Parental leave and the gender gap in career advancement*

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Abstract

Critics point out that generous parental leave policies unintentionally suppress the career advancement of highly skilled women. This study analyzes the heterogeneous impacts of parental leave policies on the gender gap in skill use, conditional on skill, drawing on data of individual skill and skill use available from the micro data of the Programme for the International Assessment of Adult Competencies (PIAAC), which contains over 50,000 individuals from 24 countries. The results show that generous parental leave narrows the gender gap in skill use among low-skilled but widens the gap among moderately high-skilled workers. This finding is robust after controlling for international differences in other family policies, gender norms, and labor-market institutions. The finding corroborates with the claim that generous parental leave entails the employer's statistical discrimination against (moderately) skilled women.

Keywords: Gender; skill use; parental leave; gender norms; labor-market institution
JEL Classification: D12; H24; J16; J12; J13; J16; J24

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1 Introduction

To promote women's labor-force participation without sacrificing family formation, most developed countries adopt parental leave systems that either legally protect jobs or pay cash benefits during the leave. As of 2011, women are eligible for a one-year or longer paid parental leave in Austria, Denmark, Germany, Japan, Korea, and Sweden.[1] The goal of the policy is to ease mothers' career continuation and advancement after child bearing. Does this policy attain its intended goals?

Many studies to date have assessed the impact of introducing or enhancing parental leave policies on the maternal labor supply. A strand of research uses cross-country panel data to estimate the impact (Ruhm, 1998; Thévenon and Solaz, 2013; Olivetti and Petrongolo, 2017). Another strand of research looks at one country at a time, examining the difference of the control and treatment groups (Baum, 2003; Berger and Waldfogel, 2004; Baker and Milligan, 2008; Lalive and Zweimüller, 2009; Dustmann and Schönberg, 2012; Schönberg and Ludsteck, 2014; Carneiro et al., 2015; Dahl et al., 2016). Kunze (2016) and Rossin-Slater (2018) review the studies in the field and conclude that introducing short-term parental leave encourages the maternal labor supply but warn that generous parental leave, such as that in Nordic countries, could threaten the career advancement of women by placing them in less demanding jobs.

A few studies report adverse effects of parental leave policies on women's career advancements. Blau and Kahn (2013) reports that generous parental leave policies increase female labor-force participation but decrease full-time employment among them, as well as the fraction of managers and professionals, based on cross-country data from 22 Organisation for Economic Co-operation and Development (OECD) countries. Olivetti and Petrongolo (2017) report that parental leave policies increase the employment of low-educated women but decrease the wages of high-educated women, based on cross-country data from 30 OECD countries. Although these studies suggest a potential trade-off of the policy, namely, favorable effects on less career-oriented women at the cost of unintended negative effects on career-oriented women, their analyses are limited to country-level aggregated data, which prevent a detailed analysis on the heterogeneous policy impacts on career advancements across skill levels and its underlying mechanism.

In the specific context of Sweden, Albrecht et al. (2003, 2015) attribute the large gender wage gap at the higher end of the wage distribution to its generous parental leave system, hypothesizing that the generous policy unintentionally hinders the career advancement of women through their human capital depreciation during the parental leave period or triggering statistical discrimination against them. Without significant variation in the

[1] In addition to these countries, former communist countries, including Czech Republic, Estonia, and Slovakia, mandate a paid parental leave of one and a half years or longer.

parental leave policies, however, one cannot derive a definitive conclusion about how parental leave policies affect women's career advancement by skill level. Thus, despite the growing attention, we have scant systematic evidence on any potential drawbacks of parental leave policies.

For a credible assessment of parental leave policies on the career advancement of women across skill levels, we need significant variation in the policies and good measurements of the skill levels and career advancement of individual workers. To fulfill this aim, we rely on micro data from the Programme for the International Assessment of Adult Competencies (PIAAC) compiled by the OECD, covering more than 30 countries (of which we use 24 countries) that differ substantially in the length of their respective parental leave periods. The PIAAC is the best-suited micro data set for our purpose, because it includes measurements on both skills and skill uses; the PIAAC measures the literacy and numeracy of adults based on an on-site test, and it also measures the frequencies of implementing certain tasks requiring a specific skill, such as reading manuals/reference sources or calculating prices/costs. The skill use measurements enable us to construct objective measures of skill use on the job for each individual.

This skill-use index has several strengths for measuring the career advancement of women over wages, which are the conventional proxy variable of workers' productivity. First, explanations other than skill under-utilization can explain lower female wages than male wages. For example, Becker-type taste discrimination explains the lower wages of women relative to men. Furthermore, the increase of women's labor supply induced by generous parental leave policies decreases women's wage relative to men's if women and men are not perfect substitutes (Ruhm, 1998), or the cost of providing parental leave could be shifted onto women's wage (Gruber, 1994). Second, our skill-use index constructed in a uniform method across countries serves as an internationally comparable measure of job assignments. Third, our skill-use measure exactly corresponds to the skill measure; this exact correspondence helps us avoid seeming skill-underutilization due to the gap between the measured skill and its use.

Scrutiny of the PIAAC reveals only small gender gaps in literacy skill across countries, whereas gender gaps in literacy use are substantial in some countries, suggesting an under-utilization of women's skill in such countries. In contrast, the gender gap in numeracy is not negligible in the first place, as found in previous studies (Guiso et al., 2008; Fryer and Levitt, 2010; Nollenberger et al., 2016), but the gender gaps in numeracy use are even more substantial in some countries. Thus, we find underutilizations of both literacy and numeracy in some countries, but the tendencies are similar across the two skills. Therefore, to avoid repetition, we mainly report the results based on literacy skill. This choice is because literacy is arguably a more general skill, forming a foundation for many tasks, and literacy use is indeed found to have a stronger correlation with wages

than numeracy use.

We next link each country's gender gap in skill utilization to the generosity of its parental leave policy. To this end, we construct the measure of paid parental leave policies from the OECD family database and the ILO legal database. The length of paid parental leave varies substantially across countries, ranging from 0 in the US to 1.3 years in Austria as of 2011 (and even longer for former socialist countries). We then regress skill use on the length of the parental leave policy by skill quartiles. The analysis shows that generous parental leave policies narrow the gender gap in skill use among the least-skilled workers (1st quartile in the skill distribution) but widens the gap among moderately skilled workers (3rd quartile). The positive policy impact on the least-skilled workers is mainly through promoting their employment, implying that parental leave helps unskilled workers who would otherwise drop out of the labor force to stay employed through job protection. In contrast, the negative policy impact on moderately skilled workers is found at both the extensive and intensive margins. This implies that parental leave discourages the skill use of moderately skilled women through driving them out of the labor force and suppressing their skill use on the job. The heterogeneous impacts of parental leave on skill use are quite robust even after controlling for other family policies, gender norms, and other labor-market institutions. According to the most-preferred specification, a one-year-longer paid parental leave narrows the literacy-use gender gap by 0.07 standard deviation among the lowest-skilled workers, while it widens the gender gap by 0.20 standard deviation among moderately high-skilled workers.

We also check the robustness of our results using conventional measures of labor-market outcomes, such as employment status, hours worked, and hourly wages, as the outcome variables. We find that generous parental leave suppresses the employment and hours of moderately high-skilled women, and we find some suggestive evidence of a negative impact on hourly wages. For example, a one-year-longer paid parental leave widens the gender gap in the employment rate by 5 percentage points among workers whose literacy skill belongs to the third quintile of the skill distribution, where men's employment rate is 86%, on average, It also widens the gap in work hours by 2.3 hours per week among the same moderately skilled group where the average men's working hours is 37.7 hours. Furthermore, generous parental leave tends to place high-skilled women in jobs that require fewer years of education and job experience as the job qualification. Also, generous parental leave tends to reduce the probability of having 11 or more subordinates among moderately skilled women.

Our research design, which exploits the cross-country variation in parental leave policies, complements existing studies that draw on a natural experiment in a single country. Recent influential studies exploiting the discontinuous extension of the parental leave period by the birth day of the child in countries credibly identifies the local effect of the

extension on mothers' labor-market outcomes, but does not identify the indirect policy impacts through the market equilibrium. For example, Adda et al. (2017) emphasizes the importance of the market equilibrium in the assessment of family policies, because family policies could change forward-looking decision making, such as the human capital investment of the younger members of the population. This equilibrium effect is captured by a cross-country comparison if we assume that the observed outcome is the long-run equilibrium outcome.

As an additional benefit, the cross-country comparison allows us to estimate the impact of parental leave policies through policy take up. Previous studies that estimate the impacts of extending the parental leave length among those who already had taken up the leave tend to find minor impacts on employment and wage in the mid-run (Lalive and Zweimüller, 2009; Schönberg and Ludsteck, 2014; Carneiro et al., 2015; Dahl et al., 2016). Consistent with this view, Lalive et al. (2014) find that job protection without cash benefits is not effective due to low take up. Indeed, Kluve and Schmitz (2018) find a positive mid-run impact on maternal employment by including the effect through take up. The latter study, in particular, contrasts with Schönberg and Ludsteck (2014), as both studies stand on German policy reforms. All these studies suggest the importance of looking at the extensive margin through take up. Thus, relying on cross-country comparisons of countries with various take up rates is important to learn the expected policy impacts in the countries with less generous parental leave policies.

While cross-country studies are often criticized for their vulnerability to omitted variable bias, all our specifications allow for gender-neutral country $\times$ skill level specific unobserved determinants of skill use. Thus, our identification does not simply depend on the cross-country variation of the generosity of parental leave; rather, it exploits the heterogeneous impacts of parental leave on skill use, conditional on skill level across genders. Furthermore, a simple omitted variable bias cannot explain our non-monotonic findings that generous parental leave promotes skill-use among low-skilled women but demotes it among moderately skilled women.

Previous studies pointing to a negative consequence of parental leave on the career advancement of women mainly list two probable mechanisms: human capital depreciation during the leave and statistical discrimination against women (Albrecht et al., 2003, 2015). Between the two explanations, human capital depreciation is not consistent with our findings that generous parental leave policy decreases the skill use of women conditional on the current skill, because skill depreciation should be captured by the decrease in the skill score. Furthermore, it does not explain the finding that generous parental leave hinders the career development of moderately skilled women but not the most-skilled women. To further test if longer parental leave entails the human capital depreciation of relatively high-skilled women, we control for the actual years of leave from the labor

market, which can be calculated in our data set. We find that the actual years of leave is negatively associated with literacy use on the job but that the association does not differ between genders. Furthermore, the negative impact of generous paid leave policies on skill use of modestly skilled women virtually does not change with and without controlling for actual years of leave from the labor market. These findings suggest that human capital depreciation is not a probable mechanism for the unintended consequence of parental leave.

We instead claim that parental leave policies strengthen statistical discrimination against moderately skilled women. Thomas (2018) sets up a theoretical model in which the firm invests in the firm-specific skill accumulation of its workers when only workers know their future labor market attachment; she shows that the firm only trains workers who send a costly signal for future commitment by working long hours. In the model, the introduction of mandatory parental leave encourages family-oriented workers to behave as if they are career-oriented and makes firms reluctant to train and promote a female worker. An analogous argument implies that parental leave policies lower the expected worker's skill level by encouraging the labor-force participation of low-skilled workers, which in turn reduces the expected returns to training from the employer's viewpoint. As a result, the employer heightens the training-offer threshold for female workers and provides fewer training opportunities for moderately skilled workers. Thomas (2018) confirmed her theoretical prediction using hours worked at early career stages as a measure of a signal for labor-market attachment and promotion as the outcome variable. Our study supplements her findings by providing direct evidence consistent with statistical discrimination on the skill and skill-use dimensions; the extension of parental leave policies hinders the skill-utilization of moderately high-skilled, not the highest-skilled, women.

2 Data

2.1 Main data set

We draw on the Programme for the International Assessment of Adult Competencies (PIAAC) by the OECD, which aims to measure adults' cognitive and workplace skills. Twenty-four countries participated in the PIAAC Round 1 (2008–2013), and 9 countries participated in Round 2 (2012–2016); participating countries in each round are tabulated in Table 1. Our analysis sample consists of all participating countries in Rounds 1 and 2, except for Australia and Indonesia, whose data sets are not provided for public use, and Russia, whose data set does not include Moscow residents. Accordingly, our analysis sample includes individuals from 30 countries, but 6 countries are excluded because they

lack some social-institution indices (See Section 2.5 for those indices).[2] Hence, our main analysis sample consists of the remaining 24 countries. The survey targets individuals ages 16–65 and collects basic background information, such as age, sex, and educational attainment.

A distinguishing feature of the PIAAC is that it tests literacy, numeracy, and problem-solving skills in technology-rich environments. None of the respondents completed all three test sections; rather, they completed two at most, where the sections are randomly assigned; possible combinations are "literacy and numeracy," "literacy and problem solving 1," "literacy and problem solving 2," "numeracy and problem solving 1," "numeracy and problem solving 2," and "problem solving 1 and problem solving 2." The PIAAC data set contains plausible values (PV), which are computed based on the test results and background information, such as sex and educational attainment (OECD, 2013b). Because sex, which is the variable of interest in our analysis, is used to impute the PVs, we do not rely on those PVs. We instead calculate test scores based on Item Response Theory (IRT) by ourselves, as described in detail in the next section.

We do not use the problem-solving section, because this section is skipped by respondents who cannot operate information and communications technology (ICT) devices to answer the questions.[3] Since all test takers for this section have the least ICT skills to answer the questions and the fraction of respondents who complete the section varies across countries, we worry about the biases that this non-random selection may bring into our analysis. Furthermore, Cyprus, France, Italy, and Spain do not implement the problem-solving section. In the end, we decided not to use the problem-solving section.

We restrict the sample to prime age adults, those between 25 and 59 at the time of the survey, while the entire sample is used to estimate skill and skill-use indices. We exclude full-time students and the permanently disabled from the sample. Also, we exclude observations with missing values in the variables necessary for our analysis. We did not restrict our analysis sample to the age range of those for whom parental leave policies are directly relevant (e.g., 25–40), because parental leave policies could affect the gender gaps in life-time career tracks.

2.2 Calculation of skill and skill-use indices

To obtain test scores that purely capture performance on the examination, we construct our own test score that depends only on the responses to questions in the examination,

[2]We obtained the German scientific-use file from GESIS.

[3]If a respondent does not have the basic ability to use a computer or if he/she refuses to use a computer, he/she skips the problem-solving section. In contrast, the literacy and numeracy test sections are computer-based, but if a respondent refuses or is unable to use a computer, he/she takes the corresponding paper-based tests. OECD (2013b) suggests that the computer-based tests and the paper-based tests are comparable.

drawing on the Item Response Theory instead of using the built-in PVs. The way the latent score is calculated in the IRT is different from our daily grading routine, in which the allotment of marks to each question is pre-determined. In contrast, the IRT characterizes each question by its "difficulty" and "discrimination," which are estimated from test takers' response patterns.

The two-parameter logistic model of the IRT specifies the probability of making the correct response as

$$\Pr(y_{ij} = 1 \,|\, a_j, b_j, \theta_i) \equiv \frac{\exp\left(a_j(\theta_i - b_j)\right)}{1 + \exp\left(a_j(\theta_i - b_j)\right)}, \tag{1}$$

where y_{ij} takes one if the respondent i correctly answers test item j and zero otherwise, and θ_i is the latent trait of respondent i. Each test item j is characterized by two parameters: a_j, the "discrimination" parameter of item j that represents the sensitivity of being correct to the ability; and b_j, which represents the "difficulty" that shifts the probability of being correct irrespective of the ability. This specification assumes that test items measure the uni-dimensional latent trait summarized by θ_i, and that observed item responses are independent, conditional on the latent trait, θ_i. In fact, the test items in the PIAAC are designed to apply this model, such that each question is independent of each other. Letting $y_i = (y_{i1}, \cdots, y_{iJ})$ and $B = (a_1, \cdots, a_J, b_1, \cdots, b_J)$, the conditional distribution for respondent i is denoted as

$$f(y_i \,|\, B, \theta_i) = \prod_{j=1}^{J} \left[\Pr(Y_{ij} = 1 \,|\, a_j, b_j, \theta_i)\right]^{y_{ij}} \left[1 - \Pr(Y_{ij} = 1 \,|\, a_j, b_j, \theta_i)\right]^{1-y_{ij}}. \tag{2}$$

Given the prior distribution of the latent trait θ_i, $\hat{B}$ is chosen to maximize the log-likelihood,

$$\ln L(B) = \sum_{i=1}^{N} \ln\left(\int f(y_i \,|\, B, \theta) d\Phi(\theta)\right), \tag{3}$$

where the prior distribution is given by the standard normal, Φ.

Finally, the latent trait parameter θ_i, is estimated using Bayes' theorem; its immediate application gives the posterior distribution of the latent trait, θ_i, conditional on the estimated parameters and response patterns. Then, the empirical Bayes mean (or posterior mean) of θ_i is

$$\tilde{\theta_i} = \int_{-\infty}^{\infty} \theta \phi(\theta \mid y_i,\, \hat{B}) d\theta = \int_{-\infty}^{\infty} \theta \frac{f(y_i \mid \hat{B},\, \theta)\phi(\theta)}{\int f(y_i \mid \hat{B},\, \theta)\phi(\theta) d\theta}\, d\theta. \tag{4}$$

We estimate the latent parameters for each country, allowing discrimination and difficulty parameters to differ across countries. To facilitate the interpretation, we normalize the

estimated skill indices so that they each have exactly zero mean and one standard deviation. A set of 49 test items is used to estimate the literacy skill score, and another set of 49 test items is used to estimate the numeracy skill score.

In addition to skill possession, respondents in the PIAAC report their skill use at work with well-defined responses, which enable us to compute the latent traits for skill use. For example, they are asked "In your job, how often do you usually read directions or introductions?" for use of literacy skill, and "In your job, how often do you usually calculate prices, costs or budgets?" for use of numeracy skill. Respondents answer these questions using a five-point frequency scale: (1) Never, (2) Less than once a month, (3) Less than once a week but at least once a month, (4) At least once a week but not every day, or (5) Every day. There are 8 items for literacy use and 6 items for numeracy use. (See Appendix A for details.) These responses are more objective than responses such as "often" and "rare," because the measurement units are well defined.

Using this information, we apply the general partial credit model (GPCM; Muraki, 1992) to each set of skill-use items, which is an extension of the two-parameter logistic model to the polytomous items. Then, we obtain two skill-use indices for each respondent as the empirical Bayes means of the posterior distribution of latent skill-use intensity; i.e., skill use of literacy and skill use of numeracy. The skill-use indices are normalized to have zero mean and one standard deviation.

Figure 1 summarizes the gender differences in skill and skill use, where each point is the gender gap of skill or skill use and the bars indicate the 95% confidence intervals. Literacy scores are roughly the same across genders, except for in five countries —Ireland, Korea, Netherlands, and Norway—where women's scores are about 0.1 standard deviation lower than men's in statistically significant ways. In contrast, the gender gaps in literacy use scores are substantially different across countries: Women use literacy more in Poland, and Slovenia and use it less in Japan, Korea, Netherlands, and Norway. In terms of numeracy, women tend to score lower and use it less at work than men. From casual observation, gender gaps in skill use tend to be small or reversed in ex-communist countries, such as Poland and Slovakia.[4] de Haan (2012) documents that these countries encourage women to participate in the labor market by providing opportunities for education and training, in order to meet the demands of labor-intensive industries under socialist regimes.

Although the international variation in gender skill-use gaps is notable, the gender gaps in skill use in this figure should be interpreted with caution due to self-selection into the labor force, as skill use at work is asked only for market participants. In the further analysis, the skill-use scores for non-participants are considered to be less than the minimum score value among market participants in each country, as their skill is actually not used in the labor market. This imputation of non-participants' skill use is

[4]We define ex-communist countries as including Czech, Estonia, Poland, and Slovakia.

justified by regarding our skill-use measure as actual skill use rather than potential skill use that would be attained if one participated in market. As a result, our skill-use measure is mixture of extensive and intensive margins, that is, participation in the market and skill-use levels in the market, respectively. We check to see if our analysis is totally driven by this imputation or the extensive margin by restricting the sample to labor-market participants.

For brevity of exposition, the following analysis focuses on literacy skill and its utilization, instead of the numeracy. The choice of literacy over numeracy is partially based on the concern that numeracy skill is acquired taking labor-market prospective into consideration. The usage of numeracy seems limited to market production, in comparison with the usage of literacy, which applies to both market and household production. As a result, women with high numeracy skill might differ from other women in unobserved ways, such as attitudes toward work (Guiso et al., 2008; Fryer and Levitt, 2010; Nollenberger et al., 2016). Furthermore, items to measure numeracy skill use do not seem to be as general as items to measure literacy skill use (e.g., use of algebra). In fact, Table 2 shows that literacy skill use is more closely correlated with the wage rates than numeracy skill use. We report the results from the analyses on numeracy skill in Appendix E; despite the aforementioned concerns, the relationships between numeracy skill use and parental leave are qualitatively similar to the relationships between literacy skill use and parental leave, though the relationships of the former tend to be less precisely estimated.

2.3 Validation of skill and skill-use indices

Before conducting a detailed analysis using these skill and skill-use indices, we validate our constructed measures by examining whether they are correlated with conventional proxy variables for each worker's productivity. We restrict the analysis sample to men to abstract gender issues away and to mitigate possible selection biases. Figures 2 and 3 illustrate the relationship between the occupation-average hourly wages and literacy skill and skill use in each country, where the size of the circles indicates the number of observations in each occupation. The figures demonstrate the positive correlation in all countries, suggesting that occupations with skilled workers or intensive skill use are associated with decent wages. This positive correlation between wages and skill and skill use assures that skill and skill-use measures carry substantive information correlated with wages, the conventional proxy for productivity.

To further confirm the correlations of skill, skill use, and log hourly wages, we estimate the following equation, restraining the sample to male observations:

$$\ln(wage)_{ij} = \beta^{s} Skill_{ij} + \beta^{su} SkillUse_{ij} + X_{ij}\beta_{j}^{x} + \lambda_{s(i),j} + u_{ij}, \tag{5}$$

where i and j indicate each individual and country; X_{ij} include age indicators, years of education, and dummy variables, indicating that the test language is the same as the respondent's native language and that parents are immigrants; and $\lambda_{s(i),j}$ is country-occupation fixed effects, with $s(i)$ indicating individual i's occupation in country j. The estimates demonstrate, for example, that one-standard-deviation increases in literacy skill and skill use are associated with 5.1% and 10.7% increases in hourly wages, respectively, unconditional on occupation, and the estimates are still sizable after controlling for occupation (Table 2). These partial associations imply that skill use conditional on skill possession is worth considering to better understand the underlying mechanism of the observed gender gaps in market outcomes.

2.4 Parental leave policies

We collected parental leave policies in 2011 from the relevant laws in each country, as well as the Working Conditions Laws Database of the International Labour Organization (ILO) and the OECD family database. See Appendix B for a full description of the data sources. We define the duration of parental leave as the sum of maternity and parental leave duration, in years, in a particular country. To be sure, these two policies are distinct, in the sense that maternity leave is given only to women, while parental leave is gender neutral; in reality, however, the parental leave is most likely to be taken by women in many countries.

Since parental leave policies have two functions, job protection and income compensation, we measure these aspects by the duration of paid leave, the duration of job protection, and the replacement rate for paid leave.[5] Among the three measures, we mainly use the duration of parental leave, because it is accurately measured and income support is presumably an important determinant for taking up the behavior. The duration of paid leave adjusted for the replacement rate is attractive, but we do not use it for the main analysis, because the replacement rate is difficult to accurately measure.[6]

[5]In calculating the parental leave duration, we exclude the leave that is available conditional on not using public childcare services.

[6]To calculate the replacement rate, we need some imputation, because some countries have an upper or lower ceiling, or a constant amount of benefits. In particular, when the benefits are flat amounts, we evaluate the replacement rate at the female median income in the PIAAC sample. The calculations of the replacement rates in Sweden and the United Kingdom are exceptional. A part of parental leave benefits in Sweden is a flat amount, and it is evaluated by women's mean earnings, due to data availability. A part of the benefits in the United Kingdom has a ceiling. Since it is quite low, we evaluate that part by the female median earnings in the PIAAC sample (See Appendix B). As a succinct measure of paid leave length and the replacement rate, we calculate the full-rate equivalent length of parental leave by multiplying the replacement rate by the duration, which is the same as the definition in the OECD family database. When the replacement rates of maternity leave and parental leave are different, we first compute the full-rate equivalent for each type of leave and then add them up. We should note that the imputation of the replacement rate using the median female earnings causes a non-classical measurement error of the replacement rate, because the imputed rate is lower than the actual rate among low earners and higher

Figure 4 summarizes the duration of parental leave of each country in 2011 based on the three definitions: the paid parental-leave period, the job protection period, and the full-time equivalent paid leave period. We confirm sufficient variation of paid parental leave periods across countries. The ranking of the generosity of the paid-leave period does not change significantly, even after adjusting for the replacement rate, except for Slovakia, where the replacement rate is substantially lower than that in other countries. Many countries legitimate substantially long job protection periods that extend more than three years, but some of them, such as Finland, France, and Spain, provide cash benefits for less than one year. While the paid parental leave duration and the job protected leave duration seem to vary somewhat independently, we obtain similar results irrespective of the choice of parental leave measures, and we mainly report the analysis using paid leave policies to avoid repetition.

2.5 Social institutions other than parental leave policies

Since we implement cross-country comparisons that associate the length of parental leave with women's skill utilization, the correlation may be driven by gender norms or other market institutions that affect both the policy and the outcome. To control for those institutions, we construct a quantitative measure of the strength of traditional gender norms using internationally comparable social surveys: the World Values Survey Wave 6 and the European Values Study 2008.[7] We further collect other quantitative indicators for social institutions, such as tax policy[8], child care policy, the strength of employment protection, and the unionization rate from the OECD database. In addition, the industrial structure could affect both the policy and the outcome, and thus, we control for the fraction of public sector employment and the fraction of service sector employment, which are calculated using the PIAAC. Note that values in 2011 are matched for the PIAAC Round 1 countries and the values in 2012 for Round 2 countries. Appendix C gives summary statistics for these indices.

than the actual rate among high earners. Among the 24 countries, we apply the imputation to 6 countries (Belgium, Czech Republic, Finland, Slovakia, Sweden, and the United Kingdom). In addition, we do not take into account any deduction of tax or social security premiums associated with the parental-leave take-up. Furthermore, the full-rate equivalent measure itself relies on a restrictive assumption that what only matters is duration times replacement rate; for example, a year (or 52 weeks) of parental leave with 10% of income replacement is assumed to be equivalent with 5.2 weeks of parental leave with full income replacement. Since these issues could be non-negligible, we offer the analyses using the replacement rate as supplemental evidence.

[7]Both surveys asked "When jobs are scarce, should men have more right to a job than women?" with possible responses "Agree" (= 1), "Neither" (= 0) and "Disagree" (= −1). We defined the index as the average of individual responses within each country.

[8]Since characteristics of the tax system depend on the levels of earnings, the OECD evaluates it at 133% and 200% of mean earnings of a single household. Although we collect the index evaluated at 200%, the differences associated with this choice are minor and the qualitative argument was unaffected.

3 Parental leave and women's skill utilization

Our main goal is to unpack the relationship between the under-utilization of women's skills and parental leave policies, conditional on the current skill level, and to distinguish it from other social institutions and social norms.

3.1 Literacy and literacy use in each country

As a step to document the gender differences in skill utilization at the extensive margin, we examine the gender difference in the employment rate over skill distribution. We define those who engage in paid work or unpaid work for their own business in the week prior to the interview as those who are in employment; we also define those who are away from their job but will return, including those who are on parental leave, as those who are in employment. Figure 5 illustrates the employment rate over the skill distribution in the sample countries, which are ordered by the duration of the paid leave duration. There are generally positive correlations between literacy skill and the employment rate across countries. As a whole, men's employment rate is higher than women's at any given literacy score, but the magnitude of the gender gaps varies across countries. The gaps are smaller in Scandinavian countries, such as Denmark, Finland, Norway, and Sweden, while the gaps are significant in Southern European and Asian countries, such as Greece, Italy, Japan, and Korea. In addition, the slopes of female labor-force participation profiles have some variation across countries. In some Northern European countries, such as Belgium, Denmark, and Sweden, skilled women are more likely to participate in the labor force than non-skilled women, while we do not find this tendency in Asian countries, especially in Japan and Korea.

We now repeat the same exercise focusing on the intensive margin; we examine the gender difference in literacy use by skill level among those who work. Figure 6 draws the relationship between skill and its use among labor-force participants. If workers and jobs are matched assortatively based on only literacy skill and its requirement on the job, we should observe 45-degree lines for all countries. In reality, the literacy scores and utilization scores are positively associated, but the slope is less than unity.[9] Women's skill-use is less intensive than men's at each skill level in most countries, with ex-communist countries, such as Poland, as exceptions. The size of the gender gaps in skill-use varies significantly across countries; for instance, the gaps are large in Austria, Chile, Japan, and Norway. The slopes are upward, indicating that those who have high skill levels tend to use their

[9]The argument here implicitly assumes that the skill and skill-use scores have "similar" distributions. For example, if one distribution is uni-modal while another is bimodal, we do not necessarily observe a 45-degree line under perfectly assortative matching. If we transform them into percentiles, however, the argument is validated as long as both distributions are continuous. Indeed, the less-than-45-degree line is found in terms of percentiles as well.

skill more frequently, but the literacy-use/literacy gradients differ across genders in some countries. Hence, we study how parental leave policies explain gender differences in skill use by skill levels.

3.2 Parental leave and literacy use

Figure 6 suggested that there are important differences in the gender gaps in literacy-use across countries. Moreover, the sizes of the gender gap in literacy-use differ substantially across the various extents of literacy skill; the gender gaps are uniform, irrespective of the literacy levels in some countries, but in contrast, the gender gaps are larger at the high literacy skill level in the other countries. We now attempt to correlate the gender gap in literacy use and the length of paid parental leave, paying attention to the heterogeneous gender gaps by literacy skill. To do so, we first estimate each country's gender gap in literacy use by literacy quartiles. Second, we examine the relationship between the country- and quartile-specific gender gaps in literacy use and the length of paid parental leave.

Figure 7 describes the relationship between the literacy-use gender gap and the paid leave policy by each literacy quartile group, where these quartile groups are defined by each country. The gender gap is measured by the difference between the average skill-use levels of women and men, and thus, the negative value indicates that women tend to use less skill than men. In addition, we exclude ex-communist countries, because their social institutions are different from those of other countries (de Haan, 2012). We include these countries in the main analysis, which controls for various aspects of social institutions.

Figure 7 shows that the relationships between the length of paid parental leave and the gender gaps in literacy use differ across literacy quartiles. Among lower literacy workers (Literacy levels: Q1 and Q2), the length of paid parental leave does not have a clear relationship with the country-specific gender gap in literacy use. In contrast, among higher literacy workers (Literacy levels: Q3 and Q4), the longer the length of paid parental leave, the larger the gender gaps in literacy use. In sum, the figure shows the association of the length of paid parental leave and skill under-utilization among high-skill women. A caveat here is that this analysis includes only those who work; we will address this limitation in Section 3.3.

3.3 Pooled country analysis

We next investigate whether the relationships observed in Figure 7 still hold after partialing out the effects of other institutions. We also incorporate the non-working population in the analysis. Since individuals who are not working use no skills for market production, their skill-use scores are lower than the lowest values observed among those in the

labor force. Note that we do not attempt to measure the *potential* literacy use of non-participants that would be realized if they worked in the market. We instead measure *actual* skill use in the labor market. Hence, the skill-use indices are considered to be left-censored, where the threshold, the minimum value of literacy use among labor-force participants, varies across countries. Since the censored Tobit model takes into account non-utilized skill due to non-participation as well as skill use within the market, it captures both the extensive and intensive margins. Furthermore, we check that our estimation results are not fully explained by the extensive margin by restricting the analysis sample to those who work.

Using the Tobit model, we estimate the effect of literacy score on literacy use by regressing the literacy-use score on the dummy variables, indicating the literacy score quartile. We examine the difference of the relationship between the literacy score and literacy use by gender and the length of parental leave by interacting the female dummy variable and the length of leave with the dummy variables for the literacy-score quartiles. Specifically, we estimate the following model, pooling all individuals from the sample countries:

$$y^*_{ijs} = \sum_{q=1}^{4} 1\{q = s\} \cdot (\beta_{0q} + \beta_{1q} Female_i + \beta_{2q} Female_i \times PL_j + \beta_{3q} Female_i \times Inst_j + x_i' \beta_{4q} + c_{js}) + u_{ijs}, \quad (6)$$

and the latent skill-use level is observed if it exceeds a certain threshold;

$$y_i = \begin{cases} y^*_{ijs} & \text{if} \quad y^*_{ijs} > y^L_j, \\ y^L_{ijs} & \text{if} \quad y^*_{ijs} \leq y^L_j, \end{cases} \qquad u_{ijs} \,|\, Female_i, s, x_i, c_{js} \sim N(0, \sigma^2_j), \quad (7)$$

where i, j, and $s \in \{1, 2, 3, 4\}$ indicate individuals, countries, and skill quartile groups. The indicator function, $1\{q = s\}$, takes one if individual i's literacy skill belongs to the literacy quartile q; PL_j is the duration of parental leave of country j measured in three ways: paid leave length, job protection period, and the full replacement equivalent length; and $Inst_j$ is the vector of institutional variables of country j, including an ex-communist dummy variable, the childcare center utilization rate, an index of the tax system, public sector size, service sector size, an index of employment protection policy, and union density. The vector x_i is the collection of individual characteristics that include age indicators, years of education, and immigrant status. Country $\times$ skill quartile group fixed effects, c_{js}, captures the country-specific relationship between the literacy-skill quartile and literacy use.

While our sample is randomly collected from each country, the error terms of the above model could be correlated within each country due to country-specific unobserved

factors. In particular, mis-specification regarding country-level variables would produce an error term common across individuals within a country. To allow for this correlation, we report the clustering of robust standard errors by the cell defined by country times skill-quartile group.

Table 3 shows the estimation results of the Tobit model consisting of equations (6) and (7), using the duration of paid leave as the measurement of parental leave policies. The basic specification in Column 1 that does not control for the gender-specific institutional term (i.e., $Female_i \times Inst_j$) except for parental leave and the ex-communist dummy variable, shows that one-year longer parental leave narrows the gender gap in skill use by 0.142 standard deviation at the lowest skill quartile. In contrast, one-year longer parental leave widens the gender gap in literacy usage by 0.088 standard deviation at the third quartile of the literacy distribution, while the estimated coefficient is not statistically significant. Controlling for cross-country differences in family policies and gender norms reduces the standard error of the estimated coefficients without changing their sizes, as reported in Columns 2 and 3. This change implies that both family policies and gender norms are important determinants of literacy-use, but they are orthogonal to the length of parental leave. Controlling for the sizes of public and service sectors changes the estimated coefficient, as reported in Column 4. In contrast, controlling for proxy variables for the other labor-market institutions does not change the estimation results substantially. Since the gender gap in literacy use is smaller in the service and public sectors than in other sectors and the countries with longer parental leave tend to have larger service/public sectors, including the shares of these two sectors affects the size of the estimated coefficients. Overall, the impact of parental leave on the gender gap in literacy use differs substantially across literacy levels; at the lowest quartile, longer parental leave narrows the gender gap, while at third quartile, it expands the gender gap.

The estimation results reported in Columns 1–5 are the Tobit results using the sample that includes those who do not work. Thus, the estimated coefficients capture the mixture of the extensive and intensive margins. To focus on the impact at the intensive margin, we estimate the same model by OLS, using those who work as the analysis sample. The estimation results are reported in Column 6 of Table 3. The estimated coefficient for the first quartile is no longer statistically significant, implying that the extensive margin drove the previous results. Therefore, this suggests that longer parental leave promotes the skill use of low-skilled women by promoting their employment through job protection. At an upper quartile, the estimated coefficient becomes attenuated, but the estimated coefficients remain statistically significant. This implies that longer parental leave suppresses the skill use of high-skilled women at the intensive margin. In Appendix D, we confirm the robustness of our results to using the duration of job protection in place of the duration of paid leave.

Our estimation results show the differential impacts of parental leave on the gender gaps in skill use by skill levels. This result does not contradict the null long-run effect on labor-market outcomes found by Carneiro et al. (2015), Dahl et al. (2016), Lalive and Zweimüller (2009), and Schönberg and Ludsteck (2014), because pooling workers with different skill levels might have masked the heterogeneous policy impacts. In the subsequent discussion, we give some potential explanations for why parental leave policies affect the gender gap in skill use differently by skill levels.

3.4 Addressing policy endogeneity

Because we exploit the cross-country variation in parental leave policies, our estimates could be confounded by unobserved heterogeneity across countries. We have shown that the estimates are not sensitive to controlling for market and social institutions (Table 3). One may still suspect that the parental leave policy is closely correlated with gender norms, but the correlation between the duration of the paid leave and our gender norm index is moderate, 0.22. Indeed, the estimated coefficients of our interest did not change after controlling for the gender-norm index (Columns 2 and 3 in Table 3). We note that this is not due to an "imprecise" measure of gender norms, because it well explains international differences in gender gaps in skill use and wages.[10] Thus, the contemporaneous omitted variable bias would be of less concern.

Reverse causality is a potential threat to our identification strategy, however, because the parental leave is sometimes regarded as a countermeasure against gender gaps in market outcomes. One possible scenario is that policy makers enhance parental leave policies to meet the demand for child care induced by the increase in labor-force participation among less-skilled women; in this scenario, we would observe a positive correlation between the duration of the parental leave and female skill use among low-skilled women. Alternatively, policy makers may enhance parental leave policies to alleviate large gender gaps between skilled men and women, which would generate a negative correlation between the duration of parental leave and the skill use of skilled women. Thus, our findings can possibly be explained by such alternative scenarios.

To address the reverse causality, we rerun the analysis using past paid leave policies in place of the current one. In particular, we use the duration of paid leave between 1971 and 2011 that is collected by the OECD. If reverse causality is a dominant source of the contemporaneous correlation of the policy and women's skill use, past policies should not be correlated with the current women's skill use. On the other hand, if the parental policy affects women's career development, the past policy variables should affect the current

[10] Although the estimates are not reported in the tables to save space, the results will be provided on request.

skill use, because the policies implemented decades ago would be relevant to some of the population who were ages 25–59 in 2011.

Table 4 demonstrates the estimation results. First, to confirm that generous parental leave policies suppress the skill use of skilled women, we re-estimate our model by using the current policy variable collected by OECD (Column 2 in Panel A). Although the size of the estimated coefficient for the 3rd-quartile group is smaller than the baseline one reported in Column 1, this is driven by two countries, Finland and Norway, where our measure of parental leave duration substantially deviates from that of the OECD.[11] Once these countries are excluded from the estimation sample, our baseline result is quantitatively replicated by the OECD measure (Columns 1 and 2 in Panel B).

Columns 3–6 examine the extent to which our estimation result is robust to the use of past parental leave duration. We find similar estimation results using the paid-leave duration in 2001 and 1991. In comparison, the estimates with the policy variable in 1981 are relatively imprecise, but the estimated coefficient is still negative. Since the current population is less relevant to the policy implemented decades ago, the attenuation of the estimates seems natural. Finally, when we use the paid duration in 1971, the estimate becomes attenuated and turns positive for the 1st- and 4th- quartile groups.

To sum up, our findings are robust to the use of past policy variables, and it seems difficult to explain those findings only by reverse causality. Of course, using lagged independent variables does not completely rule out the potential reserve causality. To overcome this limitation, we need to rely on the exogenous change of parental leave policy, but such an exogenous policy variation is hard to come by and implementing such an estimation is left for future research.

4 Effects on employment, hours, and wages

In the analysis heretofore, we used the literacy skill-use score as the degree of skill-use intensity, but this represents only a part of the wide variety of skill use in the workplace. To complement this analysis, we examine conventional labor-market outcomes such as employment, hours worked, and wage rates as alternative outcome variables. We use various estimation methods depending on the nature of the dependent variables, but the right-hand side of the estimated equations is identical to the model in the previous section.

We first use the full sample to examine the overall effects of parental leave on conventional labor-market outcomes, such as employment, hours worked, and wage rates, to supplement our preceding analyses based on our original skill-use measures (Panel A in

[11] The OECD counts the parental leave duration that is available conditional on not using public childcare centers, while we do not count it, because we do not know if other countries have a similar system.

Table 5). Column 1 indicates that generous parental leave policies decrease the employment probability of women whose literacy skill belongs to the third quartile of the literacy distribution by 5 percentage points, where the average value among men is 0.86. Although we do not find any impact on the employment rate of the least-skilled group when using paid leave, we find s positive impact on this group when using the job protection or full-rate equivalent (Tables D3 and D4).

Column 2 indicates that an additional year of paid parental leave prolongs hours worked by 2.5 hours per week of women at the bottom quartile, whereas it shortens by 2.4 hours at the third quartile of the literacy distribution. Panel B shows that this negative impact disappears when the analysis sample is restricted to the employed, and thus, the negative impact on hours worked is mainly driven by the extensive margin. The fact that generous parental leave shortens the hours worked of relatively skilled women is important in light of findings in the literature indicating that the gender gap in hours worked is a crucial determinant for the gender gap in career development among skilled workers(Bertrand et al., 2010; Gicheva, 2013; Cortés and Pan, 2018).

Column 3 indicates that the length of parental leave negatively affects the hourly rate of pay of higher-skilled workers but not in statistically significant ways.[12] This statistically insignificant result on wages probably reflects the fact that wages are not solely determined by the level of skill use, but it depends on other important considerations, such as the incentive structure within a firm or the degree of labor-market friction. Therefore, the effect of parental leave on wages is hard to detect in a discernible way. Still, when using the job protection policy as well as the full-rate equivalent policy, we found a statistically and economically significant negative impact on wage (Tables D3 and D4).

Overall, these market-outcome results reconfirm the previous result using literacy use on the job as the outcome; longer paid parental leave suppresses the skill use of the women whose literacy skill belongs to the third quartile of the literacy distribution.

5 Selection into jobs as a mediator

We now shed light on the mechanism between parental leave and skill utilization by examining the impact of parental leave on the selection into jobs. Blau and Kahn (2013) suspect that generous family policies push women out of management occupations and professional occupations, except for teachers and nurses. More generally, generous family policies may lead women to routine task-intensive jobs, because employers' costs of parental leave vary across occupations or jobs; a routine worker can be easier to substitute

[12]In this analysis, we used the Heckman sample selection correction method without any variables excluded from the wage equation, and hence, non-random sample selection issues if any, are unlikely to be mitigated. In fact, the resulting estimate was almost identical to the OLS estimate in Panel B.

with other workers while she is on leave.

5.1 Occupation choice

To examine the extent to which occupation choice explains the gender skill-use gap, we re-run our baseline analysis with 2- or 4-digit occupation codes added as control variables and with the sample restricted to the employed population. Since the detailed occupation code is unavailable in 6 countries, they are excluded from the estimation sample, but this sample restriction did not change our baseline result (Column 6 in Table 3 and Column 1 in Table 6). If the negative policy impact on moderately skilled women is driven by the occupation choice, it is expected to disappear after controlling for occupation.[13] We did not, however, find any substantial change in the estimates even after controlling for the 4-digit occupation code (Table 6). This finding is consistent with Goldin (2014), who shows that far more than one half of the gender wage gap is attributable to the wage gap within occupations. Therefore, the gender gap in market outcomes seems to originate from within-occupation difference, and the parental leave policy exacerbates this gap within occupations, rather than the gender gap across occupations.

5.2 Job complexity

The substantial within-occupation gender gap in skill use suggests that women tend to engage in simpler tasks than men, and therefore, we next investigate task complexity. To implement this idea, we need to rely on succinct measures that are comparable across countries. The first measure is respondents' perception of the skill qualification needed to implement the current job in terms of educational attainment and job experience. This measure is controversial because of its vague nature[14], but it is widely used to assess the degree of skill-mismatch in the labor market (OECD, 2013a; Pellizzari and Fichen, 2013). The question regarding education qualification reads, "If applying today, what would be the usual qualifications, if any, that someone would need to GET this type of job?" and respondents are asked to report the corresponding educational level, which the OECD converted into years. Column 4 in Table 5 reports the regression results with this response as the dependent variable. The results show that longer parental leave tends to place the women whose literacy skill belongs to the third quartile of the literacy distribution into jobs that require lower education credentials. The estimated impact, -0.829, is large relative to the male mean value 11.2.

We now move on to another measure of skill requirement in terms of the years of

[13]Relatively uncommon occupations (those with less than 50 observations in the sample) are grouped into a single category.

[14]See Leuven and Oosterbeek (2011) for a critical review.

experience required to be qualified for the current job. The question reads "Supposing that someone with this level of qualification were applying today, how much related work experience would they need to GET this job? Would that be ..." and respondents are required to respond in terms of years of required experience; the possible alternatives are 1) None, 2) Less than 1 month, 3) 1 to 6 months, 4) 7 to 11 months, 5) 1 or 2 years, and 6) 3 years or more. Since this dependent variable is given by a window (i.e., different time spans), we rely on the Tobit (or interval regression) method. The result reported in Column 5 of Table 5 shows that longer parental leave tends to place women with the second and fourth quartiles of literacy distribution into jobs that require fewer years of labor-market experience. The estimated size of the negative coefficient around -0.12 is moderate, relative to the median category of the dependent variable among employed men, which is 4, i.e., 7–11 months or 0.58–0.92 years. In sum, the analysis using the required qualification to fulfill the current job consistently shows that longer parental leave induces the selection of moderately skilled women into jobs that require lower qualifications. These results imply that selection into jobs is an important mediator for why parental leave discourages the skill use of moderately skilled women.

5.3 Promotion

Finally, we examine whether generous parental leave policies reduce the promotion opportunities of female workers through the lens of workplace hierarchy. A worker in a high position presumably engages in non-routine tasks that require his/her individual knowledge, effort, and connections. Thus, the future risk of parental-leave take-up may discourage an employer from placing a female employee in a high position, or even if she is promoted, her knowledge or skills could become obsolete during parental leave. To capture the location of respondents' position in the workplace hierarchy in an internationally comparable way, we use the number of subordinates as an outcome variable. The question that we use for this analysis reads, "How many employees do you supervise or manage directly or indirectly? Would that be ...," and respondents are asked to choose one of the following categories: 1) 0, 2) 1–5, 3) 6–10, 4) 11–24, 5) 25–99, and 6) 100 or more. We combine the last three categories into one category, because only a few people choose the 5th or 6th category.[15] Using only those who work, we regress the dummy variables corresponding to each category on the same set of explanatory variables as equation (6) using OLS.

Table 7 demonstrates that parental leave policies tend to increase the probability to have no subordinates among women relative to men. This negative effect is heterogeneous across skill levels. The least-skilled women experience it at an earlier career stage than

[15]Indeed, the 95th percentile is the 3rd category.

moderately skilled women. Furthermore, the magnitude of the effect is economically significant. For example, the gender gap in the probability to have 11 or more subordinates is widened in the 2nd- and 3rd-quartile groups by 20% and 11% of the male average, respectively. As discussed in Section 6, this observation is consistent with the theoretical prediction from statistical discrimination.

Selection into jobs relies not only on cognitive skill use but also non-cognitive skill use. The estimation results in this section reconfirm that generous parental leave policies reinforce men's roles in the labor market, while thrusting medium-skilled women away from decent career tracks. The effect of parental leave on women's career development depends heavily on the skill level, and the heterogeneity non-monotonically depends on skill levels. We will discuss why parental leave particularly hurts the career development of medium-skilled women in a subsequent section. Before that discussion, we attempt to confirm the robustness of our results.

6 Potential mechanisms

We discuss the mechanisms behind the robust finding that generous parental leave policies suppress the skill-use of skilled women. Parental leave policies could affect women's skill utilization through at least three channels; 1) job protection, 2) human capital depreciation, and 3) statistical discrimination. First, the job protection provided by parental leave policies allows women who would otherwise drop out of the labor force to continue working. Considering that low-skilled workers generally have weaker labor-force attachment than high-skilled workers, the job protection would be effective for low-skilled workers. Indeed, the policy impact on employment is positive only for the least-skilled group (Column 1 in Table D3); furthermore, the job protection policy narrows the gender gap of literacy use at the bottom skill quartile, but this effect reduces to one-third when we focus on the employed population (Columns 5 and 6 in Table D1). We observe a similar tendency in terms of other market outcomes. Thus, the positive effect of parental leave policies on the least-skilled group is arguably driven by the job protection, while other mechanisms could also work among those in the market.

The second possible channel is human capital depreciation during parental leave periods. This effect is likely to be relevant among skilled women and may seem consistent with our empirical evidence. We should note, however, that we examined skill utilization conditional on the *current* skill level measured by the literacy skill score, which is a novel feature of our approach compared with the approach that relies on a proxy for the skill level at a fixed point in time, such as educational attainment. In this setting, skill depreciation caused by parental leave policies should be reflected in the conditioning variable and should not affect skill use conditional on the skill level. Regardless of this feature, one

may argue that unobserved skill, not measured by skill score, may depreciate at different rates across the skill distribution and that those depreciated skills lead to gender gap in skill use.

To address this reasonable concern, we attempt to directly capture skill depreciation by constructing a new variable that captures the years absent from the labor market after school graduation, drawing on the actual years of labor-market experience included in the PIAAC. We estimate the basic model controlling for the years absent from the labor market to see how the estimated coefficients of interest change. If human capital depreciation is a prime mechanism, the coefficient on "Female×PL×Literacy skill" should attenuate substantially. The estimation results reported in Table 8 show that the estimated coefficients do not change after controlling for years absent from labor market. An additional year absent from the labor market reduces literacy use by 0.05 standard deviation, but the estimated coefficients are not heterogeneous across the skill distribution or gender.[16] This evidence suggests that human capital depreciation is unlikely to be a main mechanism.

Finally, generous parental leave policies can potentially encourage employers to statistically discriminate against a certain type of women. To illustrate the basic mechanism, we briefly summarize the model of Thomas (2018). Suppose that an employer chooses a worker to offer training opportunities without observing her future labor-market attachment (particularly after childbearing), but she can signal the degree of her market attachment with some costs. Since the returns to the training depend on the market attachment, the employer offers the training when observing a signal that is higher than a certain threshold. Without a maternity leave policy, most workers quit their jobs after childbearing due to substantial costs to supplying labor while taking care of their children, and thus, they have no incentive to send costly signals, whereas strongly attached workers can afford the signals and collect the returns after childbearing. As a result, the signals are informative to distinguish the strongly attached workers from others. Maternity leave policies lower the cost of the labor supply after childbearing, thereby preventing workers with weaker market attachments from getting out of the market (but they do not work full time). Furthermore, their career consideration leads them to behave similarly to the strongly attached workers; i.e., they send the signal to get training opportunities. Consequently, maternity leave policies make it more difficult for employers to distinguish strongly attached workers from moderately attached workers, which heightens the threshold to offer training and lowers the probability to get training opportunities, given each level of the signal. Therefore, maternity leave takes away training opportunities from

[16] A possible exception is the most-skilled women. The penalty of leaving the market is larger for women than men at this top skill quartile, which may be because of a difference in the skill sets possessed by men and women or other reasons. Sarsons (2017), for example, suggests that the same signal brings different information, depending on whether it comes from a man or a woman; bad information from a man tends to be interpreted in a more optimistic way than bad information from a woman.

some workers who otherwise would have such opportunities, particularly workers on the verge of the training threshold.

The essence of her model is the asymmetric information setting, where the employer makes the training decision without observing the exact type of a worker, and the maternity leave policy makes the worker's signal less informative. In our context, the source of asymmetric information is the worker's skill level, which is presumably well related to the labor-market attachment.[17] The analogous argument to Thomas (2018) suggests that parental leave policies allow low-skilled workers to participate in the market after childbearing, but make the skilled workers less distinguishable from others, because the expected skill level conditional on each value of the signal becomes lower due to the parental leave policy.[18] Thus, this statistical discrimination process pushes some skilled women out of career tracks, leading to the under-utilization of their skill.

This explanation is consistent with our empirical findings on skill use, indicating that parental leave policies have a negative impact, particularly on the 3rd-quartile group, while the negative impact is also found among the 2nd- and 4th-quartile groups as well. The "job" in the model of statistical discrimination often refers to promotion along a job ladder. In this case, statistical discrimination would lessen the promotion probability of a skilled worker at the middle of the job ladder, because a generous parental leave policy increases the threshold for promotion. This prediction is particularly in line with our empirical results on promotion. Generous paid leave policies hinder the promotion of women in the 2nd- and 3rd-skilled groups to positions that manage more than 10 subordinates, while hindering the promotion of women in the lowest-skilled group at earlier career stages (Table 7). This finding corroborates with the hypothesis that statistical discrimination is a source of the side effect from generous parental leave policies.

7 Conclusion

This study investigated the impact of parental leave policies on the employment and career development of women relative to men through the lens of the skill utilization. Drawing on the PIAAC covering 24 OECD countries, we constructed objective measures of literacy and its use on the job. Exploiting the cross-country variation in the length of paid leave, we found substantial heterogeneity in the impacts of parental leave on the gender gap in skill utilization; for the lowest-skilled group, generous parental leave policies

[17] In this case, a worker is not characterized by the marginal utility of leisure, as in Thomas (2018), but by the productivity and/or returns to the training. If the productivity (or returns to the training) of some workers is in the range where they participate in the market after childbearing only under the regime with the parental leave policy, then the same prediction as Thomas (2018) is obtained.

[18] Although the skilled worker has an incentive to send a higher signal under the regime with the parental leave policy, her optimal signal would not be high enough to get the same training opportunities as in the regime without the parental leave policy, because sending the higher signal is costly.

increase the skill utilization of women through encouraging employment. In contrast, for the moderately high-skilled group, it suppresses their skill utilization, through depressing both employment and skill use, conditional on employment. This basic finding was robust against controlling for other cross-country differences, such as other family policies, gender norms, and labor-market institutions. Using conventional labor-market outcomes, such as employment, hours worked, required qualifications, and promotion, rendered substantially the same results. These findings suggest that expanding parental leave policies entails a trade off; on one hand, parental leave promotes the employment of the least-skilled women who would otherwise drop from the labor market, while on the other hand, the policy hinders the career advancement of moderately skilled women.

We investigated why moderately skilled women suffer from the expansion of parental leave, focusing on two plausible hypotheses: human capital depreciation during the leave and the statistical discrimination by employers. Between the two alternatives, human capital depreciation does not line up with our examination of skill utilization conditional on skill score, because skill depreciation should be captured by a lower skill score. Further examination based on the actual years of leave from the labor market negates skill depreciation as an explanation. Alternatively, predictions from statistical discrimination by employers do not contradict the empirical findings in this paper. Employers that are uncertain about each worker's future commitment to the job shy away from promoting women with the fear that they will have less commitment in the future due to child bearing and rearing; the extension of parental leave policies lowers the cost of staying on the job among less committed women, and thus firms become more choosy when they decide which women to promote. Under a generous policy regime, only very high-skilled women are promoted to managerial positions; on the other hand, moderately skilled women on the verge of promotion become excluded from promotion opportunities. Our robust finding that women with moderately high skill, not the ones with the highest skill, suffer from the extension of parental leave corroborates with the theoretical consequence of statistical discrimination.

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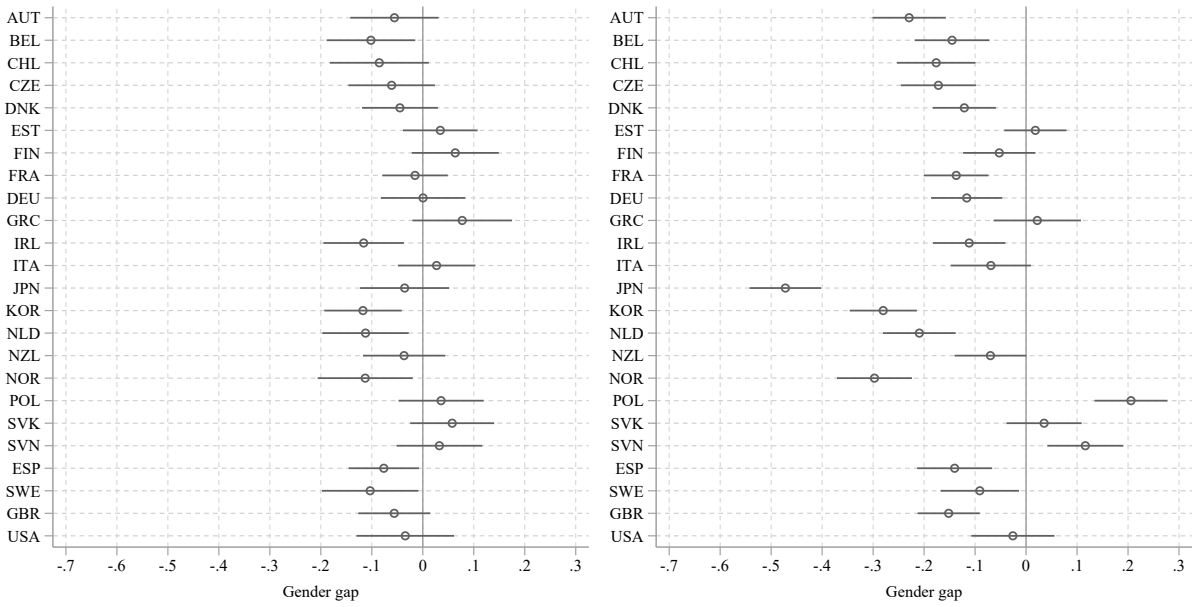
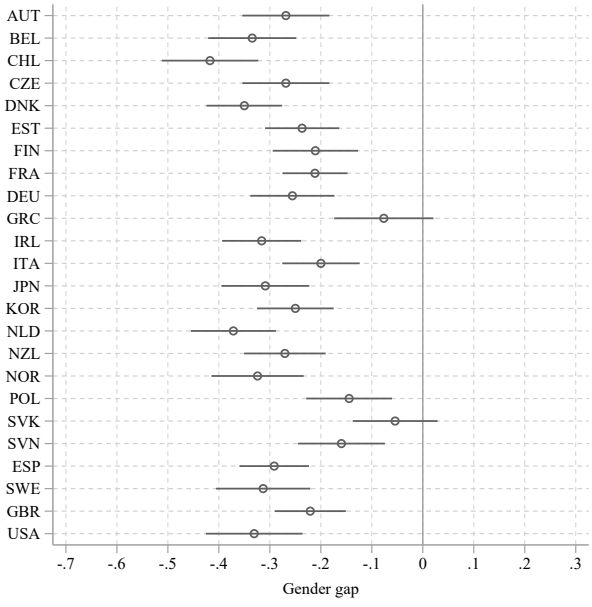
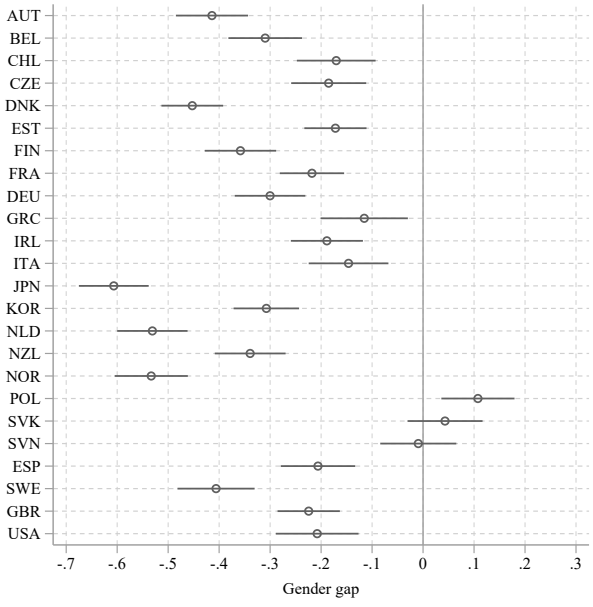


(a) Literacy skill

(b) Literacy skill use



(c) Numeracy skill



(d) Numeracy skill use

Figure 1: Gender gaps in skill and skill use

Note: This figure shows unconditional gender gaps in skill and skill use. Each point represents the gender gap, and the bars indicate its 95 percent confidential interval.

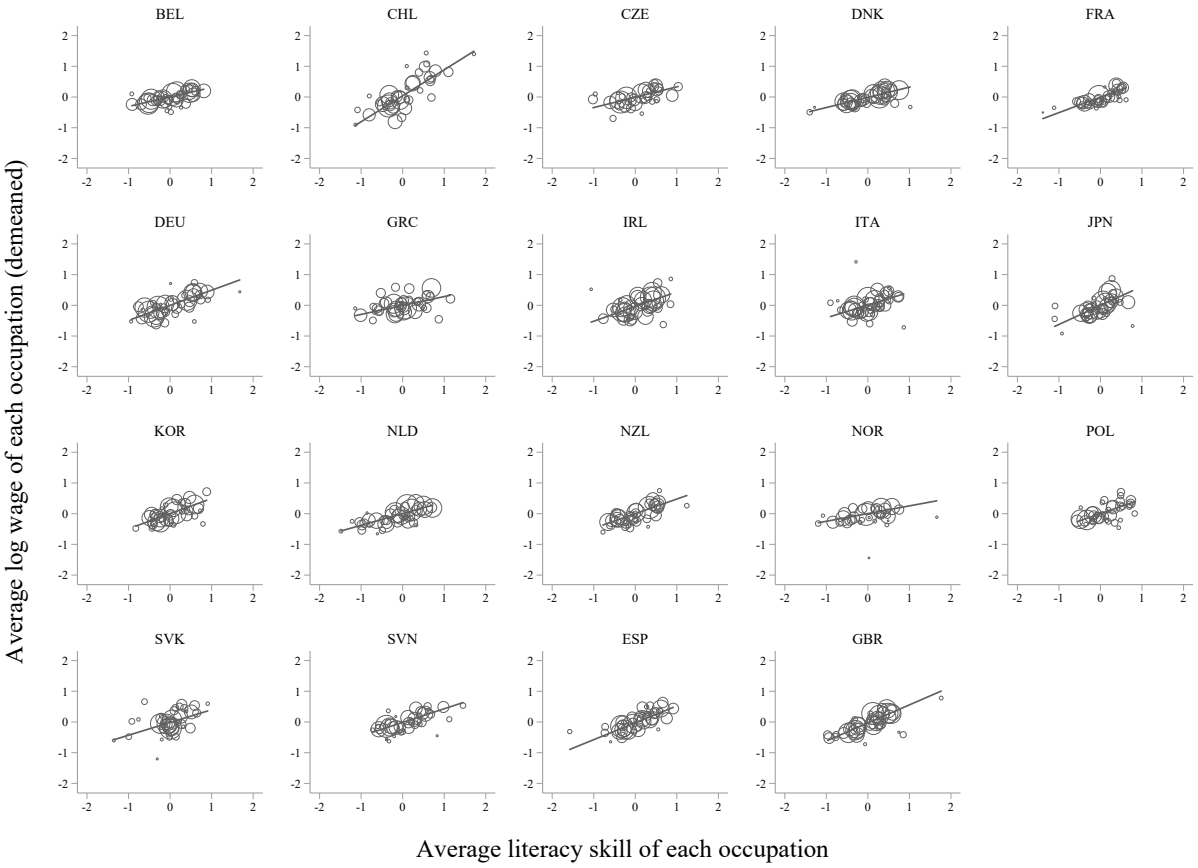


Figure 2: Occupation-average wage rates and literacy skill

Note: This figure shows the correlation between occupation-average wage rates and average literacy skill. The size of each circle indicates the number of observations engaging in each occupation. The line is the fitted value by the weighted least squares, where the number of observations in each occupation is used as a weight.

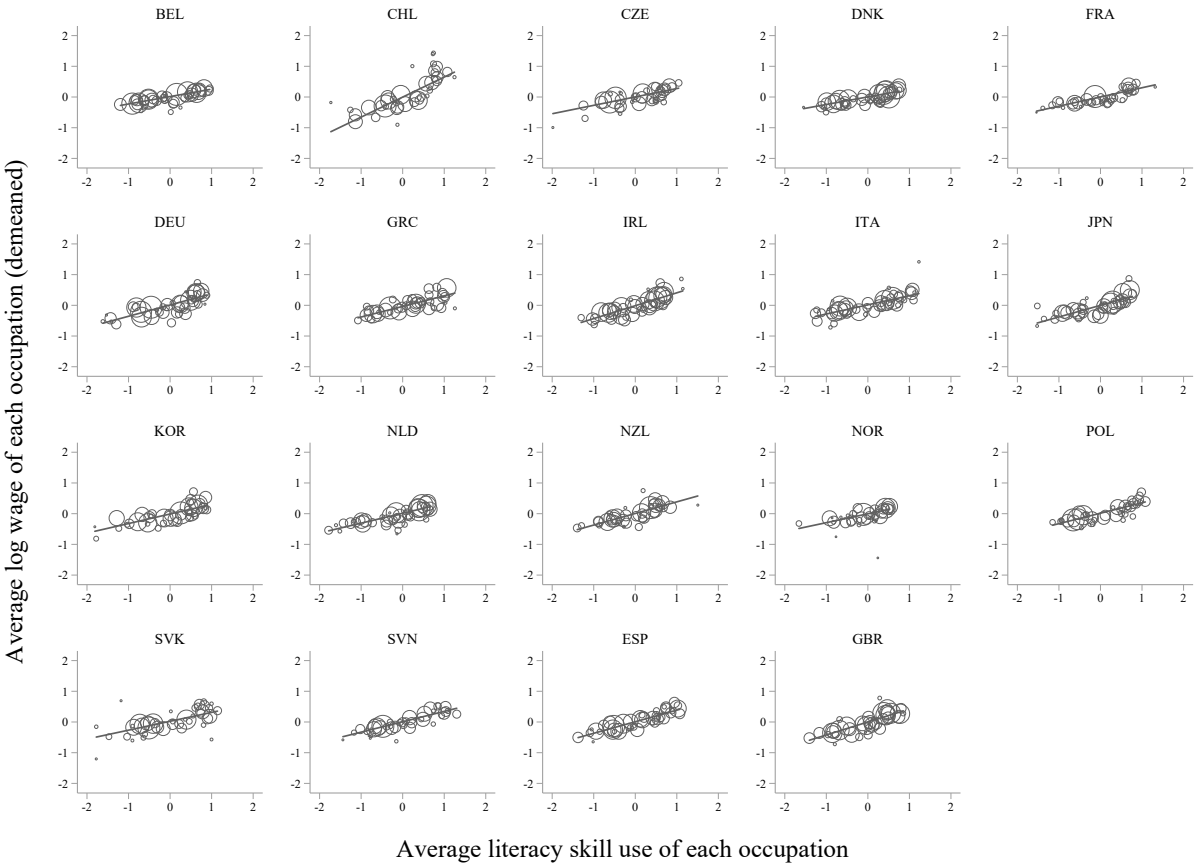
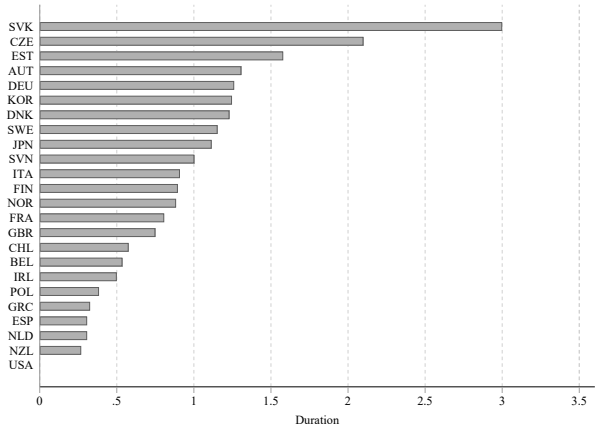
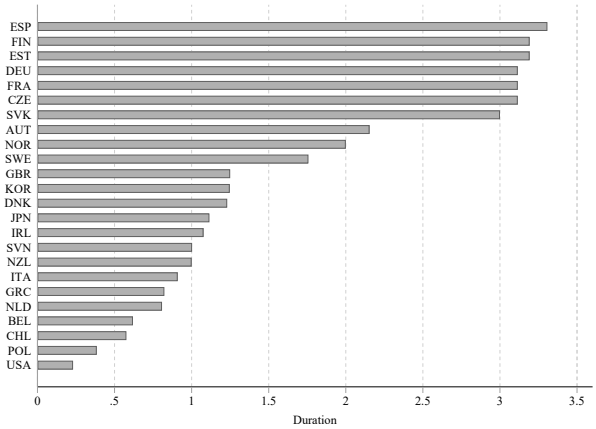


Figure 3: Occupation-average wage rates and literacy skill use

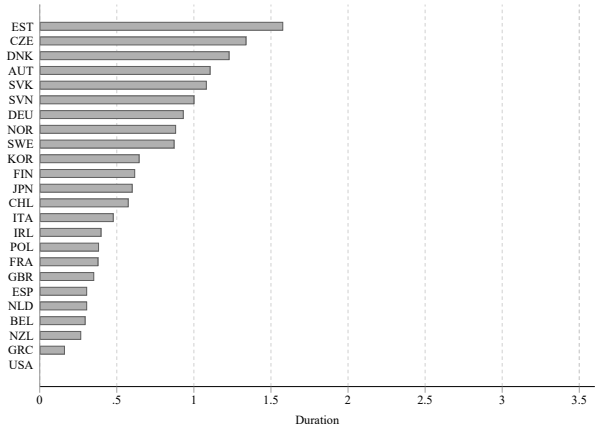
Note: This figure shows the correlation between occupation-average wage rates and average literacy skill use. The size of each circle indicates the number of observations engaging in each occupation. The line is the fitted value by the weighted least squares, where the number of observations in each occupation is used as a weight.



(a) Paid parental leave in 2011



(b) Job protection in 2011



(c) Full-rate equivalent in 2011

Figure 4: Summary of parental leave policies

Data source: The Working Conditions Laws Database of the ILO and the OECD family database. See Appendix B for a full description of the data sources.

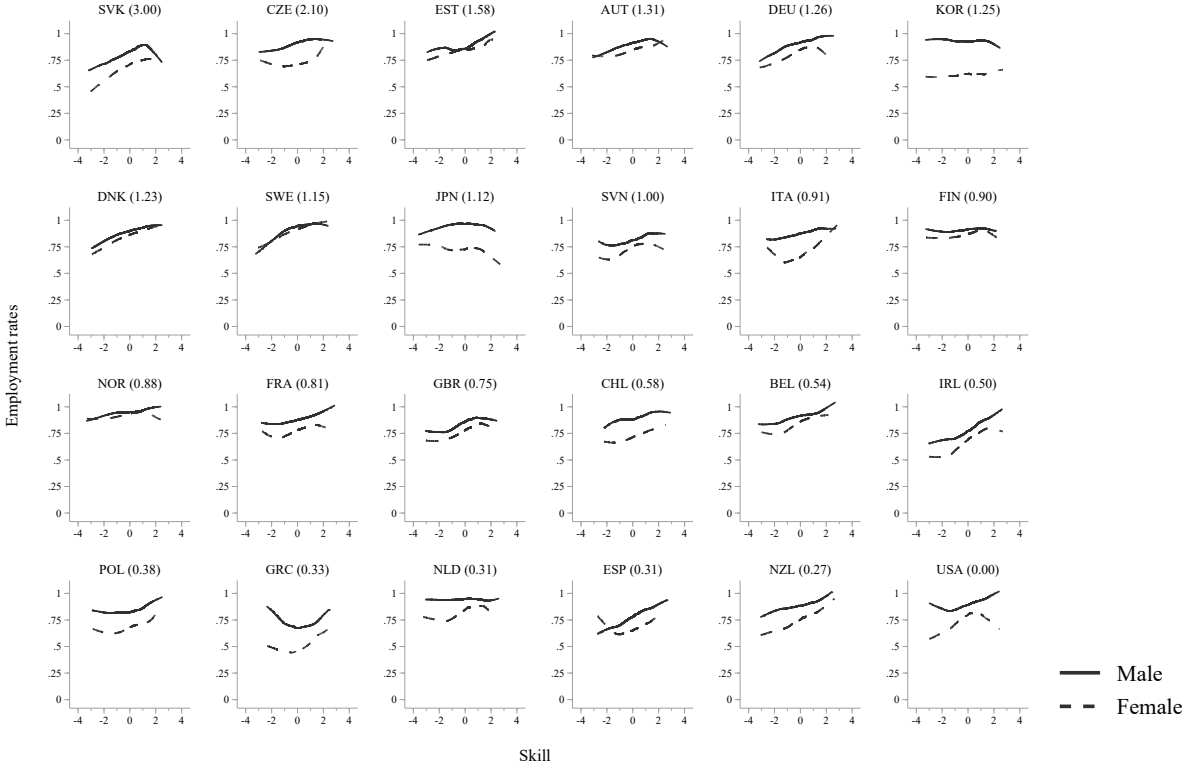


Figure 5: Literacy and employment rate

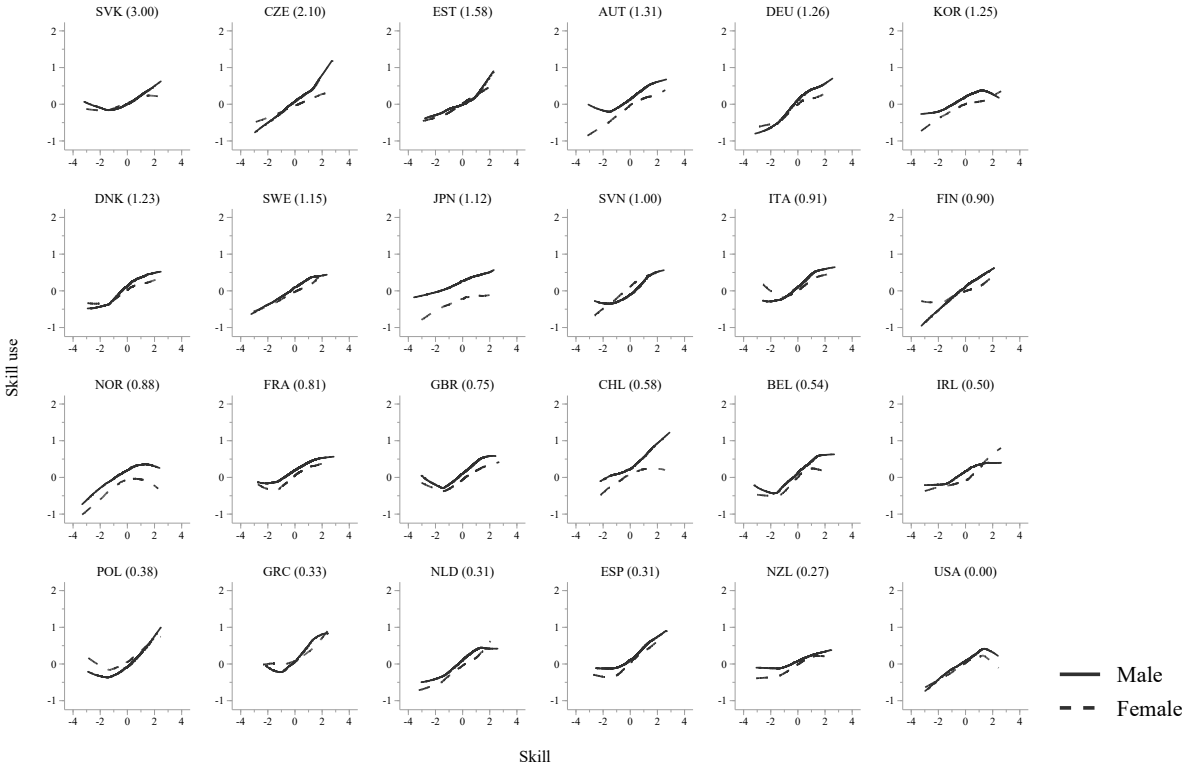


Figure 6: Literacy and literacy-use among labor-force participants

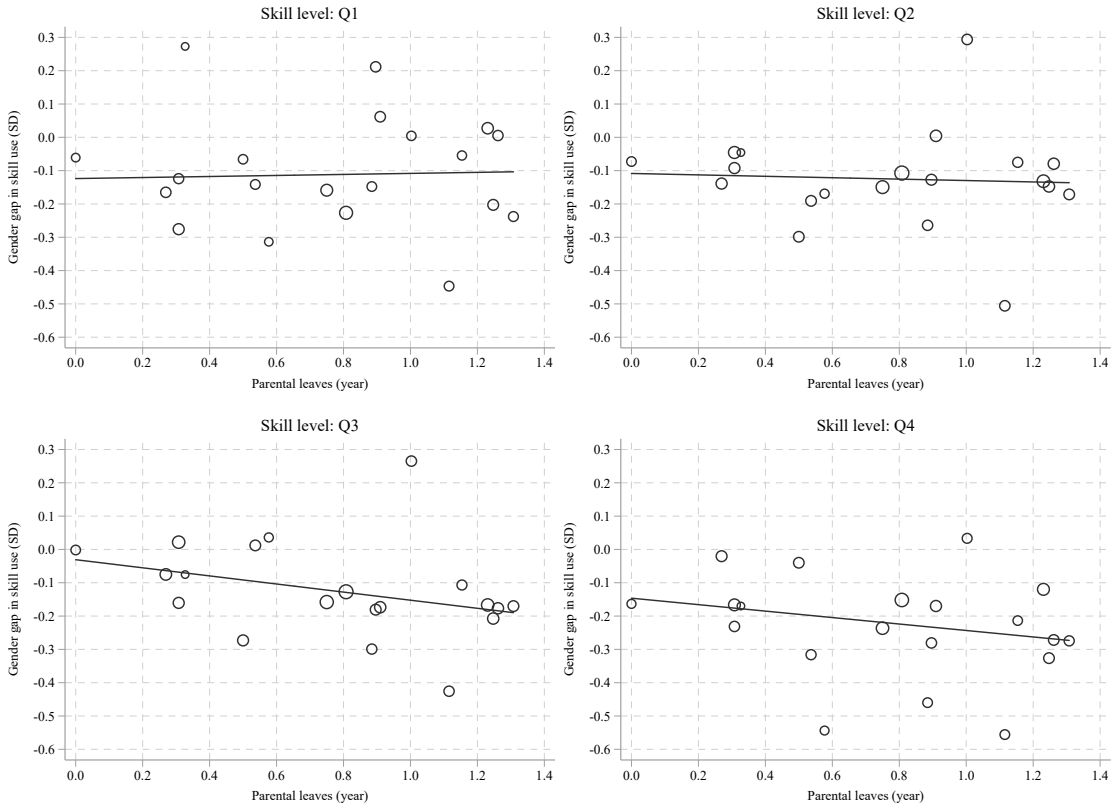


Figure 7: Unconditional gender gap in literacy skill use and the paid leave policy

Note: This figure shows relationship between the gender gap in literacy skill use and the paid leave policy. The gender gap in each country is calculated as a raw difference in average skill-use levels between employed women and men. The line is the fitted value by the weighted least squares, where the number of observations in each country is used as a weight. In this figure, ex-communist countries are excluded, because their social institutions tend to differ from those of other countries (de Haan, 2012).

Table 1: Participating countries in PIAAC

Round 1 (2008–2013)	Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, Netherlands, Norway, Poland, Russian Federation, Slovak Republic, Spain, Sweden, United Kingdom, United States
Round 2 (2012–2016)	Chile, Greece, Indonesia, Israel, Lithuania, New Zealand, Singapore, Slovenia, Turkey
Round 3 (2016–2019)	Ecuador, Hungary, Kazakhstan, Mexico, Peru, United States

Table 2: Regression estimates of hourly wages on skill and skill use

Dep.Var. $ln(wage)$	Skill: Literacy		Skill: Numeracy	
	(1)	(2)	(3)	(4)
Skill	0.051***	0.039***	0.050***	0.036***
	(0.006)	(0.005)	(0.005)	(0.005)
Skill-use	0.107***	0.072***	0.079***	0.045***
	(0.008)	(0.008)	(0.005)	(0.004)
Occupation	No	Yes	No	Yes
Observations	14143	14143	13964	13964
Countries	21	21	21	21

Note: This table shows the estimation results of equation (5). We did not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language was the same as the native language of the respondent, or that parents were immigrants. Standard errors clustered by each country are in parenthesis. * p< 0.1, ** p< 0.05, *** p < 0.01.

Table 3: The paid leave policy and utilization of literacy skill at work

Dep.Var. Literacy skill use	Full sample					Employed
	(1)	(2)	(3)	(4)	(5)	(6)
Female×PL×Literacy skill: Q1	0.142**	0.141**	0.139***	0.074**	0.067**	0.026
	(0.070)	(0.060)	(0.035)	(0.035)	(0.033)	(0.044)
Female×PL×Literacy skill: Q2	-0.009	-0.007	-0.006	-0.086	-0.072	-0.042
	(0.062)	(0.055)	(0.037)	(0.069)	(0.051)	(0.037)
Female×PL×Literacy skill: Q3	-0.088	-0.091	-0.091**	-0.211***	-0.202***	-0.081**
	(0.065)	(0.060)	(0.046)	(0.055)	(0.056)	(0.040)
Female×PL×Literacy skill: Q4	-0.011	0.005	0.004	-0.072	-0.069	-0.034*
	(0.060)	(0.057)	(0.035)	(0.045)	(0.044)	(0.019)
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies		X	X	X	X	X
Female×Skill×Gender norm			X	X	X	X
Female×Skill×Industrial structure				X	X	X
Female×Skill×Market institutions					X	X
Countries	24	24	24	24	24	24
Observations	56685	56685	56685	56685	56685	46280

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for literacy score. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Robustness checks against the reverse causality using the past paid leave policies

Dep.Var. Literacy skill use	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All available countries						
Female×PL×Literacy skill: Q1	0.074***	0.022	0.035*	0.063***	0.204***	0.224***
	(0.027)	(0.019)	(0.019)	(0.019)	(0.064)	(0.063)
Female×PL×Literacy skill: Q2	-0.026	-0.056*	-0.057*	-0.026	-0.036	0.109
	(0.061)	(0.033)	(0.033)	(0.037)	(0.128)	(0.072)
Female×PL×Literacy skill: Q3	-0.204***	-0.090	-0.106*	-0.066	-0.032	0.033
	(0.066)	(0.064)	(0.055)	(0.066)	(0.163)	(0.119)
Female×PL×Literacy skill: Q4	-0.103**	-0.102***	-0.088***	-0.051	0.028	0.164***
	(0.044)	(0.034)	(0.027)	(0.032)	(0.132)	(0.063)
Parental leave policy	2011	2011	2001	1991	1981	1971
Source of parental leave policy	Original	OECD	OECD	OECD	OECD	OECD
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X	X
Countries	21	21	21	21	21	21
Observations	49882	49882	49882	49882	49882	49882
Panel B: Exclude Finland and Norway						
Female×PL×Literacy skill: Q1	0.070**	0.057**	0.062**	0.076***	0.190***	0.232***
	(0.029)	(0.025)	(0.027)	(0.027)	(0.063)	(0.067)
Female×PL×Literacy skill: Q2	-0.040	-0.038	-0.038	-0.027	-0.085	0.055
	(0.061)	(0.058)	(0.047)	(0.045)	(0.120)	(0.092)
Female×PL×Literacy skill: Q3	-0.214***	-0.171**	-0.143**	-0.093	-0.052	0.012
	(0.064)	(0.073)	(0.059)	(0.070)	(0.162)	(0.148)
Female×PL×Literacy skill: Q4	-0.122***	-0.105**	-0.063*	-0.058	-0.035	0.092
	(0.037)	(0.043)	(0.037)	(0.035)	(0.108)	(0.060)
Parental leave policy	2011	2011	2001	1991	1981	1971
Source of parental leave policy	Original	OECD	OECD	OECD	OECD	OECD
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X	X
Countries	19	19	19	19	19	19
Observations	45896	45896	45896	45896	45896	45896

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for literacy score. As policy parental leave variables, we use the duration of paid leave between 1971 and 2011 which are collected by the OECD as well as the duration in 2011 in our database. In column 1, to ease comparison, we restrict the sample to countries where the OECD database is available. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: The paid leave policy and market outcomes

Dependent variable	Employment (1)	Work hours (2)	ln(*wage*) (3)	Quali.Educ. (4)	Quali.Exp. (5)
Panel A: All individuals					
Female×PL×Literacy skill: Q1	0.017	2.466**	0.002	-0.049	0.026
	(0.018)	(1.132)	(0.037)	(0.221)	(0.026)
Female×PL×Literacy skill: Q2	-0.018	0.259	-0.026	-0.376	-0.112**
	(0.026)	(1.542)	(0.040)	(0.292)	(0.055)
Female×PL×Literacy skill: Q3	-0.050***	-2.377***	-0.030	-0.829***	-0.080
	(0.016)	(0.796)	(0.033)	(0.204)	(0.085)
Female×PL×Literacy skill: Q4	-0.019	-0.958	-0.029	-0.340	-0.128**
	(0.018)	(0.984)	(0.026)	(0.289)	(0.059)
Mean value among men	0.86	37.7	3.75	11.2	0.58–0.92 (median)
Method	OLS	Tobit	Heckit	OLS	Tobit
Country×Skill quartile FE	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X
Countries	24	23	21	24	24
Observations	49334	45888	43033	49334	49334
Panel B: Employed individuals					
Female×PL×Literacy skill: Q1		2.304**	0.002	-0.276***	0.033
		(1.036)	(0.037)	(0.098)	(0.037)
Female×PL×Literacy skill: Q2		0.817	-0.026	-0.135	-0.094
		(0.924)	(0.040)	(0.119)	(0.060)
Female×PL×Literacy skill: Q3		0.205	-0.030	-0.159**	-0.001
		(0.590)	(0.032)	(0.071)	(0.094)
Female×PL×Literacy skill: Q4		0.545	-0.030	-0.003	-0.098
		(0.577)	(0.026)	(0.081)	(0.061)
Mean value among men		42.3	3.75	13.1	1–2 (median)
Method		OLS	OLS	OLS	Tobit
Country×Skill quartile FE		X	X	X	X
Female×Skill×Family policies		X	X	X	X
Female×Skill×Gender norm		X	X	X	X
Female×Skill×Industrial structure		X	X	X	X
Female×Skill×Market institutions		X	X	X	X
Countries		23	21	24	24
Observations		37259	32434	38929	38929

Note: This table shows estimation results regarding market outcomes and job qualification. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: The paid leave policy and utilization of literacy skill at work (Control for occupation)

Dep.Var. Literacy skill use	Baseline	Control for occupation	
	(1)	(2)	(3)
Female×PL×Literacy skill: Q1	0.027	-0.000	0.005
	(0.043)	(0.042)	(0.039)
Female×PL×Literacy skill: Q2	-0.058**	-0.045**	-0.036
	(0.024)	(0.022)	(0.022)
Female×PL×Literacy skill: Q3	-0.067*	-0.068*	-0.066**
	(0.037)	(0.038)	(0.032)
Female×PL×Literacy skill: Q4	-0.031*	-0.045***	-0.051***
	(0.017)	(0.009)	(0.013)
Country×Skill quartile FE	X	X	X
Female×Skill×Family policies	X	X	X
Female×Skill×Gender norm	X	X	X
Female×Skill×Industrial structure	X	X	X
Female×Skill×Market institutions	X	X	X
Occupation code		2 digit	4 digit
Countries	18	18	18
Observations	34861	34861	34861

Note: This table shows estimation results regarding the literacy use, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: The paid leave policy and the number of subordinates

Dependent variable	Number of subordinates			
	0	1–5	6–10	11 or more
	(1)	(2)	(3)	(4)
Female×PL×Literacy skill: Q1	0.007	0.027**	-0.022***	-0.012
	(0.019)	(0.013)	(0.007)	(0.009)
Female×PL×Literacy skill: Q2	0.024	-0.003	0.004	-0.026***
	(0.015)	(0.011)	(0.009)	(0.010)
Female×PL×Literacy skill: Q3	0.019	0.009	-0.015	-0.014*
	(0.023)	(0.017)	(0.010)	(0.008)
Female×PL×Literacy skill: Q4	0.021	-0.011	0.003	-0.013
	(0.018)	(0.018)	(0.008)	(0.015)
Mean value among men	0.596	0.187	0.086	0.131
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	24	24	24	24
Observations	39680	39680	39680	39680

Note: This table shows estimation results regarding the number of subordinates, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: The paid leave policy, years leaving labor market and utilization of literacy skill at work

Dep.Var: Literacy skill use	Full sample		Employed	
	(1)	(2)	(3)	(4)
Female×PL×Literacy skill: Q1	0.065**	0.097***	0.030	0.049
	(0.027)	(0.030)	(0.051)	(0.054)
Female×PL×Literacy skill: Q2	-0.066	-0.041	-0.023	-0.007
	(0.054)	(0.051)	(0.037)	(0.037)
Female×PL×Literacy skill: Q3	-0.219***	-0.191***	-0.067*	-0.060
	(0.054)	(0.052)	(0.038)	(0.038)
Female×PL×Literacy skill: Q4	-0.098**	-0.064	-0.034	-0.021
	(0.043)	(0.044)	(0.023)	(0.020)
AL×Literacy skill: Q1		-0.055***		-0.016***
		(0.006)		(0.003)
AL×Literacy skill: Q2		-0.058***		-0.013***
		(0.006)		(0.003)
AL×Literacy skill: Q3		-0.053***		-0.015***
		(0.006)		(0.003)
AL×Literacy skill: Q4		-0.051***		-0.011***
		(0.006)		(0.004)
Female×AL×Literacy skill: Q1		0.001		0.000
		(0.004)		(0.003)
Female×AL×Literacy skill: Q2		0.003		-0.004
		(0.007)		(0.004)
Female×AL×Literacy skill: Q3		-0.005		-0.002
		(0.005)		(0.003)
Female×AL×Literacy skill: Q4		-0.016**		-0.008**
		(0.007)		(0.003)
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	21	21	21	21
Observations	49230	49230	40936	40936

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for literacy score. AL is the actual years leaving labor market. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A Skill use items

A.1 Literacy skill use

1. Read directions or instructions
2. Read letters, memos or e-mails
3. Read articles in newspapers, magazines, or newsletters
4. Read articles in professional journals or scholarly publications
5. Read books
6. Read manuals or reference materials
7. Read bills, invoices, bank statements or other financial statements
8. Read diagrams, maps or schematics

A.2 Numeracy skill use

1. Calculate prices, costs, or budgets
2. Use or calculate fractions, decimals, or percentages
3. Use a calculator – either hand-held or computer-based
4. Use simple algebra or formulas
5. Use more advanced math or statistics, such as calculus, complex algebra, trigonometry, or use of regression techniques
6. Prepare charts, graphs or tables

B Data source of parental leave policies

Table B1: Data source of parental leave policies

Country	Paid leave	Job protection	Full-rate equivalence	Source	Note
Austria	1.308	2.154	1.108	Maternity Protection Act: 3, 5, 14.4, 15.1. General Social Insurance Act: 162. Child Care Benefit Act 14.1.	For parental leave benefits, there are some alternatives: 14.53 EUR/day for 30 months, 20.80 EUR/day for 20 months, 26.60 EUR/day for 15 month, 33 EUR/day for 12 months, or for 12 months with replacement rate, 0.8. We employed the last one, which is also the one employed in the OECD family database.
Belgium	0.537	0.619	0.297	Labour Act Art: 39, Royal Decree Regarding the Establishment of a Parental Leave in the Framework of Interruption of Professional Career Art: 2, 10, Royal Decree to Execute the Act Respecting Compulsory and Indemnity Insurance Scheme Art, 114, 115, 216, 217	The duration of job protection is 4 months. Parental leave benefits are flat-rate (679.59 EUR/month) for 3 months. We calculated the replacement rate using the median value of female monthly earnings (= 679.59/2187.625).
Chile	0.577	0.577	0.577	Labour Code: 195, 197	
Czech	2.100	3.115	1.340	Labour Code: 195, 196	The duration of parental leave is up to 3 years of a child, after the end of the maternity leave. Parental leave benefits are fixed amount with four alternatives: 11,400 CZK until the child is 24 months old, 7,600 CZK until 36 months old, 7,600 CZK until 9 months old and after it 3,800 CZK until 48 months old, and lower rate with 3,000 CZK for some periods. We employed the first one, and calculated the replacement rate using median female wage in PIAAC.
Denmark	1.231	1.231	1.231	Consolidation Act no. 1084 of 13 November 2009 on Entitlement to Leave and Benefits in the Event of Childbirth: 6, 7, 9, 10, 21, 33, 35, 36, 37	The weekly maternity leave benefits are capped by DKK 3,332. Since parents are allowed to prolong the parental leave (from 32 weeks) up to 46 weeks, we employed 46 weeks as the duration of parental leave.
Estonia	1.580	3.192	1.580	Holidays Act: 27, 30, 31, Health Insurance Act: 58, 84, Parental Benefits Act: 2, 3, 4	Although there is no paid parental leave, parents have right to receive parental benefits for 435 days. If the mother takes unpaid parental leave, the amount of the benefits is calculated on the basis of her wage. If she does not take parental leave, the amount may be calculated on the basis of his spouse's wage. The amount is capped by three time the average income.

Country	Paid leave	Job protection	Full-rate equivalent	Source	Note
Finland	0.896	3.192	0.619	Health Insurance Act: 9, 10, 11	The replacement rate of maternity leave benefits is progressive: 70 percent up to 26,720 EUR, 40 percent up to 41,100 EUR, and then 25 percent. The replacement rate of maternity leave benefits was evaluated at median of female earnings using PIAAC. Finland may have home-care leave until the child becomes age 3, if that child does not enroll public childcare. We excluded this type of leave from our definition of paid parental leave. Note that home-care leave benefit is 327.46 EUR/month, which is relatively small amount (female median monthly earning in PIAAC is 2,457 EUR, so if we take the replacement rate into account, equivalent weeks will be similar, regardless of inclusion of home care benefits).
France	0.808	3.115	0.380	Labour Code: 1225-17, 1225-18, 1225-19, 1225-2020, 1225-47, 1225-48, 1225-54, Social Security Code: 331-3, 331-4, 331-5, 331-6, 323-4, OECD family database	According to the OECD family database, parental leave benefits may be available, but not referred to in the ILO database. Thus, we followed the OECD family database. While the duration of paid leave was of 2011, the replacement rate was of 2016, due to data availability.
Germany	1.262	3.115	0.934	Maternity Protection Act: 3.2, 6.1, 13.1, 14.1. Parental Allowance and Parental Leave Act: 1, 2.1, 2.2, 2.5, 15.2, 15.3, 16.1, 16.3.	The parental leave benefits are capped by EUR 1,800 (monthly).
Greece	0.327	0.823	0.163	Social Security Programs Throughout the World: Europe, 2010	OECD family database suggests that Greece has 26 weeks special parental leave with flat amount, which is not shown in ILO database, and we did not take it into account. (Note that this value from the OECD family database was about policy in 2016.)
Ireland	0.500	1.077	0.400	Maternity Protection Act: 8, 10-11, 14, 16. Parental Leave Act: 6. Social Welfare Consolidation Act: 6, 47, 49.	The maternity leave benefits are capped by EUR 280 per week.
Italy	0.910	0.910	0.480	Legislative Decree No. 151 of 2001: 16, 20, 22, 26, 32, 34	
Japan	1.115	1.115	0.603	Labor Standards Act 1947: 65, Employment Insurance Act: 61. National Health Insurance Law: 8. Childcare and Elderly care Act: 5, 9	Information about parental leave policy in the ILO database is incorrect.

Country	Paid leave	Job protection	Full-rate equivalent	Source	Note
Korea	1.247	1.247	0.647	Labor Standards Act: 20, 74, 76. Act on Equal Employment and Support for Work-Family Reconciliation: 19. Enforcement Decree of the Employment Insurance Act: 95, 100, 101.	The parental leave benefits should be between 500,000 won/month and 1 million won/month.
Netherlands	0.308	0.808	0.308	Work and Care Act: 3.1.2, 3.1.3, 3.8, 6.1.1, 6.2	
New Zealand	0.269	1.000	0.269	Parental Leave and Employment Protection Act 1987: 9.1, 26, 28, 29, 30, 71J.	The rate of maternity leave payments is the lesser of USD 325 or 100 percent of weekly payment.
Norway	0.885	2.000	0.885	Working Environment Act: 12. National Insurance Act 14.7.	Norway has two alternatives 46 weeks with 100 percent replacement rate and 56 weeks with 80 percent replacement rates. Although we employed the first one, these two has little difference in terms of full-rate equivalent. Norway has home care leave benefits, which are available for 23 months (3,303 NOK/month for 23 months from 13 months old) if the child does not use public early childhood education and care services, but we did not include this in the definition of paid parental leave.
Poland	0.385	0.385	0.385	Social Security Program throughout the World, Europe 2010.	Although Poland has care leave for 60 days per year if the child is younger than 8 years old, we did not include this because this seems to be a temporal leave, say, when a child gets sick.
Slovak Republic	3.000	3.000	1.084	Labour Code: 166.1, Act on Social Insurance 48.2, 48.3, 53, 55. Social Security Programs throughout the World, Europe 2010, 2012.	In terms of the duration of maternity leave, the ILO database seems incorrect, which may be the duration in 2009 but not 2011. The amount of parental leaves benefit is fixed, 164.22 EUR/month in 2010. The replacement rate was evaluated at the median female wage in PIAAC.
Slovenia	1.003	1.003	1.003	Parental Protection and Family Benefits Act: 17, 26, 29, 31, 41, 43, 44	
Spain	0.308	3.308	0.308	Decree No.1/1995 enacting the Worker's Charter Art: 46, 48. Royal Decree No295/2009 on Cash benefits of the Social Security System concerning Maternity, Paternity, Risk during Pregnancy and Risk during Breastfeeding Art: 3, 8	

Country	Paid leave	Job protection	Full-rate equivalent	Source	Note
Sweden	1.154	1.758	0.874	Parental Leave Act: 4, 5. Public Insurance Act: 4.3, 4.5, 4.6.	Sixty days out of 480 days are given to each parent as exclusive right and the remaining 300 days can be divided between them however they choose. Thus, we defined 420 days as paid leave period for the mother. Since the parental leave benefits exceeding 390 days are the flat amount, 180 SEK/day. The replacement rate of this flat part was evaluated at female mean monthly earnings in 2011 (SEK 26,200) from "Sweden and gender equality."
United Kingdom	0.750	1.250	0.354	Employment Rights Act 1996: 71. The Maternity and Parental Leave Regulations 1999: 7, 14, 15. Social Security Contributions and Benefits Act 2002: 165, 166. Statutory Maternity Pay (General) Regulations 1986: 2	The replacement of the maternity leave benefits is 90 percent for the first 6 weeks (without ceiling), and the lower of either 128.73 pounds or 90 percent of average weekly earnings for the remaining 33 weeks. The replacement rate was evaluated at the median female wage in PIAAC.
United States	0.000	0.231	0.000	Family and Medical Leave Act: 102	While there is no Federal-level paid leaves, some states have paid leave systems.

Note: One year was counted by 52 weeks and one month was counted by 4.3 weeks.

C Summary statistics of social institutions and gender norms

Table C1: Summary statistics of institutional indices

	Dual earner penalty	Childcare enrollment	Gender norms	Public sector	Service sector	Emp. protect.	Union density
AUT	-0.128	0.172	-0.571	2.440	0.284	5.050	0.228
BEL	-0.089	0.413	-0.611	3.131	0.551	4.811	0.257
CHL	-0.071	0.176	-0.348	1.800	0.153	1.400	0.140
CZE	0.011	0.062	-0.305	2.751	0.158	2.093	0.218
DNK	-0.145	0.675	-0.934	2.320	0.664	6.300	0.359
EST	0.000	0.217	-0.335	2.066	0.070	1.688	0.257
FIN	-0.271	0.285	-0.818	2.167	0.696	5.009	0.316
FRA	0.029	0.510	-0.712	2.823	0.077	4.440	0.235
DEU	0.172	0.252	-0.478	2.842	0.185	4.456	0.206
GRC	-0.254	0.229	-0.263	2.440	0.228	2.735	0.217
IRL	-0.446	0.229	-0.549	1.978	0.326	4.852	0.267
ITA	-0.244	0.272	-0.467	3.032	0.363	3.705	0.215
JPN	-0.175	0.266	0.359	2.085	0.190	4.577	0.120
KOR	-0.216	0.290	0.060	2.168	0.099	2.375	0.122
NLD	-0.259	0.596	-0.527	2.884	0.184	5.141	0.257
NZL	-0.300	0.381	-0.606	1.010	0.209	4.094	0.212
NOR	-0.209	0.551	-0.913	2.310	0.535	9.659	0.358
POL	-0.012	0.080	-0.236	2.391	0.136	1.324	0.193
SVK	0.020	0.046	-0.239	2.635	0.141	1.789	0.241
SVN	-0.095	0.410	-0.658	2.670	0.220	2.690	0.296
ESP	-0.164	0.397	-0.581	2.558	0.169	3.330	0.205
SWE	-0.399	0.479	-0.895	2.517	0.675	6.110	0.351
GBR	-0.243	0.391	-0.654	1.759	0.258	3.960	0.303
USA	0.000	0.280	-0.595	1.171	0.113	4.815	0.204

D Analysis using other parental leave measures

Table D1: The job protection policy and utilization of literacy skill at work

Dep.Var. Literacy skill use	Full sample					Employed
	(1)	(2)	(3)	(4)	(5)	(6)
Female×PL×Literacy skill: Q1	0.120***	0.107***	0.063***	0.060***	0.063***	-0.022
	(0.032)	(0.034)	(0.023)	(0.015)	(0.014)	(0.020)
Female×PL×Literacy skill: Q2	0.036	0.018	-0.020	-0.018	-0.030	-0.041***
	(0.026)	(0.028)	(0.029)	(0.027)	(0.024)	(0.014)
Female×PL×Literacy skill: Q3	-0.003	-0.032	-0.069**	-0.070***	-0.072**	-0.050***
	(0.038)	(0.038)	(0.029)	(0.024)	(0.030)	(0.017)
Female×PL×Literacy skill: Q4	0.031	0.027	-0.010	-0.010	-0.016	-0.015
	(0.025)	(0.026)	(0.019)	(0.016)	(0.017)	(0.012)
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies		X	X	X	X	X
Female×Skill×Gender norm			X	X	X	X
Female×Skill×Industrial structure				X	X	X
Female×Skill×Market institutions					X	X
Countries	24	24	24	24	24	24
Observations	56685	56685	56685	56685	56685	46280

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for literacy score. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates of the coefficients of the interaction terms associated with the literacy skill index and the indicators for social institutions and social norms. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D2: The full-rate equivalent policy and utilization of literacy skill at work

Dep.Var. Literacy skill use	Full sample					Employed
	(1)	(2)	(3)	(4)	(5)	(6)
Female×PL×Literacy skill: Q1	0.367***	0.327***	0.255***	0.199***	0.216***	0.010
	(0.059)	(0.067)	(0.042)	(0.036)	(0.040)	(0.058)
Female×PL×Literacy skill: Q2	0.202**	0.155*	0.099	0.026	0.038	-0.086**
	(0.083)	(0.084)	(0.078)	(0.096)	(0.083)	(0.042)
Female×PL×Literacy skill: Q3	0.126	0.066	0.010	-0.100	-0.118	-0.097*
	(0.104)	(0.110)	(0.103)	(0.124)	(0.120)	(0.054)
Female×PL×Literacy skill: Q4	0.121	0.077	0.021	-0.090	-0.085	-0.068*
	(0.076)	(0.084)	(0.060)	(0.088)	(0.090)	(0.039)
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies		X	X	X	X	X
Female×Skill×Gender norm			X	X	X	X
Female×Skill×Industrial structure				X	X	X
Female×Skill×Market institutions					X	X
Countries	24	24	24	24	24	24
Observations	56685	56685	56685	56685	56685	46280

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for literacy score. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates of the coefficients of the interaction terms associated with the literacy skill index and the indicators for social institutions and social norms. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D3: The job protection policy and market outcomes

Dependent variable	Employment (1)	Work hours (2)	ln(*wage*) (3)	Quali.Educ. (4)	Quali.Exp. (5)
Panel A: All individuals					
Female×PL×Literacy skill: Q1	0.040***	2.943***	-0.059***	0.356***	0.045*
	(0.013)	(0.492)	(0.010)	(0.128)	(0.027)
Female×PL×Literacy skill: Q2	0.005	0.933	-0.067***	-0.013	-0.065**
	(0.010)	(0.643)	(0.006)	(0.122)	(0.028)
Female×PL×Literacy skill: Q3	-0.008	0.005	-0.052***	-0.211*	-0.055**
	(0.010)	(0.371)	(0.007)	(0.114)	(0.026)
Female×PL×Literacy skill: Q4	0.001	0.267	-0.025**	0.013	-0.075**
	(0.006)	(0.303)	(0.010)	(0.094)	(0.031)
Mean value among men	0.86	37.7	3.75	11.2	0.58–0.92 (median)
Method	OLS	Tobit	Heckit	OLS	Tobit
Country×Skill quartile FE	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X
Countries	24	23	21	24	24
Observations	49334	45888	43033	49334	49334
Panel B: Employed individuals					
Female×PL×Literacy skill: Q1		1.307**	-0.058***	-0.129**	0.014
		(0.564)	(0.010)	(0.050)	(0.021)
Female×PL×Literacy skill: Q2		0.575	-0.067***	-0.121***	-0.099***
		(0.436)	(0.006)	(0.039)	(0.017)
Female×PL×Literacy skill: Q3		0.157	-0.052***	-0.124***	-0.051**
		(0.320)	(0.007)	(0.027)	(0.024)
Female×PL×Literacy skill: Q4		0.225	-0.025**	0.001	-0.103***
		(0.322)	(0.010)	(0.029)	(0.029)
Mean value among men		42.3	3.75	13.1	1–2 (median)
Method		OLS	OLS	OLS	Tobit
Country×Skill quartile FE		X	X	X	X
Female×Skill×Family policies		X	X	X	X
Female×Skill×Gender norm		X	X	X	X
Female×Skill×Industrial structure		X	X	X	X
Female×Skill×Market institutions		X	X	X	X
Countries		23	21	24	24
Observations		37259	32434	38929	38929

Note: This table shows estimation results regarding market outcomes and job qualification. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D4: The full-rate equivalent policy and market outcomes

Dependent variable	Employment (1)	Work hours (2)	ln(*wage*) (3)	Quali.Educ. (4)	Quali.Exp. (5)
Panel A: All individuals					
Female×PL×Literacy skill: Q1	0.077**	5.383**	-0.048	0.566	-0.012
	(0.030)	(2.224)	(0.068)	(0.395)	(0.081)
Female×PL×Literacy skill: Q2	0.031	2.972	-0.102*	0.254	-0.171**
	(0.042)	(3.058)	(0.054)	(0.465)	(0.084)
Female×PL×Literacy skill: Q3	-0.022	-0.981	-0.089*	-0.301	-0.286***
	(0.038)	(1.950)	(0.048)	(0.563)	(0.095)
Female×PL×Literacy skill: Q4	-0.017	-0.593	-0.048	-0.307	-0.282***
	(0.030)	(1.783)	(0.049)	(0.462)	(0.070)
Mean value among men	0.86	37.7	3.75	11.2	0.58–0.92 (median)
Method	OLS	Tobit	Heckit	OLS	Tobit
Country×Skill quartile FE	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X
Countries	24	23	21	24	24
Observations	49334	45888	43033	49334	49334
Panel B: Employed individuals					
Female×PL×Literacy skill: Q1		2.980	-0.047	-0.232	-0.027
		(2.129)	(0.068)	(0.159)	(0.105)
Female×PL×Literacy skill: Q2		1.393	-0.102*	-0.049	-0.183**
		(1.645)	(0.054)	(0.183)	(0.086)
Female×PL×Literacy skill: Q3		0.535	-0.088*	0.039	-0.251**
		(1.148)	(0.048)	(0.144)	(0.103)
Female×PL×Literacy skill: Q4		0.534	-0.049	-0.010	-0.233**
		(1.397)	(0.049)	(0.107)	(0.100)
Mean value among men		42.3	3.75	13.1	1–2 (median)
Method		OLS	OLS	OLS	Tobit
Country×Skill quartile FE		X	X	X	X
Female×Skill×Family policies		X	X	X	X
Female×Skill×Gender norm		X	X	X	X
Female×Skill×Industrial structure		X	X	X	X
Female×Skill×Market institutions		X	X	X	X
Countries		23	21	24	24
Observations		37259	32434	38929	38929

Note: This table shows estimation results regarding market outcomes and job qualification. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D5: The job protection policy and utilization of literacy skill at work (Control for occupation)

Dep.Var. Literacy skill use	Baseline	Control for occupation	
	(1)	(2)	(3)
Female×PL×Literacy skill: Q1	-0.027	-0.045*	-0.027
	(0.029)	(0.026)	(0.023)
Female×PL×Literacy skill: Q2	-0.057***	-0.047***	-0.032**
	(0.015)	(0.014)	(0.013)
Female×PL×Literacy skill: Q3	-0.059***	-0.076***	-0.057***
	(0.023)	(0.022)	(0.019)
Female×PL×Literacy skill: Q4	-0.001	-0.016	-0.013
	(0.025)	(0.021)	(0.023)
Country×Skill quartile FE	X	X	X
Female×Skill×Family policies	X	X	X
Female×Skill×Gender norm	X	X	X
Female×Skill×Industrial structure	X	X	X
Female×Skill×Market institutions	X	X	X
Occupation code		2 digit	4 digit
Countries	18	18	18
Observations	34861	34861	34861

Note: This table shows estimation results regarding the literacy use, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D6: The full-rate equivalent and utilization of literacy skill at work (Control for occupation)

Dep.Var. Literacy skill use	Baseline	Control for occupation	
	(1)	(2)	(3)
Female×PL×Literacy skill: Q1	0.096	0.011	0.049
	(0.071)	(0.067)	(0.062)
Female×PL×Literacy skill: Q2	-0.037	-0.077*	-0.052
	(0.057)	(0.046)	(0.043)
Female×PL×Literacy skill: Q3	-0.123*	-0.161**	-0.110*
	(0.070)	(0.070)	(0.064)
Female×PL×Literacy skill: Q4	-0.126***	-0.106***	-0.104**
	(0.046)	(0.039)	(0.044)
Country×Skill quartile FE	X	X	X
Female×Skill×Family policies	X	X	X
Female×Skill×Gender norm	X	X	X
Female×Skill×Industrial structure	X	X	X
Female×Skill×Market institutions	X	X	X
Occupation code		2 digit	4 digit
Countries	18	18	18
Observations	34861	34861	34861

Note: This table shows estimation results regarding the literacy use, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D7: The job protection policy and the number of subordinates

Dependent variable	Number of subordinates			
	0	1–5	6–10	11 or more
	(1)	(2)	(3)	(4)
Female×PL×Literacy skill: Q1	0.010	0.001	-0.006*	-0.005*
	(0.007)	(0.006)	(0.003)	(0.003)
Female×PL×Literacy skill: Q2	0.010	-0.005	-0.003	-0.003
	(0.007)	(0.008)	(0.003)	(0.007)
Female×PL×Literacy skill: Q3	0.021**	-0.006	-0.011***	-0.004
	(0.009)	(0.008)	(0.003)	(0.005)
Female×PL×Literacy skill: Q4	0.006	0.001	-0.001	-0.007
	(0.007)	(0.008)	(0.004)	(0.006)
Mean value among men	0.596	0.187	0.086	0.131
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	24	24	24	24
Observations	39680	39680	39680	39680

Note: This table shows estimation results regarding the number of subordinates, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D8: The full-rate equivalent policy and the number of subordinates

Dependent variable	Number of subordinates			
	0	1–5	6–10	11 or more
	(1)	(2)	(3)	(4)
Female×PL×Literacy skill: Q1	0.013	0.021	-0.028**	-0.006
	(0.030)	(0.023)	(0.012)	(0.013)
Female×PL×Literacy skill: Q2	0.042*	-0.023	-0.002	-0.018
	(0.024)	(0.015)	(0.015)	(0.019)
Female×PL×Literacy skill: Q3	0.043	-0.005	-0.034***	-0.003
	(0.046)	(0.040)	(0.013)	(0.013)
Female×PL×Literacy skill: Q4	0.055*	-0.017	-0.004	-0.034
	(0.032)	(0.030)	(0.013)	(0.024)
Mean value among men	0.596	0.187	0.086	0.131
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	24	24	24	24
Observations	39680	39680	39680	39680

Note: This table shows estimation results regarding the number of subordinates, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D9: The job protection policy, years leaving labor market and utilization of literacy skill at work

Dep.Var: Literacy Skill use	Full sample		Employed	
	(1)	(2)	(3)	(4)
Female×PL×Literacy skill: Q1	0.046***	0.051***	-0.014	-0.011
	(0.014)	(0.015)	(0.020)	(0.022)
Female×PL×Literacy skill: Q2	-0.039	-0.035	-0.031**	-0.030**
	(0.024)	(0.026)	(0.013)	(0.012)
Female×PL×Literacy skill: Q3	-0.079***	-0.068**	-0.040**	-0.037**
	(0.029)	(0.027)	(0.017)	(0.017)
Female×PL×Literacy skill: Q4	-0.021	0.009	-0.002	0.009
	(0.019)	(0.019)	(0.017)	(0.017)
AL×Literacy skill: Q1		-0.055***		-0.016***
		(0.006)		(0.003)
AL×Literacy skill: Q2		-0.059***		-0.013***
		(0.006)		(0.003)
AL×Literacy skill: Q3		-0.053***		-0.015***
		(0.006)		(0.003)
AL×Literacy skill: Q4		-0.051***		-0.011***
		(0.006)		(0.004)
Female×AL×Literacy skill: Q1		0.001		0.001
		(0.004)		(0.003)
Female×AL×Literacy skill: Q2		0.003		-0.004
		(0.007)		(0.004)
Female×AL×Literacy skill: Q3		-0.005		-0.002
		(0.005)		(0.003)
Female×AL×Literacy skill: Q4		-0.016**		-0.008**
		(0.007)		(0.003)
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	21	21	21	21
Observations	49230	49230	40936	40936

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for literacy score. *AL* is the actual years leaving labor market. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates of the coefficients of the interaction terms associated with the literacy skill index and the indicators for social institutions and social norms. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table D10: The full-rate equivalent, years leaving labor market and utilization of literacy skill at work

Dep.Var: Literacy Skill use	Full sample		Employed	
	(1)	(2)	(3)	(4)
Female×PL×Literacy skill: Q1	0.144**	0.172***	0.046	0.069
	(0.063)	(0.052)	(0.064)	(0.064)
Female×PL×Literacy skill: Q2	0.012	0.044	-0.066	-0.045
	(0.107)	(0.098)	(0.057)	(0.057)
Female×PL×Literacy skill: Q3	-0.188	-0.154	-0.081	-0.070
	(0.142)	(0.130)	(0.061)	(0.060)
Female×PL×Literacy skill: Q4	-0.179**	-0.116	-0.057	-0.037
	(0.086)	(0.090)	(0.046)	(0.040)
AL×Literacy skill: Q1		-0.055***		-0.016***
		(0.006)		(0.003)
AL×Literacy skill: Q2		-0.058***		-0.012***
		(0.006)		(0.003)
AL×Literacy skill: Q3		-0.053***		-0.015***
		(0.006)		(0.003)
AL×Literacy skill: Q4		-0.051***		-0.011***
		(0.006)		(0.004)
Female×AL×Literacy skill: Q1		0.001		0.001
		(0.004)		(0.003)
Female×AL×Literacy skill: Q2		0.003		-0.004
		(0.007)		(0.004)
Female×AL×Literacy skill: Q3		-0.006		-0.002
		(0.005)		(0.003)
Female×AL×Literacy skill: Q4		-0.016**		-0.008**
		(0.007)		(0.003)
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	21	21	21	21
Observations	49230	49230	40936	40936

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for literacy score. *AL* is the actual years leaving labor market. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates of the coefficients of the interaction terms associated with the literacy skill index and the indicators for social institutions and social norms. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

E Analysis of numeracy skill

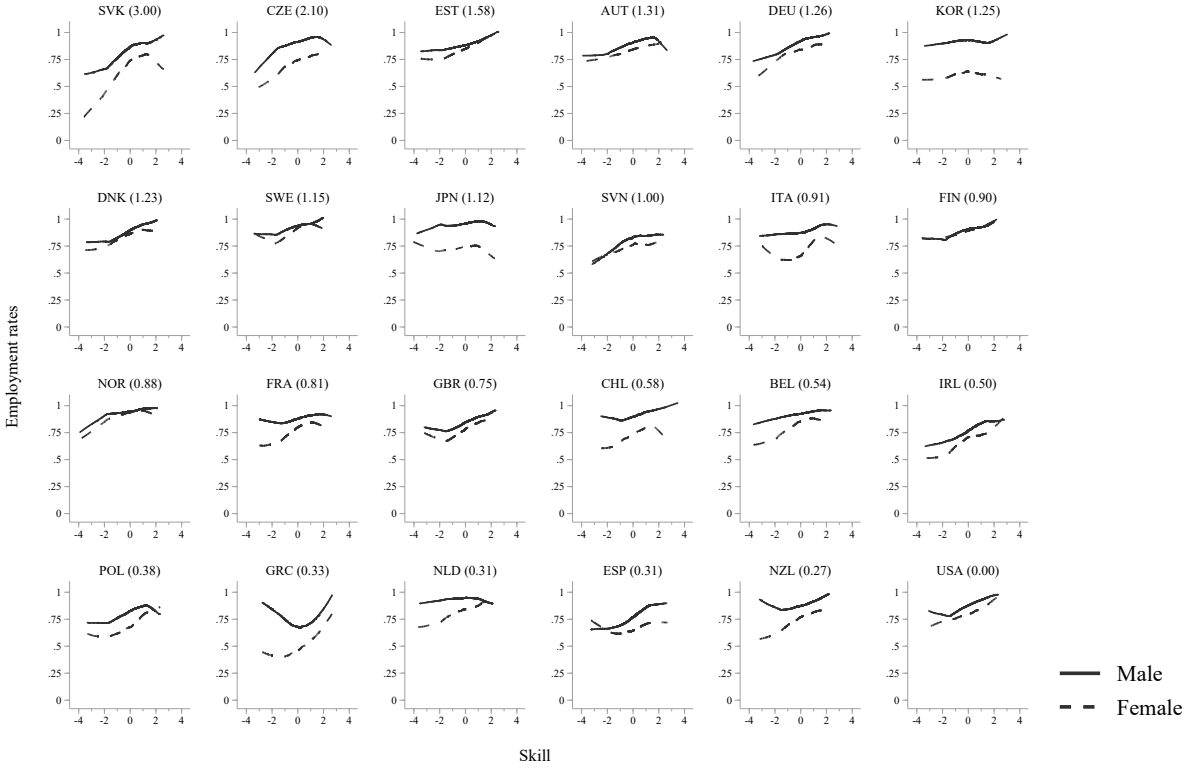


Figure E1: Employment rates at each numeracy skill level

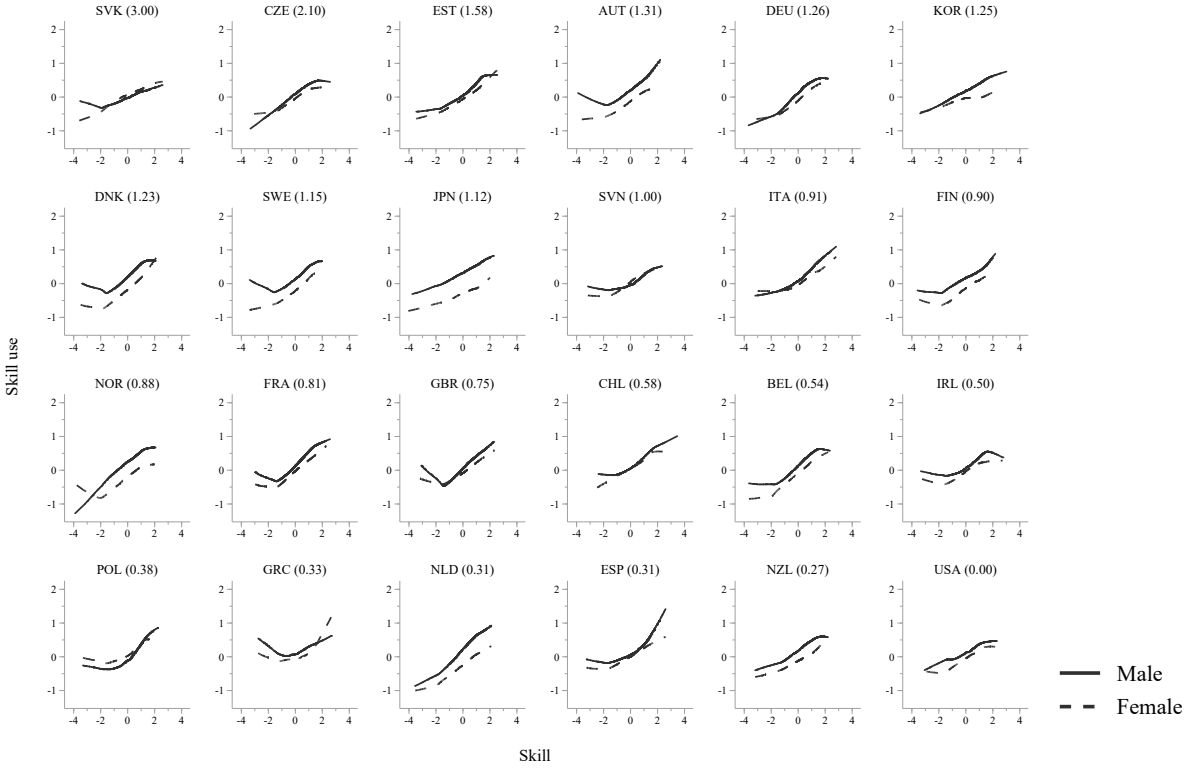


Figure E2: Skill use and skill within labor-force participants (Numeracy)

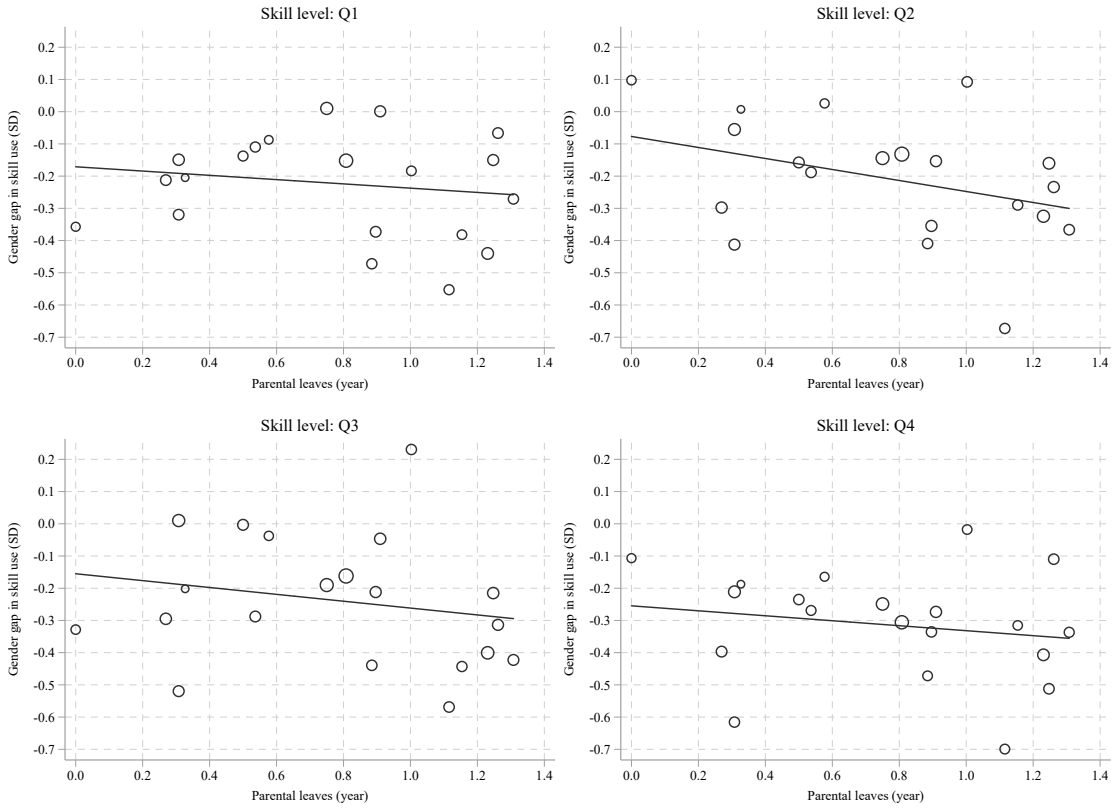


Figure E3: Unconditional gender gap in numeracy skill use and the paid leave policy

Note: This figure shows relationship between the gender gap in numeracy skill use and the paid leave policy. The gender gap in each country is calculated as a raw difference in average skill-use levels between employed women and men. The line is the fitted value by the weighted least squares, where the number of observations in each country is used as a weight. In this figure, ex-communist countries are excluded, because their social institutions tend to differ from those of other countries (de Haan, 2012).

Table E1: The paid leave policy and utilization of numeracy skill at work

Dep.Var. Numeracy skill use	Full sample					Employed
	(1)	(2)	(3)	(4)	(5)	(6)
Female×PL×Numeracy skill: Q1	-0.030	-0.050	-0.053	-0.067	-0.070	-0.000
	(0.062)	(0.051)	(0.041)	(0.055)	(0.060)	(0.054)
Female×PL×Numeracy skill: Q2	-0.034	-0.045	-0.042	-0.044	-0.022	-0.064
	(0.065)	(0.064)	(0.048)	(0.070)	(0.054)	(0.061)
Female×PL×Numeracy skill: Q3	-0.041	-0.037	-0.040	-0.136**	-0.130***	-0.028
	(0.054)	(0.053)	(0.041)	(0.061)	(0.048)	(0.045)
Female×PL×Numeracy skill: Q4	-0.017	-0.033	-0.035	-0.102**	-0.098**	-0.026
	(0.069)	(0.065)	(0.038)	(0.049)	(0.042)	(0.043)
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies		X	X	X	X	X
Female×Skill×Gender norm			X	X	X	X
Female×Skill×Industrial structure				X	X	X
Female×Skill×Market institutions					X	X
Countries	24	24	24	24	24	24
Observations	56626	56626	56626	56626	56626	46365

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for numeracy score. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E2: The job protection policy and utilization of numeracy skill at work

Dep.Var. Numeracy skill use	Full sample					Employed
	(1)	(2)	(3)	(4)	(5)	(6)
Female×PL×Numeracy skill: Q1	0.054*	0.034	-0.001	-0.002	-0.013	-0.047**
	(0.032)	(0.025)	(0.027)	(0.027)	(0.026)	(0.021)
Female×PL×Numeracy skill: Q2	0.028	0.011	-0.031	-0.031	-0.037*	-0.068***
	(0.029)	(0.027)	(0.027)	(0.026)	(0.022)	(0.021)
Female×PL×Numeracy skill: Q3	0.028	0.029	-0.007	-0.007	-0.018	-0.009
	(0.026)	(0.027)	(0.027)	(0.022)	(0.023)	(0.018)
Female×PL×Numeracy skill: Q4	0.027	0.009	-0.042***	-0.044***	-0.057***	-0.042**
	(0.032)	(0.030)	(0.015)	(0.014)	(0.010)	(0.017)
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies		X	X	X	X	X
Female×Skill×Gender norm			X	X	X	X
Female×Skill×Industrial structure				X	X	X
Female×Skill×Market institutions					X	X
Countries	24	24	24	24	24	24
Observations	56626	56626	56626	56626	56626	46365

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for numeracy score. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E3: The full-rate equivalent policy and utilization of numeracy skill at work

Dep.Var. Numeracy skill use	Full sample					Employed
	(1)	(2)	(3)	(4)	(5)	(6)
Female×PL×Numeracy skill: Q1	0.021	-0.003	-0.058	-0.073	-0.047	-0.128*
	(0.084)	(0.074)	(0.068)	(0.091)	(0.096)	(0.072)
Female×PL×Numeracy skill: Q2	0.020	-0.010	-0.064	-0.067	-0.074	-0.198***
	(0.070)	(0.066)	(0.058)	(0.084)	(0.074)	(0.069)
Female×PL×Numeracy skill: Q3	0.052	0.035	-0.020	-0.157*	-0.143*	-0.142*
	(0.073)	(0.077)	(0.077)	(0.088)	(0.078)	(0.079)
Female×PL×Numeracy skill: Q4	0.021	-0.003	-0.077	-0.191***	-0.179***	-0.143**
	(0.074)	(0.070)	(0.053)	(0.062)	(0.052)	(0.061)
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies		X	X	X	X	X
Female×Skill×Gender norm			X	X	X	X
Female×Skill×Industrial structure				X	X	X
Female×Skill×Market institutions					X	X
Countries	24	24	24	24	24	24
Observations	56626	56626	56626	56626	56626	46365

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for numeracy score. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E4: Robustness checks against the reverse causality using the past paid leave policies (Numeracy skill)

Dep.Var. Numeracy skill use	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All available countries						
Female×PL×Numeracy skill: Q1	-0.087	-0.105**	-0.103**	-0.066	0.008	0.008
	(0.095)	(0.044)	(0.044)	(0.044)	(0.162)	(0.098)
Female×PL×Numeracy skill: Q2	0.015	-0.042	-0.085**	-0.060*	-0.323***	-0.110
	(0.058)	(0.035)	(0.033)	(0.033)	(0.116)	(0.083)
Female×PL×Numeracy skill: Q3	-0.141***	-0.070	-0.081**	-0.096***	-0.276***	-0.147*
	(0.052)	(0.045)	(0.037)	(0.034)	(0.101)	(0.078)
Female×PL×Numeracy skill: Q4	-0.115**	-0.076**	-0.103***	-0.073**	-0.012	-0.188***
	(0.052)	(0.034)	(0.028)	(0.032)	(0.122)	(0.069)
Parental leave policy	2011	2011	2001	1991	1981	1971
Source of parental leave policy	Original	OECD	OECD	OECD	OECD	OECD
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X	X
Countries	21	21	21	21	21	21
Observations	49845	49845	49845	49845	49845	49845
Panel B: Exclude Finland and Norway						
Female×PL×Numeracy skill: Q1	-0.106	-0.156**	-0.107*	-0.088	-0.047	-0.071
	(0.099)	(0.062)	(0.057)	(0.054)	(0.163)	(0.108)
Female×PL×Numeracy skill: Q2	0.002	-0.005	-0.084*	-0.068*	-0.375***	-0.193*
	(0.060)	(0.059)	(0.046)	(0.038)	(0.092)	(0.100)
Female×PL×Numeracy skill: Q3	-0.144***	-0.171***	-0.126***	-0.147***	-0.294***	-0.171*
	(0.053)	(0.059)	(0.036)	(0.030)	(0.101)	(0.096)
Female×PL×Numeracy skill: Q4	-0.129***	-0.102*	-0.118***	-0.094***	-0.049	-0.270***
	(0.048)	(0.055)	(0.033)	(0.035)	(0.112)	(0.067)
Parental leave policy	2011	2011	2001	1991	1981	1971
Source of parental leave policy	Original	OECD	OECD	OECD	OECD	OECD
Country×Skill quartile FE	X	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X	X
Countries	19	19	19	19	19	19
Observations	45715	45715	45715	45715	45715	45715

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for numeracy score. As policy parental leave variables, we use the duration of paid leave between 1971 and 2011 which are collected by the OECD as well as the duration in 2011 in our database. In column 1, to ease comparison, we restrict the sample to countries where the OECD database is available. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E5: The paid leave policy and market outcomes (Numeracy skill)

Dependent variable	Employment (1)	Work hours (2)	ln(*wage*) (3)	Quali.Educ. (4)	Quali.Exp. (5)
Panel A: All individuals					
Female×PL×Numeracy skill: Q1	-0.032	-1.028	-0.021	-0.577***	0.023
	(0.020)	(0.991)	(0.049)	(0.215)	(0.039)
Female×PL×Numeracy skill: Q2	0.010	0.864	-0.043	-0.050	-0.068
	(0.012)	(0.845)	(0.042)	(0.127)	(0.048)
Female×PL×Numeracy skill: Q3	-0.047**	-1.557	-0.010	-0.781***	-0.135***
	(0.018)	(1.170)	(0.039)	(0.237)	(0.048)
Female×PL×Numeracy skill: Q4	-0.033***	-1.874***	-0.028	-0.692***	-0.142**
	(0.012)	(0.656)	(0.028)	(0.207)	(0.068)
Mean value among men	0.86	38	3.74	11.2	0.58–0.92 (median)
Method	OLS	Tobit	Heckit	OLS	Tobit
Country×Skill quartile FE	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X
Countries	24	23	21	24	24
Observations	49226	45763	42885	49226	49226
Panel B: Employed individuals					
Female×PL×Numeracy skill: Q1		1.547	-0.022	-0.319***	0.106**
		(0.973)	(0.049)	(0.065)	(0.045)
Female×PL×Numeracy skill: Q2		1.531	-0.043	-0.176*	-0.061
		(1.041)	(0.042)	(0.089)	(0.049)
Female×PL×Numeracy skill: Q3		0.713	-0.012	-0.172*	-0.072
		(0.664)	(0.039)	(0.091)	(0.074)
Female×PL×Numeracy skill: Q4		0.359	-0.029	-0.133***	-0.076
		(0.490)	(0.028)	(0.045)	(0.082)
Mean value among men		42.2	3.74	13.1	1–2 (median)
Method		OLS	OLS	OLS	Tobit
Country×Skill quartile FE		X	X	X	X
Female×Skill×Family policies		X	X	X	X
Female×Skill×Gender norm		X	X	X	X
Female×Skill×Industrial structure		X	X	X	X
Female×Skill×Market institutions		X	X	X	X
Countries		23	21	24	24
Observations		37293	32374	38965	38965

Note: This table shows estimation results regarding market outcomes and job qualification. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E6: The job protection policy and market outcomes (Numeracy skill)

Dependent variable	Employment (1)	Work hours (2)	ln(*wage*) (3)	Quali.Educ. (4)	Quali.Exp. (5)
Panel A: All individuals					
Female×PL×Numeracy skill: Q1	0.021	1.557***	-0.072***	0.142	-0.000
	(0.013)	(0.599)	(0.013)	(0.142)	(0.020)
Female×PL×Numeracy skill: Q2	0.014**	1.106***	-0.073***	0.042	-0.033*
	(0.007)	(0.371)	(0.007)	(0.071)	(0.020)
Female×PL×Numeracy skill: Q3	0.000	0.409	-0.052***	-0.143	-0.066**
	(0.007)	(0.401)	(0.010)	(0.106)	(0.030)
Female×PL×Numeracy skill: Q4	-0.007	-0.271	-0.037***	-0.169	-0.097***
	(0.010)	(0.383)	(0.010)	(0.120)	(0.028)
Mean value among men	0.86	38	3.74	11.2	0.58–0.92 (median)
Method	OLS	Tobit	Heckit	OLS	Tobit
Country×Skill quartile FE	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X
Countries	24	23	21	24	24
Observations	49226	45763	42885	49226	49226
Panel B: Employed individuals					
Female×PL×Numeracy skill: Q1		0.597	-0.071***	-0.172***	-0.032
		(0.517)	(0.013)	(0.036)	(0.024)
Female×PL×Numeracy skill: Q2		0.547	-0.073***	-0.155***	-0.055***
		(0.477)	(0.007)	(0.056)	(0.021)
Female×PL×Numeracy skill: Q3		0.238	-0.053***	-0.155***	-0.078***
		(0.365)	(0.010)	(0.038)	(0.030)
Female×PL×Numeracy skill: Q4		0.271	-0.038***	-0.074***	-0.109***
		(0.304)	(0.010)	(0.026)	(0.028)
Mean value among men		42.2	3.74	13.1	1–2 (median)
Method		OLS	OLS	OLS	Tobit
Country×Skill quartile FE		X	X	X	X
Female×Skill×Family policies		X	X	X	X
Female×Skill×Gender norm		X	X	X	X
Female×Skill×Industrial structure		X	X	X	X
Female×Skill×Market institutions		X	X	X	X
Countries		23	21	24	24
Observations		37293	32374	38965	38965

Note: This table shows estimation results regarding market outcomes and job qualification. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E7: The full-rate equivalent policy and market outcomes (Numeracy skill)

Dependent variable	Employment (1)	Work hours (2)	ln(*wage*) (3)	Quali.Educ. (4)	Quali.Exp. (5)
Panel A: All individuals					
Female×PL×Numeracy skill: Q1	0.026	1.987	-0.138**	0.088	-0.042
	(0.035)	(2.209)	(0.068)	(0.440)	(0.071)
Female×PL×Numeracy skill: Q2	0.039**	2.913*	-0.105	0.150	-0.167***
	(0.019)	(1.570)	(0.069)	(0.216)	(0.059)
Female×PL×Numeracy skill: Q3	-0.010	0.721	-0.096	-0.212	-0.252***
	(0.039)	(2.039)	(0.059)	(0.567)	(0.076)
Female×PL×Numeracy skill: Q4	-0.022	-2.354	-0.079	-0.506	-0.288***
	(0.031)	(1.799)	(0.053)	(0.507)	(0.088)
Mean value among men	0.86	38	3.74	11.2	0.58–0.92 (median)
Method	OLS	Tobit	Heckit	OLS	Tobit
Country×Skill quartile FE	X	X	X	X	X
Female×Skill×Family policies	X	X	X	X	X
Female×Skill×Gender norm	X	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X	X
Female×Skill×Market institutions	X	X	X	X	X
Countries	24	23	21	24	24
Observations	49226	45763	42885	49226	49226
Panel B: Employed individuals					
Female×PL×Numeracy skill: Q1		2.148	-0.138**	-0.250*	0.013
		(1.861)	(0.068)	(0.150)	(0.090)
Female×PL×Numeracy skill: Q2		1.821	-0.104	-0.300**	-0.182***
		(1.894)	(0.069)	(0.150)	(0.063)
Female×PL×Numeracy skill: Q3		1.059	-0.098	-0.108	-0.252**
		(1.471)	(0.059)	(0.156)	(0.120)
Female×PL×Numeracy skill: Q4		0.503	-0.081	-0.049	-0.209*
		(1.111)	(0.053)	(0.096)	(0.112)
Mean value among men		42.2	3.74	13.1	1–2 (median)
Method		OLS	OLS	OLS	Tobit
Country×Skill quartile FE		X	X	X	X
Female×Skill×Family policies		X	X	X	X
Female×Skill×Gender norm		X	X	X	X
Female×Skill×Industrial structure		X	X	X	X
Female×Skill×Market institutions		X	X	X	X
Countries		23	21	24	24
Observations		37293	32374	38965	38965

Note: This table shows estimation results regarding market outcomes and job qualification. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E8: The paid leave policy and utilization of numeracy skill at work (Control for occupation)

Dep.Var. Numeracy skill use	Baseline	Control for occupation	
	(1)	(2)	(3)
Female×PL×Numeracy skill: Q1	-0.010	-0.016	-0.025
	(0.053)	(0.039)	(0.037)
Female×PL×Numeracy skill: Q2	-0.022	-0.058	-0.062
	(0.047)	(0.054)	(0.052)
Female×PL×Numeracy skill: Q3	0.021	0.042	0.033
	(0.027)	(0.042)	(0.035)
Female×PL×Numeracy skill: Q4	-0.009	0.034	0.024
	(0.022)	(0.029)	(0.028)
Country×Skill quartile FE	X	X	X
Female×Skill×Family policies	X	X	X
Female×Skill×Gender norm	X	X	X
Female×Skill×Industrial structure	X	X	X
Female×Skill×Market institutions	X	X	X
Occupation code		2 digit	4 digit
Countries	18	18	18
Observations	34800	34800	34800

Note: This table shows estimation results regarding the numeracy use, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E9: The job protection policy and utilization of numeracy skill at work (Control for occupation)

Dep.Var. Numeracy skill use	Baseline	Control for occupation	
	(1)	(2)	(3)
Female×PL×Numeracy skill: Q1	-0.072***	-0.057***	-0.057***
	(0.024)	(0.021)	(0.022)
Female×PL×Numeracy skill: Q2	-0.040	-0.052*	-0.056**
	(0.030)	(0.030)	(0.028)
Female×PL×Numeracy skill: Q3	0.008	-0.007	-0.007
	(0.024)	(0.022)	(0.020)
Female×PL×Numeracy skill: Q4	-0.005	-0.007	-0.024
	(0.019)	(0.018)	(0.019)
Country×Skill quartile FE	X	X	X
Female×Skill×Family policies	X	X	X
Female×Skill×Gender norm	X	X	X
Female×Skill×Industrial structure	X	X	X
Female×Skill×Market institutions	X	X	X
Occupation code		2 digit	4 digit
Countries	18	18	18
Observations	34800	34800	34800

Note: This table shows estimation results regarding the numeracy use, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E10: The full-rate equivalent policy and utilization of numeracy skill at work (Control for occupation)

Dep.Var. Numeracy skill use	Baseline	Control for occupation	
	(1)	(2)	(3)
Female×PL×Numeracy skill: Q1	-0.179**	-0.192***	-0.187***
	(0.085)	(0.071)	(0.054)
Female×PL×Numeracy skill: Q2	-0.092	-0.196**	-0.203**
	(0.088)	(0.088)	(0.083)
Female×PL×Numeracy skill: Q3	-0.040	-0.097	-0.090
	(0.053)	(0.075)	(0.063)
Female×PL×Numeracy skill: Q4	-0.060	-0.048	-0.073
	(0.043)	(0.061)	(0.062)
Country×Skill quartile FE	X	X	X
Female×Skill×Family policies	X	X	X
Female×Skill×Gender norm	X	X	X
Female×Skill×Industrial structure	X	X	X
Female×Skill×Market institutions	X	X	X
Occupation code		2 digit	4 digit
Countries	18	18	18
Observations	34800	34800	34800

Note: This table shows estimation results regarding the numeracy use, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E11: The paid leave policy and the number of subordinates (Numeracy skill)

Dependent variable	Number of subordinates			
	0	1–5	6–10	11 or more
	(1)	(2)	(3)	(4)
Female×PL×Numeracy skill: Q1	0.030**	-0.011	0.011	-0.030***
	(0.015)	(0.011)	(0.008)	(0.006)
Female×PL×Numeracy skill: Q2	0.026*	-0.018	-0.014**	0.006
	(0.016)	(0.015)	(0.007)	(0.012)
Female×PL×Numeracy skill: Q3	-0.005	0.022	0.016*	-0.032**
	(0.015)	(0.015)	(0.009)	(0.015)
Female×PL×Numeracy skill: Q4	0.014	0.007	-0.006	-0.015*
	(0.025)	(0.011)	(0.014)	(0.008)
Mean value among men	0.595	0.189	0.086	0.130
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	24	24	24	24
Observations	39732	39732	39732	39732

Note: This table shows estimation results regarding the number of subordinates, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E12: The job protection policy and the number of subordinates (Numeracy skill)

Dependent variable	Number of subordinates			
	0	1–5	6–10	11 or more
	(1)	(2)	(3)	(4)
Female×PL×Numeracy skill: Q1	0.022***	-0.010*	-0.000	-0.012***
	(0.007)	(0.005)	(0.003)	(0.004)
Female×PL×Numeracy skill: Q2	0.021***	-0.016***	-0.005*	-0.001
	(0.006)	(0.005)	(0.003)	(0.005)
Female×PL×Numeracy skill: Q3	0.014*	-0.002	0.002	-0.013*
	(0.007)	(0.006)	(0.005)	(0.008)
Female×PL×Numeracy skill: Q4	0.007	-0.003	-0.002	-0.003
	(0.006)	(0.004)	(0.005)	(0.004)
Mean value among men	0.595	0.189	0.086	0.130
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	24	24	24	24
Observations	39732	39732	39732	39732

Note: This table shows estimation results regarding the number of subordinates, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E13: The full-rate equivalent policy and the number of subordinates (Numeracy skill)

Dependent variable	Number of subordinates			
	0	1–5	6–10	11 or more
	(1)	(2)	(3)	(4)
Female×PL×Numeracy skill: Q1	0.024	-0.007	0.017	-0.034**
	(0.026)	(0.020)	(0.011)	(0.015)
Female×PL×Numeracy skill: Q2	0.036	-0.040	-0.023**	0.028**
	(0.033)	(0.026)	(0.011)	(0.014)
Female×PL×Numeracy skill: Q3	0.015	0.023	0.007	-0.045***
	(0.037)	(0.031)	(0.017)	(0.016)
Female×PL×Numeracy skill: Q4	0.081	-0.014	-0.044	-0.023*
	(0.050)	(0.023)	(0.028)	(0.012)
Mean value among men	0.595	0.189	0.086	0.130
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	24	24	24	24
Observations	39732	39732	39732	39732

Note: This table shows estimation results regarding the number of subordinates, where the estimation sample was restricted to the employed population. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E14: The paid leave policy, years leaving labor market and utilization of numeracy skill at work

Dep.Var: Numeracy skill use	Full sample		Employed	
	(1)	(2)	(3)	(4)
Female×PL×Numeracy skill: Q1	-0.065	-0.028	-0.003	0.012
	(0.056)	(0.051)	(0.058)	(0.057)
Female×PL×Numeracy skill: Q2	0.024	0.044	-0.002	0.013
	(0.059)	(0.058)	(0.056)	(0.055)
Female×PL×Numeracy skill: Q3	-0.106*	-0.067	0.024	0.039
	(0.059)	(0.054)	(0.038)	(0.034)
Female×PL×Numeracy skill: Q4	-0.067*	-0.051	0.013	0.019
	(0.038)	(0.035)	(0.035)	(0.032)
AL×Numeracy skill: Q1		-0.049***		-0.016***
		(0.005)		(0.002)
AL×Numeracy skill: Q2		-0.051***		-0.016***
		(0.005)		(0.003)
AL×Numeracy skill: Q3		-0.044***		-0.016***
		(0.004)		(0.002)
AL×Numeracy skill: Q4		-0.048***		-0.016***
		(0.004)		(0.004)
Female×AL×Numeracy skill: Q1		0.004		0.001
		(0.003)		(0.002)
Female×AL×Numeracy skill: Q2		0.003		-0.002
		(0.004)		(0.003)
Female×AL×Numeracy skill: Q3		-0.012**		-0.004
		(0.005)		(0.003)
Female×AL×Numeracy skill: Q4		-0.003		-0.001
		(0.004)		(0.004)
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	21	21	21	21
Observations	49230	49230	41027	41027

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for numeracy score. AL is the actual years leaving labor market. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E15: The job protection policy, years leaving labor market and utilization of numeracy skill at work

Dep.Var: Numeracy skill use	Full sample		Employed	
	(1)	(2)	(3)	(4)
Female×PL×Numeracy skill: Q1	-0.039	-0.025	-0.073***	-0.067***
	(0.026)	(0.022)	(0.018)	(0.017)
Female×PL×Numeracy skill: Q2	-0.049*	-0.041	-0.059***	-0.055***
	(0.027)	(0.027)	(0.019)	(0.018)
Female×PL×Numeracy skill: Q3	-0.028	-0.014	-0.011	-0.006
	(0.021)	(0.019)	(0.015)	(0.015)
Female×PL×Numeracy skill: Q4	-0.045***	-0.026**	-0.034*	-0.027
	(0.010)	(0.011)	(0.020)	(0.020)
AL×Numeracy skill: Q1		-0.049***		-0.016***
		(0.005)		(0.002)
AL×Numeracy skill: Q2		-0.051***		-0.017***
		(0.005)		(0.003)
AL×Numeracy skill: Q3		-0.044***		-0.016***
		(0.004)		(0.003)
AL×Numeracy skill: Q4		-0.048***		-0.016***
		(0.004)		(0.004)
Female×AL×Numeracy skill: Q1		0.004		0.001
		(0.003)		(0.002)
Female×AL×Numeracy skill: Q2		0.003		-0.002
		(0.004)		(0.003)
Female×AL×Numeracy skill: Q3		-0.012**		-0.004
		(0.005)		(0.003)
Female×AL×Numeracy skill: Q4		-0.003		-0.001
		(0.004)		(0.004)
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	21	21	21	21
Observations	49230	49230	41027	41027

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for numeracy score. AL is the actual years leaving labor market. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E16: The full-rate equivalent policy, years leaving labor market and utilization of numeracy skill at work

Dep.Var: Numeracy skill use	Full sample		Employed	
	(1)	(2)	(3)	(4)
Female×PL×Numeracy skill: Q1	-0.125	-0.095	-0.155**	-0.140*
	(0.114)	(0.092)	(0.077)	(0.074)
Female×PL×Numeracy skill: Q2	-0.051	-0.017	-0.146**	-0.122*
	(0.095)	(0.090)	(0.063)	(0.064)
Female×PL×Numeracy skill: Q3	-0.173*	-0.113	-0.083	-0.060
	(0.103)	(0.094)	(0.062)	(0.063)
Female×PL×Numeracy skill: Q4	-0.121	-0.079	-0.053	-0.039
	(0.081)	(0.079)	(0.050)	(0.050)
AL×Numeracy skill: Q1		-0.049***		-0.017***
		(0.005)		(0.002)
AL×Numeracy skill: Q2		-0.051***		-0.016***
		(0.005)		(0.003)
AL×Numeracy skill: Q3		-0.044***		-0.016***
		(0.004)		(0.003)
AL×Numeracy skill: Q4		-0.048***		-0.016***
		(0.004)		(0.004)
Female×AL×Numeracy skill: Q1		0.004		0.002
		(0.003)		(0.002)
Female×AL×Numeracy skill: Q2		0.003		-0.002
		(0.004)		(0.003)
Female×AL×Numeracy skill: Q3		-0.012**		-0.004
		(0.005)		(0.003)
Female×AL×Numeracy skill: Q4		-0.003		-0.001
		(0.004)		(0.004)
Country×Skill quartile FE	X	X	X	X
Female×Skill×Family policies	X	X	X	X
Female×Skill×Gender norm	X	X	X	X
Female×Skill×Industrial structure	X	X	X	X
Female×Skill×Market institutions	X	X	X	X
Countries	21	21	21	21
Observations	49230	49230	41027	41027

Note: This table shows estimation results of the censored Tobit model consisting of equations (6) and (7) for numeracy score. AL is the actual years leaving labor market. We do not report the estimates of the constant term or the coefficients of age indicators, years of education and dummy variables indicating that the test language is the same as the native language of the respondent, or that parents are immigrants. We also omit some estimates relating to social institutions. Standard errors clustered by each country and skill quartile group are in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.