Employment protection legislation and on-the-job training in an informal labor market: Evidence from Peru[*]

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Abstract

Training and learning on the job are two critical channels for human capital accumulation during work years. Several studies in developed countries have found that fixed-term contract (FTC) workers receive less training sponsored by their employers than open-ended contract (OEC) workers do. In contrast, FTC workers participate more actively in informal learning during their job spells. Using the PIAAC dataset for Peru as a case study, we test these two ideas and find no robust differences in training or learning across contract types. However, we find that informal workers – dependent employees without a contract – and the self-employed receive substantially less training of any type than formal workers. Further evidence from the Mexico points in the same direction, suggesting that this is a stylized fact for highly informal labor markets. These results expose a major structural weakness in emerging economies labor markets that can affect long-run growth and equity.

JEL Codes : J24, E26

Keywords : informality, on-the-job training, informal learning, development,
dual labor markets.

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1 Introduction

This paper looks at the relationship between workers' contract status and their training opportunities. Training and learning on the job are two critical channels for human capital accumulation during work years. Recently, empirical studies focused on OECD countries have found that the probability that employees working with fixed-term contracts (FTC) are offered employer-sponsored training opportunities is much lower than the same probability for employees with open-ended contracts (OEC) (OECD, 2014a; Cabrales et al., 2017). This is arguably due to the gap in incentives induced by stringent employment protection legislation (EPL). On the other hand, Ferreira et al. (2018) found that FTC workers in developed (OECD) labor markets engage more actively in informal learning at work[1], with further evidence that suggests that this difference is driven by the pursuit of promotion or finding a more stable job. Thus, informal learning partly compensates for lack of employer-sponsored training. Their finding fits with the so-called stepping-stone hypothesis (Booth et al., 2002).

We study the relationship between contract types and training in the context of developing countries, using the Peruvian labor market as a case of study and then replicating the results for Mexico. Specifically, we exploit rich publicly available microdata from the *Programme for the International Assessment of Adult Competencies* (PIAAC) Survey of Adult Skills conducted in Peru in 2018 to document patterns contrasting with the evidence for Europe. The PIAAC survey is the first of its kind to provide internationally harmonized and detailed information about worker's abilities and aptitudes, employers' characteristics, learning activities in the workplace, among others.[2] While our estimates should not be interpreted as a causal relationship between contract type (or lack thereof) and on-the-job training and learning, we use the rich set of controls that PIACC offers, which includes workers' motivations as well as reading and numerical skills measures to limit as much as possible the role of confounding unobservables.

Results show some striking stylized facts for Peru and for Mexico as well. On the one hand, after controlling for the wealth of controls afforded by PIAAC, we find no relationship between the contract

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[1] These activities comprise learning by doing in the job, learning directly from co-workers or supervisors, and keeping up to date with new products and services.

[2] In the case of Peru, no other survey presents nearly as much detail about a worker's everyday jobs than PIAAC. Only the National Household Survey (ENAHO) provides a fairly decent module on worker's labor conditions but does not delve into learning activities i the workplace.

type of a formal worker and the amount of on-the-job training and informal learning they acquire. On the other hand, we find that informal employees (those without contracts) are 17pp less likely to participate in any type of OJT when compared to formal workers (those with contracts). Informal workers are, unfortunately, not any more or less likely to incur in informal learning, suggesting that they are not acquiring proportionately more skills to move (step) into better, hopefully formal, jobs.

Quite clearly there are significant differences in labor markets in developing and developed countries. Informality is one such key difference, being pervasive in developing labor markets while rare in developed countries. Peru is certainly one such a case: more than three quarters of all jobs are informal, while nearly half of all private sector employees have no contract (INEI, 2019). In addition, there is also segmentation of the European type: most formal labor contracts (about three quarters) are of a fixed term nature. Moreover, basic education is poor and most youth enter the labor market unprepared for the requirements of the labor market. Within this context, we suggest a setting that is consistent with our findings. Formal firms are large and handle more complex operations that require more skillful workers than informal firms. These firms may find it profitable to train employees regardless of their contract type. Firms that hire informal workers conduct much smaller and simple operations, and thus are smaller in size. Their size minimizes the probability of being detected in irregular non contractual relationships and enables them to hire workers on an informal basis. Since the operations are simple, these workers are offered little in the way of training opportunities.

We contribute to the empirical literature by providing evidence of how labor market segmentation affects OJT distribution in a setting with a large informal sector. We hope to draw attention to the role that informality has in the career prospects of young adults in developing countries. From a policymaking perspective, the evidence fits with the narrative that informal jobs retain low productivity workers into a long-run path of further informality with scarce opportunities for developing human capital and earning better wages, i.e., the exclusion hypothesis.[3] Lack of on-the-job training and learning is a matter of concern as it could tamper with total factor productivity and investment per worker (Boeri and Garibaldi, 2007; Caggese and Cuñat, 2008; Cingano et al., 2010).

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[3] This view is not too different from the main results of the seminal empirical paper by Autor and Houseman (2010) which finds that temporary (here called FTC) jobs foster further unemployment spells and worse incomes than "permanent" (here called OEC) jobs. In a way, we reinterpret the differences between temporary and permanent jobs in developed countries as those between informal and formal jobs in Peru.

The remainder of the paper is organized as follows. In Section 2 we look at the literature on the relationship between a worker's contract type and the amount of on-the-job training the worker receives. In Section 3 we briefly present institutional background on the Peruvian labor market. In Sections 4.1 and 4.2 we describe our dataset and the empirical strategy, respectively. In Section 5, we present and interpret our main results. Finally, in Section 6 we conclude.

2 Literature review

The coexistence of FTC and OEC labor modalities and their consequences for the economy and welfare have been studied extensively in labor economics. To begin with, in frictionless models, temporary jobs should take over the labor market, but match-and-search models built around the Mortensen and Pissarides (1994) seminal paper provide a theoretical rationale for labor markets with concurrent contract modalities. Berton and Garibaldi (2012) argue that firms face a trade-off between the flexibility of adjustment to negative productivity shocks embedded in FTC relationships – firms can terminate an FTC at will without (or with low) cost - and the higher hiring rate afforded by OEC contracts in equilibrium . Workers also face a trade-off between the stability offered by OEC contracts and the availability of FTC jobs. In this setting, the search model equilibrium supports duality.

A key prediction in this literature, stated in, among others, Dolado et al. (2016) , is that higher EPL stringency and costs will lead to lower FTC-to-OEC conversion rates and a smaller space for OEC jobs. Some empirical evidence does suggest that labor legislation in a country can act as a catalyst to spur a surge in FTC jobs. Boeri (2010) documents the effects of three decades of regulatory reforms in Europe that affected employment protection. They find that employment protection costs are positively associated with the proportion of FTC jobs in the labor market and a lower FTC-to-OEC conversion rate. Centeno et al. (2009) found similar results in his evaluation of a reform in Portugal that increased OEC employment protection costs for small firms between 11 and 20 workers in size.

Of particular pertinence to our paper, the type of contract in a labor relationship has been shown, in both theory and empirics, to have an impact on the amount of training that the employee receives within a job. On the one hand, because the employment spell has a known and limited duration, firms are generally expected to invest less resources training their FTC workers, and the latter have fewer

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incentives to accumulate firm-specific skills (Berton and Garibaldi, 2012; Ferreira et al., 2018). Lack of on-the-job learning and low levels of effort among FTC workers in general is a matter of concern as it could tamper with total factor productivity and investment per worker (Boeri and Garibaldi, 2007; Caggese and Cuñat, 2008; Cingano et al., 2010).

Empirical evidence for developed countries strongly supports the negative relative relationship between training and holding an FTC job. The gap in training widens even further when the so-called EPL gap (i.e., the difference in firing costs between FTC and OEC workers) expands. In this case, the relative value of an OEC job to a FTC job firm increases, and consequently, so does the probability that only OEC workers receive on-the-job training (Berton and Garibaldi, 2012; Dolado et al., 2016; Cabrales et al., 2017). In other words, training differences between FTC and OEC workers tend to happen in countries with the most stringent EPL legislations and the most segmented dual markets (Cutuli and Guetto, 2013; Bentolila et al., 2019). Indeed, many years prior Blanchard and Landier (2002) warned out that the rise in EPL stringency across Europe may lead to overly sclerotic labor markets with lower productivity.

On the other hand, the stepping-stone hypothesis maintains that FTC workers will develop their skills actively to improve their chances to later secure a more stable OEC job (Booth et al., 2002). Unlike formal on-the-job training, which is typically sponsored by the firm, workers engage in informal (or unstructured) on-the-job learning processes from their peers and/or supervisors. Because this occurs concurrently with their working hours, there are no differential incentives to provide such opportunities to FTC and OEC workers (Heckman et al., 2002). In fact, for developing countries it becomes compulsory to instruct workers with skills not supplied in formal education system (ILO, 2015). Other authors further argue that firms will provide free training even to their FTC workers so as to screen abilities, which are ex-ante unobservable, and use this information to decide on conversion to an OEC position (Autor and Houseman, 2010; Faccini, 2014). Finally, Martins (2021) presents evidence that training is quite profitable for firms.

A handful of empirical studies support the stepping-stone hypothesis, while others point against it, arguing instead that FTC jobs could become dead end jobs. As pointed by Bentolila et al. (2019), evidence in favor of the stepping-stone view stems mostly from developed countries with low firing costs, although dead-end evidence is found in some flexible labor markets years after the FTC

employment spell. In Italy (Gagliarducci, 2005) and Spain (García-Pérez and Muñoz-Bullón, 2011), where labor market are the most segmented and EPL gaps are the widest in Europe, there is strong evidence against the stepping-stone hypothesis. Ferreira et al. (2018) use the PIAAC European harmonized dataset and an instrumental variable approach to give the most robust evidence up to date that FTC workers engage more actively in informal learning than OEC workers. They warn, though, that there exist "bad" temporary jobs that provide nil opportunities for learning and pose a dead-end trap for workers.

Research is much more scant for developing countries. Almeida and Aterido (2011) use cross-country firm data for the developing world to study the effects of EPL enforcement on on-the-job training. They find causal, albeit very small, positive effect of enforcement on firms' investment in training. There is clearer evidence that firm size is strongly and positively correlated with investment in training in the developing world (Almeida and Aterido, 2015). One feature that stands out, however, is rampant informality. Informal firms face different incentives to train their workers than formal firms do. Informal workers usually work in firms which are small in size. The smaller a firm is, the easier it can avoid regulators supervision and fines (Meghir et al., 2015) and the lower are the firm's skill requirement, so that it may not profit from spending resources in training their workers (Almeida and Aterido, 2015). Thus, we can expect that informal workers do not receive as much training as formal workers do.

3   The Peruvian labor market

In Peru formal labor markets are segmented into FTCs and OECs to an even greater extent than in Europe. On the one hand, Peruvian labor legislation protects and tries to promote long-term stable labor relationships, i.e., OECs, with the employer actively investing in the recurrent training of its labor force. Thus, labor contracts are OEC by default and terminations initiated by employers are discouraged. In, effect, OECs can only be terminated under proven fair cause, otherwise compensation between 1.5 and 12 monthly needs to be paid to the worker, at the rate of 1.5 wages per year worked. However, this specific article of the law was found inconstitutional by the Constitutional Court. As a consequence of this 2001 ruling, any termination without fair cause can be reverted and the worker can request to be reinstated in the same firm at his own behest. Jaramillo et al. (2019) show that the

Figure 1. *Formal contracts in Peru*
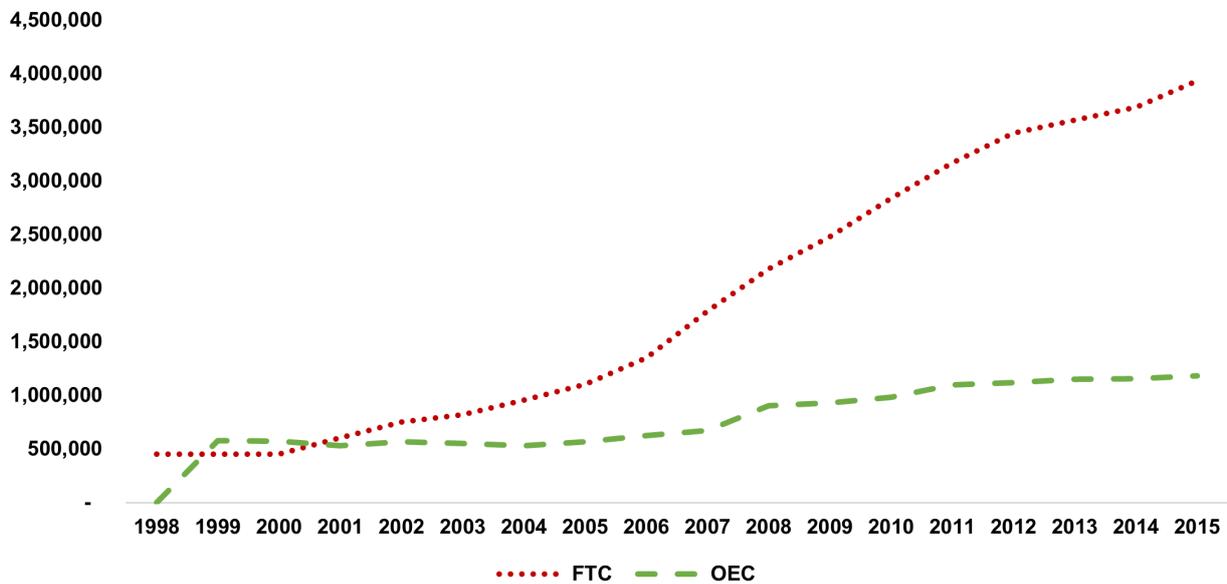
ruling resulted in a sharp increase in the share of FTC hiring by reducing the probability that worker starts an OEC job in 40 percentage points to 21% in 2015. Figure 1 shows the evolution of labor contracts in Peru's formal sector since prior to this legal reform.

On the other hand, FTCs are allowed under broad conditions: firms' market needs, increased production or the temporary nature of the services contracted. This type of contracts can be terminated at zero cost just by letting it expire. They also can be renewed for a period not to exceed five years in total. According to national household surveys, prior to the pandemic, out of all contracts for salaried employees only 22 percent were OEC (INEI, 2018). Recent evidence indicates that the rate of conversion of FTCs into OECs is quite low: only 7 percent of FTCs are converted (Jaramillo and Campos, 2022). This is consistent with evidence that associates high EPL with low FTC-to-OEC conversion rates Bentolila et al. (2019).

The Peruvian labor market is also characterized by high levels of informality. Over three quarter of occupied workers were informal in 2021. If we approximate by report of having a contract, only 43 percent of salaried employees were formal. In addition, only 11 percent of the self-employed were formal.[4]

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[4] The formal self-employed are identified as those with a tax identification number.

Thus, we can think of Peru's labor market as made up of three tiers. There is a dual structure in the formal portion of the market, divided by type of contract: OECs and FTCs. The third tier is made up of the informal workers. In addition, most of the independent workers, or self-employed, are informal as well.

4 Empirical approach

4.1 The PIAAC dataset

We use the Peruvian PIAAC dataset to implement our empirical strategy. This dataset is a nationally representative sample of 7289 individuals between the ages of 15 and 65.[5] As mentioned earlier, it offers rich detail about a worker's daily activities, use of skills, and, in particular, learning processes within the firm. In addition, the PIAAC conducts a standardized test to measure cognitive numerical, reading, and problem-solving abilities. Peru only recently joined the group of countries conducting the PIAAC in round 3, which took place between 2017 and 2018.

Our main outcomes are formal on-the-job training and informal on-the-job learning. For the former, we explore the same dummy variable as in Cabrales et al. (2017) which indicates whether a worker attended a training session organized in the workplace or training provided by supervisors or co-workers. Additionally, we differentiate whether the training was sponsored at least partially by the employer (or was costless for the employee) as models typically assume that training is costly for the employee (Berton and Garibaldi, 2012; Cabrales et al., 2017). With that insight, we also look at training that might not be provided on-the-job but is sponsored by the employee herself.[6]

For our second outcome variable of interest, informal learning (on-the-job), we follow Ferreira et al. (2018) who use an index of learning already provided by the OECD based on three questions: (1) How often do you learn new work-related things from co-workers or supervisors, (2) How often does your job involve learning-by-doing form the tasks you perform, and (3) How often does your job involve keeping up-to-date with new products or services.[7] The index - which has been validated for

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[5] The response rate was 83%, much higher than the 70% minimum recommended by the OECD (León et al., 2018).

[6] We code a worker as having had any training if, in the last 12 months, he took on-the-job training, participated in open or distance education, in seminars or workshops, or private lessons.

[7] These questions are measured on a Likert-scale with options for "Never" (1), "Less than once a month" (2), "Less than once a week but at least once a month" (3), "At least once a week but not every day" (4), and "Every day" (5).

international comparison, scale reliability and correlations (OECD, 2014b) – is standardized, so it is a measure of intensity of on-the-job learning and learning-by-doing.

Our main regressors of interest are a handful of dummy variables for the contractual status of the individual. Any individual at work is either self-employed or an employee of some firm. Among the employees, we divide them into workers with and without contracts. We use this differentiation as a proxy for informality in the salaried labor force. Ideally, we would have used additional pieces of information to identify an informal worker more precisely. Specifically, we are sorely missing some variable about the legal obligations paid by the employer for the social benefits of its employee. Following ILO standardized measurements, the national statistical office (INEI) classifies employees as informal if their employers do not contribute to their social security (pension or health insurance). For the PIAAC, we assume that a lack of contract reflects this condition. León et al. (2018) additionally add that an informal worker must receive less than a minimum wage and has an education mismatch, but the latter is not necessarily associated with informality. Further, by looking at contractual status, we can partition the whole employee labor force into informal, FTC and OEC workers. We remark that, in the case of Peru, self-employment status is largely a sign of informality, as it captures subsistence workers rather than entrepreneurs or free-lancers. Our statistics clearly provide evidence for this interpretation.

The composition of labor by contract and employee status in the PIAAC dataset matches fairly well with official statistics of the Peruvian labor market. In Table 1, nearly one half (48.5%) of all laboring individuals are self-employed. Among employees, over two fifths (41.2%) do not have any contract and we consider them to be informal, while little over one fifth have an OEC contract (21.2%). This implies that among all formal employees almost two thirds are FTC workers (64%), which is fairly close to the figures presented in Section 1.[8]

In addition, PIAAC comes with a wealth of control variables commonly cited in the human capital literature as being part of the individual's production function. In the Mincer equation literature, these are typically unobservable characteristics, as they are too detailed and in-depth to ask in national surveys. Traditional background characteristics include age, gender, years of education, household

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[8] Some explanations for these differences might involves undersampling of rural areas or poor households which is bound to happen due to their inaccessibility. It is well-known that informality there represents close to 100% of all jobs (Jaramillo and Ñopo, 2020).

Table 1. *PIAAC sample by working and contractual status*

Categories	Obs.	People (Thousands)	% Total	% EAP	% Employed	% Employees
No category	371	1512				
Inactive	1542	4009	19.2%			
Unemployed	323	767	3.7%	5.0%		
Employed	5053	14548	69.8%	95.0%		
Self-employed	2444	7062	33.9%	46.1%	48.5%	
Employee	2609	7487	35.9%	48.9%	51.5%	
OEC	*667*	*1587*	*7.6%*	*10.4%*	*10.9%*	*21.2%*
FTC	*1027*	*2824*	*13.6%*	*18.4%*	*19.4%*	*37.7%*
No contract	*915*	*3081*	*14.8%*	*20.1%*	*21.2%*	*41.2%*

Notes: First four rows partition the total sample and amount to 7289 observations. The number of people is obtained after applying the sampling weight. The last four columns show percentages weighted by sample weights.

composition (number of children and marital status), work experience and work tenure in years, and average working hours per week. Less common are the education mismatch categorical variables, the PIAAC scores on numeracy, reading and problem-solving which roughly test for cognitive abilities, and variables for readiness and motivation towards learning[9]. Job characteristics include traditional variables such as dummies for firm size, firm sector, and occupation sector. The latter two are codified according to the Revision 4 of the International Standard Industry Classification (ISIC rev. 4). They also include detailed information about skills use in jobs, such as task flexibility and use of planning, numeracy, reading, problem-solving, physical force, writing and information technologies, as well as individual perceptions, such as job satisfaction and trust of others. We describe the coding of all these variables in detail in Appendix Table A1.

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[9] Readiness is a standardized index constructed by the OECD from the following questions measured on the same five-point Likert scale: (1) When I hear or read about new ideas, I try to relate them to real-life situations to which they might apply; (2) I like learning new things; (3) when I come across something new, I try to relate it to what I already know; (4) I like to get to the bottom of difficult things; (5) I like to figure out how different ideas fit together; and (6) if I don't understand something, I look for additional information to make it clearer. This is a metacognitive ability that structures the learning process and affects learning efficiency..Learning is a dummy that activates when an individual feels identified at least to great extent with learning new skills, working out difficult tasks, relating new things to what they previously know and seek more information when they do not know something.

4.2 4.2 Empirical strategy

We will estimate the following equation of interest:

$$Y_i = F(X_i \, \beta + \delta T_i + \varepsilon_i) \tag{1}$$

where Y_i is the dependent variable. Y_i will take values corresponding to two distinct variables, which reflect both formal on-the-job training and informal learning. For the formal training variable, Y_i is a probability of receiving training (a dummy variable) and thus we estimate probit models, $F = \Phi(\cdot)$. The informal learning variable, an index, is continuous, and thus we estimate a linear regression, $F(z) = z$. The main independent variables are stored in T_i, which are dummy variables for contract types and working status (informal vs. formal, FTC vs. OEC, among other variations). X_i is a vector of controls and ε_i is an idiosyncratic error for individual i.

In general, δ cannot be interpreted as a causal effect of contract type on our dependent variable as there is a potential endogeneity issue. Specifically, contract type is potentially based on individual's self-selection or selection by the employer. Unobservable and omitted variables that could mediate the relationship between contract type and training will lead to biased OLS or ML estimates. These variables may include, for example, individuals' abilities, capacity for self-motivation, aptitude for learning (Mincer, 1997; Autor, 2001), the firm's characteristics and the job's specific skill requirements. Some of these are captured in our dataset, others may not.

Indeed, our empirical strategy relies on adding a comprehensive set of controls proxied in PIACC, the dataset we use, to the specification (X_i) to control for typically unobservable characteristics. In the case of Peru, to our knowledge, no other dataset before has provided such a detailed minutia on the employee's job and skills for a nationally representative sample. Our preferred specification, thus, contains information about worker's demographic and labor characteristics, firm characteristics, occupation, motivation, trust, numeracy and reading skills used at the workplace, and cognitive skills.

Even with such an array of controls, though, we remark that we do not interpret our estimates as a causal effect from contract type to training, but as a robust association that withstands model specification. Ferreira et al. (2018) points out that time preferences and risk aversion could affect

contract type and investment in learning decisions. Neither variable is proxied for in our dataset. At the local level, some geographical stratification (departments, geographical altitude, rural or urban dummies) are sorely missing at the moment, as are more precise questions for alternative identification of informal jobs (social obligations paid by the employer). The issue of reverse causality also remains somewhat. In these regards, the ideal approach would include a plausible instrumental variable for contract types, although reliable instruments are hard to come across, or a natural experiment that generated exogenous (not self-selected) variation in the assignment of contract types, as in Autor and Houseman (2010).[10]

5   Results

5.1   Descriptive statistics

To start the analysis, in Table 2 we present simple mean differences of the training variables between four contract pairs: FTC vs. OEC, Informal vs. Formal, Self-employed vs. OEC, Self-employed vs. Informal. There is a 4.2 percentage point decrease in the probability that an FTC worker receives OJT compared to OEC workers, but this is only significant with a weak 90% confidence level. This probability difference increases to 6.3 percentage points if we limit OJT to that which is financed or sponsored (by the employer) and gains additional statistical significance. Alternatively, the probability difference is 9 percentage points if we consider training more broadly (i.e. training outside the job), and 9.8 percentage points if in addition this training is sponsored by the employee.

These mean differences are much bigger and strongly significant when comparing formal workers with the informal or self-employed groups. Whether the training is financed or not does not amplify the differences in the probability of receiving OJT or undertaking broad training and may in fact decrease it. Even some differences in training between informal and self-employed can be seen in the last two columns of Table 2, and while smaller in size, are strongly significant. These already suggests that training is a low probability event for informal and self-employed, while self-employed in the sample might largely reflect yet another face of informality. There are no statistically significant

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[10] We have tried instrumenting informality in our dataset with lagged macroeconomic informality and unemployment rates by gender, cohort, and sector. However, these instruments suffered from a weak first stage with F-statistics below the typical threshold of 10, which in turn inflated standard deviations for the second stage estimations.

differences in informal learning patterns between FTC and OEC workers, or between informal and self-employed workers. There is, however, a strongly significant difference of 0.3 standard deviations in informal learning between informal and formal workers, and the same between self-employed and OEC workers.

Table 2. *Balance table of training characteristics by contract type*

	FTC - OEC		Informal - Formal		Selfemployed - OEC		Selfemployed - Informal	
Variable	Diff.	p-value	Diff.	p-value	Diff.	p-value	Diff.	p-value
OJT	-0.042*	(0.098)	-0.363***	(0.000)	-0.429***	(0.000)	-0.039***	(0.008)
Training	-0.087***	(0.000)	-0.345***	(0.000)	-0.466***	(0.000)	-0.065***	(0.000)
Number of OJT	-0.186	(0.572)	-0.092	(0.817)	-0.709**	(0.021)	-0.501	(0.273)
Financed OJT	-0.059**	(0.020)	-0.304***	(0.000)	-0.369***	(0.000)	-0.028**	(0.016)
Financed Training	-0.094***	(0.000)	-0.306***	(0.000)	-0.402***	(0.000)	-0.036***	(0.006)
Informal learning (index)	-0.086	(0.124)	-0.321***	(0.000)	-0.338***	(0.000)	0.037	(0.535)
Observations	1,669		2,550		3,066		3,285	

*Notes: * [**] (***) denotes 90% [95%] (99%) significance. We show simple mean differences of training and learning outcomes between different sets of workers as indicated by the first row.*

To fully exploit the wealth of data observed in PIAAC, in Appendix Table A2 we explore differences by contract type of further worker characteristics. OEC workers are older than FTC workers on average, but around the same age as self-employed, while informal workers are the youngest. In work experience, the ranking is similar, but self-employed actually have comparable experience as OEC workers. There is a larger male representation among formal workers than informal workers. Informal and self-employed workers have more children on average than formal workers. As far as education concerns, OEC workers have the highest number of years of education accumulated (18.9), followed by FTC (17.9), while informal (15.2) and self-employed (14.8) lag behind severely. The same ranking holds when comparing individual's learning attitude and motivation, meaning the OEC workers have better attitude towards learning, and formals fare better at learning than informal workers. There are no differences in parents' education and number of weekly working hours between OEC and FTC workers, only between formal workers and informal workers and self-employed. Looking at average standardized scores across all three tests, OEC workers consistently perform better than FTC workers, the latter perform better than informal workers, and informal workers themselves fare better than self-employed workers. Consequently, the use of numeracy and reading skills at the workplace is much more prevalent among OTC workers, followed by FTC, informal and the self-employed. Along those lines, formal workers are much more likely to work at more technically demanding

occupations, such as managers, professionals, and technicians.

The firms' characteristics, shown specifically in Appendix Table A3, also differ significantly among workers with and without contract. Most important to our paper is the fact that over 75% of informal workers are employed in microfirms (1-10 employees in size) and virtually none are employed in large firms (250 or more employees in size). By comparison, the distribution of FTC and OEC workers across firm sizes is largely the same, with nearly a third going to microfirms, another third going to small firms (10-50 employees in size), and the rest going to medium (51-250 employees in size) or large firms. Informal workers are also much more likely to work for firms in the primary sectors (agriculture, fishing and forestry) as well as in sales, accommodation and transport sectors, and construction. By contrast, formal workers are much more likely to work for firms in specialized services (education, health, public administration or finances).

Overall, these descriptive stats depict the OEC workers as being older in age and more experienced while also possessing slightly more skills and better motivations than the younger FTC workers. There is a much bigger gap between skills and motivations among either type of formal workers and informal or self-employed workers. Consequently, the more skilled workers are assigned more cognitively demanding tasks on a more regular basis. Remarkably, while informal workers can be argued to be the youngest and least experienced, demographic differences are not quite apparent between self-employed and formal, even OEC, workers. This gives better ground to the claim that self-employment in Peru is, by and large, an even more severe form of informality, likely subsistence workers, trapped at a relatively old age in a circle of poor productivity and low quality jobs. The virtual non-existence of informal workers in large firms and their abundance in microfirms also supports the assumptions usually used in the informality literature that firm size is closely related to informality, insofar as it is very difficult to hide informal workers from enforcement agencies in large firms and, in contrast, quite easy for small firms.

5.2 Estimation results

Now we show differences in training between contract types after controlling for a wealth of confounders. In Table 3, we use our full specification which includes as controls the whole set of variables listed in Appendix Table A1. Unlike the simple differences from Table 2, we show that

none of the training variables or the informal are different between OEC and FTC workers.

Table 3. *Effect of contract type on formal employees' probability of receiving OJT and informal training*

Regressor	OJT	Inf. Learn.	OJT	Inf. Learn.	OJT	Inf. Learn.
OEC (Formal)	0.277***	-0.062				
	(0.038)	(0.091)				
FTC (Formal)	0.266***	0.016	-0.027	0.044		
	(0.036)	(0.090)	(0.042)	(0.076)		
No contract	0.063	-0.069	-0.189***	-0.028		
	(0.040)	(0.095)	(0.055)	(0.090)		
Self-employed					-0.201***	0.034
					(0.031)	(0.080)
Observations	1,722	1,264	1,037	1,032	1,722	1,264
(Pseudo) R^2	0.151	0.152	0.147	0.173	0.134	0.151
Base category	Self-employed	Self-employed	OEC	OEC	Any Employee	Any Employee
Controls	Partial	Partial	Full	Full	Partial	Partial

Notes: * [**] (***) denotes 90% [95%] (99%) significance. We present ML marginal effects of the regressors on the probability of receiving the training types shown, and the OLS coefficient on the intensity of informal learning in column (5). The four variants of training type are described in detail in Appendix Table A1. Base category is indicated in the footnote of each regression. We use the battery of variables in Appendix Tables A2 and A3 as controls in all regressions.

Then, in Table 4, we use the same specification to compare formal workers (OEC and FTC combined) to informal workers. The results show that training, in any of our four codings, is much less likely among informal workers than formal workers after adding our battery of controls. The probability of receiving OJT is 17 pp lower for informal workers than it is for formal workers. Having any training is only 10.2 pp less likely. For both cases, the differential increases to 18.6 pp for OJT and 16.1 pp for broad training if the training is sponsored by the employee. Interestingly, we see no significant difference in informal learning between the informal and formal workers.

In Table 5, we compare more types of workers to add further insight to our results and in addition perform the same specifications for Mexico. We chose Mexico since its labor market features similar levels of informality as Peru. We include the full list of controls, except in regression that include the sample of self-employed. This is so because some controls are not available for the self-employed due to the nature of self-employment (e.g. tenure years in the firm, firm size dummies and education mismatch).

The first panel serves to show that both in Peru and Mexico we find no differences in training received

Table 4. *Effect of informality on job training and informal training*

Regressor	OJT	Training	Financed OJT	Financed Training	Informal Learning
No contract	-0.170***	-0.102**	-0.186***	-0.161***	-0.057
	(0.047)	(0.040)	(0.043)	(0.048)	(0.079)
Observations	1,037	1,037	1,033	1,037	1,032
(Pseudo) R^2	0.147	0.168	0.130	0.116	0.173
Other controls	Yes	Yes	Yes	Yes	Yes

Notes: This Table is analogous to Table 3, but we use a sample of all dependent workers, and compare formal workers (FTC and OEC combined) against informal workers.

by FTC and OEC workers, but substantial differences of very similar magnitude between formal and informal workers. The next two panels serve to show that the self-employed exhibit similar patterns than the informal workers in that they are exposed to much less training than formal workers.

5.3 Discussion and interpretation

Overall, our estimates indicate that there is a substantial gap in formal OJT in the Peruvian labor market between dependent formal workers (irrespective of their contract type) and the informal workers. At the same time, there are no differences in training between FTC and OEC workers.

To understand this, an explanatory mechanism requires delving further into the background surrounding a labor market with high informality. Firms that hire formal workers handle more complex operations that require more skillful workers than those that basic education are currently producing. These firms find it profitable to train their employees regardless of their contract type. Firms that hire informal workers conduct much smaller and simple operations, and thus are smaller in size. Their size minimizes the possibility of being detected in irregular non contractual relationship and enables them to hire workers on an informal basis. Since the operations are simple, these workers are rarely offered training opportunities.

As mentioned above, informal learning is a critical tool for human capital accumulation in the absence of formal training spaces and to pursue more rewarding job positions. We found no evidence that an informal work serves as a stepping stone for informal workers, as they exert no more effort than formal workers to acquire skills.

Table 5. *Effect of contract status on OJT probability in Peru vs Mexico*

Comparison	Peru	Mexico
FTC (Formal) v. OEC (Formal)	-0.018	-0.053
	(0.036)	(0.048)
No contract (Informal) v. OEC (Formal)	-0.190***	-0.145***
	(0.046)	(0.044)
Observations	1,444	1,187
Pseudo-R^2	0.144	0.161
OEC (Formal) v. Self-employed	0.275***	0.353***
	(0.033)	(0.031)
FTC (Formal) v. Self-employed	0.274***	0.265***
	(0.029)	(0.047)
No contract (Informal) v. Self-employed	0.049	0.116***
	(0.030)	(0.035)
Observations	3,045	1,993
Pseudo-R^2	0.172	0.209
Self-employed v. Employees	-0.203***	-0.262***
	(0.020)	(0.020)
Observations	3,045	1,995
Pseudo-R^2	0.187	0.200

*Notes: * [**] (***) denotes 90% [95%] (99%) significance. we show the ML marginal effects of contract type vs. baseline category on the probability of receiving OJT. We use full set of controls shown in Table 4 where we can, and, when including the self-employed in the sample, we use a reduced set of controls that does not include controls that are not asked to the self-employed (i.e. Firm size, tenure and education mismatch). On the left [right] we show estimates in the Peruvian [Mexican] sample.*

6 Conclusions

Whereas previous studies for developed countries have found that OJT is more prevalent for stable OEC workers than FTC workers, our results for Peru using the same underlying data – from the richly detailed PIAAC - show no significant differences in training between these two types of workers. Instead, we find substantial differences in the probability of receiving OJT between formal and informal salaried workers, as well as between formal workers and the self-employed (most of which are informal). Also contrasting with evidence from Europe, we find no differences in informal learning patterns between different labor categories.

These differences in access to training are worrisome for three reasons. First, training is an engine for productivity and long-run growth. Its absence in the informal sector, which comprises over three quarters of the labor market, is thus an obstacle to sustainable growth. Second, these differences and their effects on productivity only serve to perpetuate or possibly increase inequalities between the informal sector and formal sector. Third, there is no evidence of any endogenous catch-up between the sectors in the shape of informal learning, as we found no differences in these among different worker categories in the labor market.

Future research should look more closely at the effect of informality on the provision of training in the job. Very little has been written on this subject considering its potential impact on productivity, and this is one of a very small list of papers to address this question empirically. Also, future PIAAC surveys conducted in developing countries should add several questions to improve the characterization of the employee's legal conditions. In addition, future studies could take a deeper look at the differences between labor markets between developed and developing countries in order to understand where the differences in training between temporary and permanent employees arise from.

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Appendix

Table A1. *List of variables*

Variable	Description
Training variables	
On-the-job training (OJT)	In the last 12 months, worker had attended any organized sessions for on-the-job training or training by supervisors or co-workers
Training	In the last 12 months, worker received OJT, participated in courses conducted through open or distance education, seminars or workshops, or other courses or private lessons
Financed OJT	In the last 12 months, worker received OJT, and this activity was financed fully or partially by the employer or was costless.
Financed Training	In the last 12 months, worker received training, and this activity was financed fully or partially by the employer or was costless.
Informal learning	Index of learning provided by the OECD based around three questions: (1) How often do you learn new work-related things from co-workers or supervisors, (2) How often does your job involve learning-by-doing form the tasks you perform, and (3) How often does your job involve keeping up-to-date with new products or services. These questions are measured on a Likert-scale with options for "Never" (1), "Less than once a month" (2), "Less than once a week but at least once a month" (3), "At least once a week but not every day" (4), and "Every day" (5)

Variable	Description
Contract types	
OEC (Formal)	Worker has an indefinite contract
FTC (Formal)	Worker has a fixed-term contract or is employed by a temporary employment agency.
No contract (Informal)	Worker has no contract or working at an apprenticeship or other training scheme
Self-employed	Worker is self-employed
Workers characteristics	
Age	Age in years
Male	Is male
Number of children	Number of children
Has children	Has any children
Lives with spouse/partner	Lives with the spouse or partner
Spouse/partner works	The spouse or partner is working
Parent w/ superior education	The parent has superior education
Years of education	Years of education imputed through highest obtained qualification
Work experience (years)	Years of paid work during lifetime

Variable	Description
Learning attitude (standardized)	Index constructed by the OECD, and then standardized, from the following questions measured on the same five-point Likert scale: (1) When I hear or read about new ideas, I try to relate them to real-life situations to which they might apply; (2) I like learning new things; (3) when I come across something new, I try to relate it to what I already know; (4) I like to get to the bottom of difficult things; (5) I like to figure out how different ideas fit together; and (6) if I don't understand something, I look for additional information to make it clearer.
Weekly working hours	Average working hours per week
Overeducated	Worker reports that its qualification is more than what is necessary to do its job
Undereducated	Worker reports that its qualification is less than what is necessary to do its job
Tenure (years)	Number of years working in the firm, computed as worker's age during interview and age when entering its current job.
Job satisfaction	Self-reported satisfaction with current job is "extremely satisfied" or "satisfied"
Learning motivation	Worker reports that he feels identified at least to great extent with learning new skills, working out difficult tasks, relating new things to what they previously know and seek more information when they do not know something.
Trust of others	Individuals agrees or strongly agrees that he can trust other people.

Table A1 *(Continued)*

Variable	Description
Health status	Has good health or even better.
Literacy score	Mean of plausible values in the literacy component of PIAAC cognitive test.
Numeracy score	Mean of plausible values in the numeracy component of PIAAC cognitive test.
Problem-solving score	Mean of plausible values in the problem-solving component of PIAAC cognitive test.
Firm size	
Firm size 1-10	Employer firm has between 1 and 10 workers.
Firm size 11-50	Employer firm has between 11 and 50 workers.
Firm size 51-250	Employer firm has between 51 and 250 workers.
Firm size 251-1000	Employer firm has between 251 and 1000 workers.
Firm size 1001+	Employer firm has more than 1000 workers.
Job industry	
Agriculture forestry and fishing	ISIC revision 4 industry of the employer firm.
Mining	ISIC revision 4 industry of the employer firm.
Manufacturing	ISIC revision 4 industry of the employer firm.
Energy water and sanitation	ISIC revision 4 industry of the employer firm.
Construction	ISIC revision 4 industry of the employer firm.
Sales transport accommodation and food services	ISIC revision 4 industry of the employer firm.
Information and communications	ISIC revision 4 industry of the employer firm.
Finances and real estate	ISIC revision 4 industry of the employer firm.
Professional technicians and administrative services	ISIC revision 4 industry of the employer firm.
Public administration education and health	ISIC revision 4 industry of the employer firm.
Other services	ISIC revision 4 industry of the employer firm not mentioned in the above categories.
Occupation category	

Continued on next page

Variable	Description
Managers	ISIC revision 4 occupation category of the worker's job.
Professionals	ISIC revision 4 occupation category of the worker's job.
Technicians and associate professionals	ISIC revision 4 occupation category of the worker's job.
Clerical support workers	ISIC revision 4 occupation category of the worker's job.
Service and sales workers	ISIC revision 4 occupation category of the worker's job.
Skilled agricultural and fishery workers	ISIC revision 4 occupation category of the worker's job.
Craft and related trade workers	ISIC revision 4 occupation category of the worker's job.
Plant and machine operators	ISIC revision 4 occupation category of the worker's job.
Elementary occupations	ISIC revision 4 occupation category of the worker's job.
Armed Forces	ISIC revision 4 occupation category of the worker's job.
Use of skills in workplace	
Task flexibility at work (Standardized)	Index of use of task discretion at work, provided by OECD. Then, standardized.
Planning skills at work (Standardized)	Index of use of planning skills at work, provided by OECD. Then, standardized.
Complex problem-solving	Worker self-report that he uses complex problem-solving skills at least once a week.

Table A1 *(Continued)*

Variable	Description
Physical tasks	Worker self-report that he uses physical strength at least once a week.
Numeracy-related tasks (Standardized)	Index of use of numeracy skills (basic and advanced) at work, provided by OECD. Then, standardized.
Reading-related tasks (Standardized)	Index of use of reading-related skills (prose and texts) at work, provided by OECD. Then, standardized.
Writing-related tasks (Standardized)	Index of use of writing skills at work, provided by OECD. Then, standardized.
ICT-related tasks (Standardized)	ndex of use of ICT skills at work, provided by OECD. Then, standardized.

Table A2. *Balance table of workers' non-training characteristics by contract type*

Variable	FTC - OEC Diff.	p-value	Informal - Formal Diff.	p-value	Selfemployed - OEC Diff.	p-value	Selfemployed - Informal Diff.	p-value
Age	-6.592***	(0.000)	-4.680***	(0.000)	0.595	(0.315)	9.474***	(0.000)
Male	-0.033	(0.189)	-0.071***	(0.000)	-0.045**	(0.050)	0.046**	(0.015)
Number of children	-0.171**	(0.027)	0.292***	(0.000)	0.706***	(0.000)	0.517***	(0.000)
Has children	-0.106***	(0.000)	-0.089***	(0.000)	0.098***	(0.000)	0.254***	(0.000)
Lives with spouse/partner	-0.139***	(0.000)	-0.092***	(0.000)	0.071***	(0.002)	0.252***	(0.000)
Spouse/partner works	-0.102***	(0.003)	-0.055*	(0.060)	-0.038	(0.209)	0.076***	(0.007)
Parent w/ superior education	-0.026	(0.234)	-0.090***	(0.000)	-0.155***	(0.000)	-0.048***	(0.000)
Years of education	-0.952***	(0.000)	-2.992***	(0.000)	-4.311***	(0.000)	-0.698***	(0.000)
Work experience (years)	-6.135***	(0.000)	-3.460***	(0.000)	-0.617	(0.259)	6.750***	(0.000)
Learning attitude (index)	-0.093**	(0.048)	-0.331***	(0.000)	-0.528***	(0.000)	-0.137***	(0.000)
Learning attitude (standardized)	-0.096**	(0.048)	-0.342***	(0.000)	-0.545***	(0.000)	-0.142***	(0.000)
Weekly working hours	0.602	(0.404)	-5.414***	(0.000)	-3.051***	(0.001)	1.981***	(0.010)
Overeducated	0.040***	(0.009)	0.046***	(0.001)	0.000	()	0.000	()
Undereducated	-0.042*	(0.055)	-0.018	(0.330)	0.000	()	0.000	()
Tenure (years)	-7.204***	(0.000)	-2.689***	(0.000)	0.000	()	0.000	()
Literacy score	-0.155***	(0.002)	-0.409***	(0.000)	-0.700***	(0.000)	-0.192***	(0.000)
Numeracy score	-0.217***	(0.000)	-0.537***	(0.000)	-0.741***	(0.000)	-0.066*	(0.091)
Problem-solving score	-0.103	(0.122)	-0.209***	(0.000)	-0.488***	(0.000)	-0.215***	(0.000)
Job satisfaction	-0.051**	(0.013)	-0.120***	(0.000)	-0.098***	(0.000)	0.054***	(0.002)
Learning motivation	-0.083***	(0.001)	-0.188***	(0.000)	-0.225***	(0.000)	0.016	(0.335)
Trust of others	0.007	(0.761)	0.010	(0.570)	-0.001	(0.974)	-0.015	(0.374)
Health status	-0.026	(0.278)	-0.107***	(0.000)	-0.251***	(0.000)	-0.128***	(0.000)
Task flexibility at work (Index)	-0.123***	(0.002)	-0.089***	(0.005)	0.096**	(0.014)	0.263***	(0.000)
Task flexibility at work (Standardized)	-0.154***	(0.002)	-0.111***	(0.005)	0.119**	(0.014)	0.327***	(0.000)
Planning skills at work (Index)	-0.166***	(0.000)	-0.296***	(0.000)	-0.213***	(0.000)	0.185***	(0.000)
Planning skills at work (Standardized)	-0.202***	(0.000)	-0.358***	(0.000)	-0.258***	(0.000)	0.224***	(0.000)
Complex problem-solving	-0.006	(0.788)	-0.104***	(0.000)	-0.128***	(0.000)	-0.020	(0.181)
Physical tasks	0.055**	(0.029)	0.144***	(0.000)	0.213***	(0.000)	0.034*	(0.066)
Numeracy-related tasks (Index)	-0.147**	(0.021)	-0.438***	(0.000)	-0.683***	(0.000)	-0.152***	(0.001)
Numeracy-related tasks (Standardized)	-0.141**	(0.021)	-0.421***	(0.000)	-0.656***	(0.000)	-0.146***	(0.001)
Reading-related tasks (Index)	-0.351***	(0.000)	-0.522***	(0.000)	-0.749***	(0.000)	-0.007	(0.877)
Reading-related tasks (Standardized)	-0.325***	(0.000)	-0.482***	(0.000)	-0.691***	(0.000)	-0.007	(0.877)
Writing-related tasks (Index)	-0.154***	(0.008)	-0.417***	(0.000)	-0.731***	(0.000)	-0.221***	(0.000)
Writing-related tasks (Standardized)	-0.148***	(0.008)	-0.402***	(0.000)	-0.705***	(0.000)	-0.213***	(0.000)
ICT-related tasks (Index)	-0.049	(0.500)	-0.635***	(0.000)	-0.351***	(0.000)	0.312***	(0.000)
ICT-related tasks (Standardized)	-0.044	(0.500)	-0.564***	(0.000)	-0.312***	(0.000)	0.277***	(0.000)
Observations	1,669		2,550		3,066		3,285	

Table A3. *Balance table of workers' firm characteristics by contract type*

Variable	FTC - OEC Diff.	p-value	Informal - Formal Diff.	p-value	Selfemployed - OEC Diff.	p-value	Selfemployed - Informal Diff.	p-value
Firm size 1-10	-0.001	(0.966)	0.434***	(0.000)	0.000	()	0.000	()
Firm size 11-50	0.033	(0.171)	-0.167***	(0.000)	0.000	()	0.000	()
Firm size 51-250	-0.004	(0.860)	-0.138***	(0.000)	0.000	()	0.000	()
Firm size 251-1000	0.003	(0.829)	-0.076***	(0.000)	0.000	()	0.000	()
Firm size 1001+	-0.032***	(0.007)	-0.053***	(0.000)	0.000	()	0.000	()
Agriculture forestry and fishing	0.024**	(0.042)	0.103***	(0.000)	0.187***	(0.000)	0.069***	(0.000)
Mining	0.001	(0.919)	-0.023***	(0.000)	-0.022***	(0.000)	-0.000	(0.806)
Manufacturing	0.049***	(0.004)	-0.001	(0.969)	-0.002	(0.907)	-0.032***	(0.006)
Energy water and sanitation	0.001	(0.820)	-0.004	(0.208)	-0.003	(0.314)	0.000	(0.949)
Construction	0.034***	(0.001)	0.031***	(0.001)	0.030***	(0.002)	-0.022**	(0.013)
Sales transport acommodation and food services	0.034	(0.121)	0.100***	(0.000)	0.251***	(0.000)	0.129***	(0.000)
Information and communications	0.004	(0.610)	-0.015***	(0.007)	-0.017***	(0.000)	-0.005	(0.156)
Finances and real estate	-0.022**	(0.026)	-0.032***	(0.000)	-0.049***	(0.000)	-0.002	(0.424)
Professional technicians and administrative services	0.022	(0.140)	-0.049***	(0.000)	-0.034***	(0.001)	0.001	(0.928)
Public adminsitration education and health	-0.123***	(0.000)	-0.207***	(0.000)	-0.354***	(0.000)	-0.069***	(0.000)
Other services	-0.024***	(0.007)	0.096***	(0.000)	0.013	(0.243)	-0.068***	(0.000)
Managers	-0.030***	(0.001)	-0.019***	(0.002)	-0.010	(0.263)	0.028***	(0.000)
Professionals	-0.073***	(0.000)	-0.142***	(0.000)	-0.196***	(0.000)	-0.008	(0.396)
Technicians and associate professionals	0.003	(0.865)	-0.094***	(0.000)	-0.106***	(0.000)	-0.014*	(0.091)
Clerical support workers	-0.002	(0.885)	-0.072***	(0.000)	-0.117***	(0.000)	-0.044***	(0.000)
Service and sales workers	-0.005	(0.786)	0.095***	(0.000)	0.104***	(0.000)	0.012	(0.475)
Skilled agricultural and fishery workers	-0.000	(0.994)	0.032***	(0.000)	0.189***	(0.000)	0.158***	(0.000)
Craft and related trade workers	0.049***	(0.001)	0.028**	(0.026)	0.058***	(0.000)	-0.001	(0.911)
Plant and machine operators	0.020	(0.107)	-0.014	(0.159)	0.074***	(0.000)	0.075***	(0.000)
Elementary occupations	0.048***	(0.005)	0.191***	(0.000)	0.016	(0.267)	-0.205***	(0.000)
Armed Forces	-0.010***	(0.010)	-0.005*	(0.054)	-0.013***	(0.000)	-0.001	(0.111)
Observations	1,669		2,550		3,066		3,285	