)
LearnWork			-0.012		-0.048		-0.044
			(0.034)		(0.036)		(0.044)
R2		0.069	0.163	0.282	0.314	0.261	0.283
N		2,287	1,810	1,882	1,502	1,278	1,111

Note:

1) ( ) includes standard errors calculated by jackknife method.

2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

3) ※ indicates variables that were automatically omitted due to lack of information on teacher-to-pupil ratio.

Table A.14Results of PIAAC PSTRE Score Regression for Germany

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.250***	-0.168*	-0.269***	-0.197**	-0.392***	-0.285**
		(0.090)	(0.102)	(0.085)	(0.095)	(0.106)	(0.117)
	45-54	-0.518***	-0.435***	-0.571***	-0.519***	※	※
		(0.070)	(0.073)	(0.067)	(0.068)		
	55-65	-0.840***	-0.758***	-0.850***	-0.835***	※	※
		(0.083)	(0.100)	(0.083)	(0.098)		
RspEdu	2			0.415***	0.386**	0.761***	0.803**
				(0.152)	(0.189)	(0.261)	(0.318)
	3			0.982***	0.926***	1.473***	1.444***
				(0.151)	(0.190)	(0.272)	(0.320)
PntEdu	2			0.354***	0.383***	0.239	0.240
				(0.130)	(0.139)	(0.209)	(0.213)
	3			0.410***	0.442***	0.428**	0.463**
				(0.129)	(0.137)	(0.203)	(0.211)
Books16				0.119***	0.106***	0.115***	0.107***
				(0.019)	(0.022)	(0.027)	(0.029)
CompUse							
TPRatio						※	※
Ready			0.314***		0.163***		0.196**
			(0.056)		(0.054)		(0.088)
Task			0.052		0.023		-0.016
			(0.037)		(0.034)		(0.052)
LearnWork			0.070**		-0.001		-0.032
			(0.034)		(0.033)		(0.055)
R2		0.087	0.126	0.280	0.283	0.224	0.236
N		1,578	1,385	1,494	1,319	625	559

Note:

1) ( ) includes standard errors calculated by jackknife method.

2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

3) ※indicates variables that were automatically omitted due to lack of information on teacher-to-pupil ratio.

Table A.15Results of PIAAC PSTRE Score Regression for Finland

		Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
AgeGrp	35-44	-0.319***	-0.288***	-0.244***	-0.217***	-0.090	-0.305
		(0.069)	(0.070)	(0.063)	(0.065)	(0.284)	(0.311)
	45-54	-0.710***	-0.632***	-0.553***	-0.485***	-0.541***	-0.448***
		(0.071)	(0.071)	(0.076)	(0.077)	(0.090)	(0.091)
	55-65	-1.264***	-1.115***	-0.983***	-0.865***	-0.972***	-0.851***
		(0.072)	(0.081)	(0.072)	(0.083)	(0.080)	(0.094)
RspEdu	2			0.454***	0.386***	0.471***	0.382**
				(0.088)	(0.098)	(0.167)	(0.182)
	3			0.994***	0.852***	1.032***	0.887***
				(0.104)	(0.114)	(0.178)	(0.193)
PntEdu	2			0.164***	0.185***	0.178**	0.199**
				(0.054)	(0.058)	(0.072)	(0.078)
	3			0.298***	0.303***	0.319***	0.321***
				(0.080)	(0.091)	(0.100)	(0.121)
Books16				0.101***	0.083***	0.099***	0.086***
				(0.017)	(0.018)	(0.020)	(0.023)
CompUse							
TPRatio						0.000	0.006
						(0.018)	(0.020)
Ready			0.451***		0.298***		0.295***
			(0.055)		(0.054)		(0.063)
Task			0.054		0.029		0.017
			(0.034)		(0.031)		(0.038)
LearnWork			0.021		0.001		0.018
			(0.038)		(0.038)		(0.044)
R2		0.211	0.231	0.373	0.356	0.366	0.363
N		1,756	1,469	1,723	1,446	1,167	939

Note:
1) ( ) includes standard errors calculated by jackknife method.
2) Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.16. Pairwise Correlation Matrix of On-the-job Learning Indices

	Readiness to learn	Task discretion	Learning at work
Readiness to learn	1		
Task discretion	0.2496 (0.00)	1	
Learning at work	0.2671 (0.00)	0.1726 (0.00)	1

Note: Numbers in parentheses are p-values.

Table A.17. Variance Influence Factors of On-the-job Learning Indices

	Numeracy	Literacy	PSTRE
Readiness to learn	1.25	1.25	1.20
Task discretion	1.09	1.09	1.08
Learning at work	1.18	1.18	1.16
Mean VIF of all three	1.76	1.76	2.36

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