1. Dual Labour Markets and (Lack of) On-The-Job Training: Evidence for Spain using PIAAC data

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Abstract

Using the Spanish micro data in PIAAC, we first document how the excessive dualism of the Spanish labour market leads to lower on-the-job training for temporary workers than for permanent workers. Next, we find that that the lower specific training received by temporary workers has a detrimental effect on their literacy and numeracy scores in the PIAAC study.

Keywords: Dual labour market, Total factor productivity, On-the-job training, Cognitive skills.

Introduction

Among the most salient features of the Spanish economy during the last twenty years or so we find the following two : (i) a strong labour-market segmentation stemming from large differences in employment protection legislation (EPL henceforth) that encourage the widespread use of temporary / fixed-term contracts, and (ii) a sharp reduction in the growth rate of Total Factor Productivity (TFP henceforth), a multifactor productivity variable that captures investment in R&D and the level of human capital of accumulated by employers and workers.

The origin of the first feature dates back to the mid-eighties when, in order to ameliorate the sharp rise in unemployment after the two oil price crises and the re-industrialization process during the transition to democracy, a radical labour market reform was passed in 1984. This reform allowed the indiscriminate use of temporary contracts (with either reduced or no costs for dismissal) for any regular productive activity (and not just for seasonal employment, as it had been the case until then), while keeping the rigid employment protection of permanent contracts unchanged through high severance pay (see, e.g., Dolado et al., 2002 and 2008).

The rate of temporary work (i.e., the share of workers under temporary contracts in the total number of employees) soared from 15% before the reform to 35.4% in the mid-nineties. Since then, around 90% (94% nowadays) of newly signed contracts have been of this type, while the average temp-to-perm conversion rate has oscillated between 10% in the nineties and first half of the 2000s and 5% nowadays (see Amuedo-Dorante, 2001 and Güell and Petrongolo, 2007). Later on, after a long sequence of partial labour market reforms, the rate of temporary work stabilized at around 30%. Even after the mass destruction of temporary jobs in Spain during the Great Recession, it has dropped to only to 24%, which still remains as one of the highest rates in the OECD.

As regards the second feature, labour productivity growth has seen a significant slowdown over the long boom (1995-2007) that preceded the Great Recession, when both employment and hours worked experienced a sharp growth. It is important to highlight that this reduction of labour productivity growth was not due to a slowdown in the accumulation of physical capital per worker, as a result of the strong job creation. Rather, it was due to a sharp decline in the growth rate of TFP, which went down from an average of 1.5% in 1980-1994 to -0.35% in 1995-2007. Although a substantial part of this decline has been due to the heavy dependence of the Spanish economy on several low value-added sectors (e.g., construction, tourism, catering, etc.), there is extensive evidence documenting that TFP growth has also performed rather poorly in several tradable sectors, such as the manufacturing industry (see, e.g., Escribá and Murgui, 2009).

This negative performance of the TFP growth rate in Spain is rather puzzling since it took place during a period of large technological improvements worldwide. In particular, it contrasts not only with the US, where TFP growth sharply accelerated, but also with the rest of Europe where, despite a certain slowdown, TFP has evolved considerably better than in Spain. So, according to EU KLEMS (a harmonized database of multifactor productivity in EU countries) the average TFP growth rate in the EU-15 fell from 2.7% in 1970-1994 to 1.3% in 1995-2005 while, as discussed above, the corresponding reduction of TFT growth in Spain has been much larger (see Escribá and Murgui, 2009).

Our goal in this paper is to establish a link between the two above-mentioned features using a mechanism that so far has not received too much attention in the literature. Specifically, we analyze how the gap in EPL strictness between permanent and temporary contracts may have reduced the amount of on-the- job training (OJT henceforth) that temporary employees receive the workplace. In addition, we explore whether this detrimental effect on OJT also translates into changes in temporary workers' cognitive skills and competences, and thus

ultimately affect their accumulation of human capital. The cross –sectional database for Spain available in the first wave of the *Programme for the International Assessment of Adult Competencies* (PIAAC) allows us to jointly explore these two effects. The basic insight of our approach is that, in a context of wage rigidity and a high EPL gap between temporary and permanent workers, firms seem far less inclined to turn unstable contracts into stable ones. This causes temporary contracts to change from being "probationary contracts" (*stepping stones*) to become "terminal contracts" (*dead-ends*) leading to a very high worker turnover between employment and unemployment. Insofar as the EPL gap cannot be neutralized through enough wage flexibility, firms have little incentive to invest in the training their employees. By the same token, neither workers have the right incentives to improve on their job performance by accumulating better productive capabilities. Since these skills and OJT are very important components of multifactor productivity, this mechanism may have played an important role in explaining the relation between labour market duality and the unsatisfactory development of TFP growth (see Bassaninni et al., 2008).

This type of mechanism has been recently proposed by Dolado et al. (2013) using a model where the decisions of employers and workers interact in a dual labour market inspired by the characteristics of the Spanish one. The setup that these authors consider is one in which firms find it optimal to initially hire workers under fixed-term contracts. When such contracts expire (typically after 1 or 2 years), the employers face the decision to upgrade the worker to a permanent contract (subject to dismissal costs / much higher EPL) or to dismiss the worker and hire another one again in sequence on a temporary basis

Temporary workers set the optimum level of effort/productivity in their jobs by trading off the disutility of exerting effort and the utility provided by a combination of the wage received in a temporary job and the expectation of promotion to a permanent job at the end of the fixed-term contract. Firms with temporary jobs take decisions on wages, contract conversion rates and investment on occupational training, so as to maximize expected benefits subject to workers' participation and incentive compatibility constraints.

Dolado et al.'s (2013) show that, insofar as wage rigidity prevents the neutralization of the severance pay effects in collective bargaining, as is the case in Spain, an increase in the EPL gap between the two types of workers (i.e., larger labour-market dualism) not only leads to less investment by firms on OJT, but also implies a reduction in workers' effort. The basic insight for this result is that a higher EPL gap reduces the temp-to-perm conversion rate. Therefore, firms do not find it profitable to invest in the training of temporary workers who are very unlikely to b eupgraded. This gives rise to a disappointment effect among workers, who respond to the lower and more uncertain promotion prospects by exerting less effort. Hence, this leads to a self-fulfilling prophecies equilibrium where employers do not invest in workers, expecting that they will not exert enough effort, and workers fulfill these expectations by rationally anticipating firms' strategies.

For the empirical test of their model, these authors use the *Survey of Business Strategies* (SBS), conducted by the SEPI Foundation. The SBS provides firm-level longitudinal information on a representative sample of manufacturing firms in Spain during 1991-2005 which, for each year

and firm in the survey, allows to compute both the growth rate of TFP and the conversion rate of temporary workers into permanent ones.

By means of panel regression methods (controlling for a wide range of socio-economic and demographic variables for both workers and firms), their main empirical finding is that an increase of the EPL gap leads to reductions in the conversion rate in those firms with a higher rate of temporary work which, in turn decreases their TFP growth rate. The opposite is found when the EPL gap goes down (as happened, for example, after the changes in labour market regulation in the reforms of 1994 and 1997). Furthermore, they document that, since the early 2000s, the slowdown in TFP is particularly concentrated in those manufacturing industries intensive in temporary work rates that are ancillary linked to the construction sector (cement, wood and furniture, etc.),where a bubble started to grow in the early 2000s.

One problem of the SBS is that it lacks information on both firm-provided training activities at the workplace and the effort exerted by employees. The availability in PIAAC of different measures of OJT activities for workers as well as on their scores in the literacy and numeracy tests allows us to overlook, at least in part, this deficiency. Hence, using the cross-sectional sample for Spain in PIAAC, our main goal here is to check, firstly, whether there is a direct causal relation between the type of contract held by the worker and the amount of OJT received at the workplace and, secondly, whether enjoying this type of training increases literacy and numeracy skills.

In order to derive testable hypotheses in our empirical approach, we start by developing a simple model of a two-tier labour market where job vacancies opened by firms differ according to the educational attainment of job seekers. For simplicity it is assumed that firms offer permanent contracts (with high dismissal costs) to highly-educated workers, while temporary contracts (without dismissal costs) are only available for less-educated workers. Before entering the labour market, individuals (who differ in their innate ability and therefore in the cost of education) select their preferred level of education according to the expected utility to be achieved in each type of job. The main result of the model is that, in the presence of rigid wages and aggregate productivity shocks that drive job destruction, greater labour market dualism reduces workers' incentives to improve their level of education, especially during booms. Other important predictions are that, on the one hand, growing specialization in sectors in which temporary work is more intensive reduces workers' human capital accumulation and, on the other hand, that investment in education exhibits, *ceteris paribus*, a counter-cyclical pattern since its opportunity cost is lower in recessions.

In general, our empirical results support these theoretical implications. First, using a large number of controls on individual and job characteristics (including worker's motivation), we find a substantially negative and statistically significant relationship between holding a temporary contract and the amount of OJT received at the workplace. Secondly, we find that the less OJT individuals receive, the worse their literacy and numeracy skills. These results turn out to be consistent with the growing empirical evidence about the negative effects of persistent labour market dualism in Spain on productivity growth and unemployment (see Bentolila et al., 2012).

The rest of the paper is structured as follows. Section 2 provides a brief overview of the related literature in Spain on this topic. Section 3 develops a simple theoretical model that guides our empirical approach. Section 4 describes the PIAAC database and provides descriptive statistics of the outcome and treatment variables used in the empirical analysis. Section 5 presents the main empirical results. Finally, Section 6 offers some brief conclusions.

RELATED LITERATURE

In addition to the previously discussed paper by Dolado et al. (2013), there are some other related works, focusing on the Spanish case, that examine the effects of segmentation in the labour market on productivity growth. We next summarize their main conclusions.

Possibly the first paper addressing this issue is Sánchez and Toharia (2000) who, on the basis of the main implications of a standard efficiency wage model, use data from the SBS for the period 1991-1994 to estimate the relationship between the rate of temporary work and labour productivity growth. Specifically, they regress average labour productivity on the rate of temporary work at the firm level, plus other controls, finding a negative relationship between both variables. Similar results been obtained by Alonso-Borrego (2010) and Gonzalez and Miles (2012) using more updated samples drawn from the Firms' Balance Sheets of the Bank of Spain (CBBE) and the SBS, respectively. Like Dolado et al. (2013), these authors focus on documenting the negative effect of contractual instability on the growth rate of TFP, rather than on labour productivity growth. Yet, they ignore the mechanism linking conversion rates and TFP which is stressed by the latter authors.

Regarding the relationship between dualism and the incidence of occupational training in Spain, it is worth highlighting the work of Alba-Ramirez (1994) and De la Rica et al. (2008). In both cases, they document that firms invest less in training temporary workers given their high turnover rates, although they do not examine how the amount of training has varied with the changes observed in the EPL gap which have taken place since the initial labour market reform in 1984.

Recently, Garda (2013) analyzes the size of wage losses experienced by those workers who have been displaced to other firms as a result of having been subject to a collective dismissal (ERE) in their previous firm. If firms provide a higher level of specific training to workers with permanent contracts than to those with temporary contracts, the loss of this type of human capital will be more significant for the first type of workers than for the second. Therefore, we would expect to find higher wage losses among workers with permanent contracts. Using the Social Security records from the Continuous Sample of Working Lives (MCVL) and controlling by job tenure, sector of activity and other covariates, the results confirm that permanent workers subject to EREs suffer higher and more permanent wage cuts than those with temporary contracts.

A MODEL OF EDUCATIONAL CHOICE IN A DUAL LABOUR MARKET

Preliminaries

In our model, workers and firms live for two periods and, for simplicity, we assume that there is no time discounting. At the beginning of the first period, workers apply for jobs after having chosen their educational level. Firms have a linear technology and only hire workers whose expected value for the company, *W*, is equal to or greater than their hiring costs. The initial skill of the worker is denoted by $\theta \in \left[\underline{\theta}, \overline{\theta}\right]$ and we assume that its distribution is uniform. Human capital is a composite of skill and education. Again, for the sake of simplicity, we assume that there are only two levels of education, and that the human capital of a highly-educated worker is $H^e(\theta) = h\theta$, where *h> 1*, while the human capital of a less-educated worker is $H^u(\theta) = \theta$. The cost of acquiring education $C(\theta)$ is assumed to be decreasing in θ. Specifically, we choose the functional form $C(\theta) = \theta^{-\gamma}$, where $\gamma > 0$.

Once the education decision has been made, firms hire workers either using temporary (T) or permanent contracts (P). The difference between these two types of contracts is that dismissing a worker with a P contract involves a firing cost $F > 0$, while there is no dismissal compensation for temporary workers. To simplify the analysis, we assume that P contracts are only offered to workers with high education, while those jobs available for the T workers do not have this requirement. Therefore, workers without education start in T job positions whose initial productivity is equal to their human capital, while educated workers start in P job positions whose initial productivity is equivalent to $\zeta = h\theta$.

In the second period, workers' productivity changes due to an aggregate shock that captures business cycle fluctuations. In particular, during this period, the productivity of the less-educated workers is perceived by firms with T jobs to be uniformly distributed $U\left[\overline{\theta}(1-\varepsilon), \overline{\theta}\right]$, where $\varepsilon \in [0,1]$ is a parameter of the distribution, for which it holds that $\underline{\theta} = \overline{\theta}(1-\varepsilon)$. As a result of this assumption, the p.d.f .and c.d.f. of the productivity for this kind of worker during the second period are: $g_\theta(\varepsilon) = \frac{1}{\varepsilon\overline{\theta}}$ and $G_\theta(\varepsilon) = 1 + \frac{\theta - \overline{\theta}}{\varepsilon\overline{\theta}}$, respectively. Likewise, the corresponding distribution of productivity perceived by firms with P jobs for workers with higher educational level is $U\left[\overline{\zeta}(1-\varepsilon), \overline{\zeta}\right]$, where $\overline{\zeta} = h\overline{\theta}$, so that $g_\zeta(\varepsilon) = \frac{1}{\varepsilon\overline{\zeta}}$ and $G_\zeta(\varepsilon) = 1 + \frac{\zeta - \overline{\zeta}}{\varepsilon\overline{\zeta}}$. Notice that in both cases a higher (lower) value of ε captures a recessionary (expansionary) phase in which the average productivity of workers in both types of firms drops (increases).

Wages in P and T jobs are denoted as w_P and w_T, respectively, and are taken to be not fully flexible. In order to simplify the analysis, it is assumed that these wages are only paid in the second period and are posted by firms at the beginning of the first period. They verify that $w_T < w_P$, and are set by firm subject to the constraints $F < w_P < F + \overline{\zeta}\left(= F + h\overline{\theta}\right)$ and $0 < w_T < \overline{\theta}$. As will be argued below, these restricted ranges of wage variation, while capturing some degree of wage rigidity, ensure that workers always prefer working to not working. Therefore, the participation constraints are satisfied.

Finally, another relevant assumption is the existence for workers in T jobs of a rate of voluntary quits, q, with $0 < q < 1$, during the second period (reflecting the unexpected termination of temporary employment which is not due to a negative shock). By contrast contrary, workers in P jobs never quit.

Asset values

(I) Firms

Firms hire workers whenever the expected value of their contribution to the firm's profits is greater than the hiring cost, HC, which is taken to be identical for both types of jobs.

Denoting the asset value of a firm which offers contracts of a given type as W_i $(i = P,\ T)$, the following asset value is obtained for firms with P jobs,

$$W_P(\varepsilon,\zeta) = \zeta - HC + \left[\int_{\overline{\zeta}(1-\varepsilon)}^{\overline{\zeta}} \max(\zeta - w_P, -F)\, dG_\zeta(\varepsilon)\right] =$$

(using integration by parts, see Appendix)

$$= \zeta - HC + \left[\left(\overline{\zeta} - w_P\right) - \int_{w_P - F}^{\overline{\zeta}} G_\zeta(\varepsilon)\, d\zeta\right] \qquad (1)$$

Regarding firms offering temporary jobs, their asset value is,

$$W_T(\varepsilon,\theta) = \theta - HC + (1-q)\left[\int_{\overline{\theta}(1-\varepsilon)}^{\overline{\theta}} \max(\theta - w_T,\ 0)\, dG_\theta(\varepsilon)\right] =$$

$$= \theta - HC + (1-q)\left[\left(\overline{\theta} - w_T\right) - \int_{w_T}^{\overline{\theta}} G_\theta(\varepsilon)\, d\theta\right]. \qquad (2)$$

Note that the terms $w_P - F$ and w_T in expressions (1) and (2) turn out to be the productivity cutoffs used by firms to keep their workers in P and T jobs, respectively. In other words, this means that workers with productivities $\theta < w_T$ and $\zeta < w_P - F$ will see their contracts terminated in the second period. From the value of these cutoffs it can be inferred that a wage rise increases the job destruction rate while a rise in severance payments, F, reduces that rate for workers with P jobs. This is because, upon having to pay higher dismissal costs, firms will prefer keep some workers whose productivity has fallen and who would have been dismissed under lower severance pay. Specifically, using the uniform distributions $\zeta \sim U\left[h\bar{\theta}(1-\varepsilon), h\bar{\theta}\right]$ and $\theta \sim U\left[\bar{\theta}(1-\varepsilon), \bar{\theta}\right]$ with $\varepsilon \in [(0,1]$ we can write,

$$W_P(\varepsilon,\theta) = h\theta - HC + \left[\frac{\left(h\bar{\theta} - w_P + F\right)^2}{2\varepsilon h\bar{\theta}} - F\right] \tag{3}$$

$$W_T(\varepsilon,\theta) = \theta - HC + (1-q)\left[\frac{\left(\bar{\theta} - w_T\right)^2}{2\varepsilon\bar{\theta}}\right]. \tag{4}$$

(II) Workers

As for workers, assuming for the sake of simplicity that the value of being unemployed is equal to zero, their asset values, V_i, of being employed with a P and T contract are as follows,

$$\begin{aligned} V_P(\varepsilon,\theta) &= \left[\int_{w_P - F}^{h\bar{\theta}} w_P dG_\zeta(\varepsilon) + \int_{h\bar{\theta}(1-\varepsilon)}^{w_P - F} F dG_\zeta(\varepsilon)\right] - C(\theta) = \\ &= \frac{w_P h\bar{\theta}}{\varepsilon h\bar{\theta}} - \frac{\left(w_P - F\right)^2}{\varepsilon h\bar{\theta}} - \frac{Fh\bar{\theta}(1-\varepsilon)}{\varepsilon h\bar{\theta}} - C(\theta) \\ &= \frac{\left(w_p - F\right)\left[h\bar{\theta} - \left(w_P - F\right)\right]}{\varepsilon h\bar{\theta}} + F - C(\theta) \end{aligned} \tag{5}$$

$$\begin{aligned} V_T(\varepsilon,\theta) &= (1-q)\left[\int_{w_T}^{\bar{\theta}} w_T dG_\zeta(\varepsilon)\right] = \\ &= (1-q)\left[\frac{w_T\bar{\theta}}{\varepsilon\bar{\theta}} - \frac{{w_T}^2}{\varepsilon\bar{\theta}}\right] = (1-q)\left[\frac{w_T\left(\bar{\theta} - w_T\right)}{\varepsilon\bar{\theta}}\right] \end{aligned} \tag{6}$$

Given these derivations, note that V_P and V_T are strictly positive in (5) and (6) since the admissible productivity thresholds for workers in jobs P and T are, respectively, $w_P - F$ and

w_T . As a result, it follows that $w_P - F < h\bar{\theta}$ and $w_T < \bar{\theta}$ so that the participation constraint is satisfied, meaning that workers prefer to work than not to work.

Decisions on education

According to the previous asset values, at the beginning of the initial period the worker will decide to invest in education if the net gains of getting educated outweigh the net gains of not doing so. That is, workers decide to invest in education if,

$$\frac{\left(w_p - F\right)\left[h\bar{\theta} - \left(w_P - F\right)\right]}{\varepsilon h\bar{\theta}} + F - \theta^{-\gamma} \geq \left(1-q\right)\left[\frac{w_T\left(\bar{\theta} - w_T\right)}{\varepsilon\bar{\theta}}\right] \qquad (7)$$

from which it follows that an initial skill threshold θ^* can be defined such that those individuals with $\theta < \theta^*$ would not invest in education while that those with $\theta \geq \theta^*$ will do. From (7), it follows that θ^* can be re-written as,

$$\theta^* = \frac{1}{D^{\gamma}}, \qquad \text{where}$$

$$D = \frac{\left(w_p - F\right)\left[h\bar{\theta} - \left(w_P - F\right)\right]}{\varepsilon h\bar{\theta}} + F - \left(1-q\right)\left[\frac{w_T\left(\bar{\theta} - w_T\right)}{\varepsilon\bar{\theta}}\right]. \qquad (8)$$

Comparative Statics

Since for any predetermined variable, x, $\partial\theta^*/\partial x = \left(\partial\theta^*/\partial D\right)\left(\partial D/\partial x\right)$ and $\partial\theta^*/\partial D < 0$ the following comparative statics results can be derived,

$$\frac{\partial\theta^*}{\partial w_P} < 0 \text{, given that } sign\frac{\partial D}{\partial w_P} = sign\left[h\bar{\theta} - 2\left(w_P - F\right)\right] > 0 \qquad (9)$$

$$\frac{\partial\theta^*}{\partial w_T} > 0 \text{, given that } sign\frac{\partial D}{\partial w_T} = sign\left\{-\left(1-q\right)\left[\bar{\theta} - 2w_T\right]\right\} < 0 \qquad (10)$$

$$\frac{\partial\theta^*}{\partial F} < 0 \text{, if and only if } \varepsilon > 1 - \frac{2\left(w_P - F\right)}{h\bar{\theta}} \text{, since } sign\frac{\partial D}{\partial F} = sign\left\{\frac{2\left(w_P - F\right)}{\varepsilon h\bar{\theta}} - \frac{1-\varepsilon}{\varepsilon}\right\} \qquad (11)$$

$$\frac{\partial\theta^*}{\partial q} < 0 \text{, given that } sign\frac{\partial D}{\partial q} > 0 \qquad (12)$$

$$\frac{\partial\theta^*}{\partial \varepsilon} > 0 \text{, given that } sign\frac{\partial D}{\partial \varepsilon} < 0 \qquad (13)$$

We now turn to the interpretation of the previous results. First, as regards (9) and (10), we get that, while an increase in w_P (keeping all other variables constant) implies that that more individuals get educated (smaller θ^*), a rise in w_T leads to the opposite effect. Obviously, these two effects arise from the assumed relationship between type of contract and educational level. Since a P contract is only offered to highly-educated individuals, a higher wage in this type of jobs necessarily induces a greater incentive to invest in education. Conversely, a rise in the temporary workers' wage makes P jobs and education less attractive.

Secondly, as can be observed in (11), the effect of changes in severance pay F over θ^* depends on the business-cycle phase. If ε is sufficiently large (i.e., when the economy suffers a recession) then an increase in F reduces θ^*, so that more individuals invest in education. The opposite occurs when ε is small, (i.e., when the economy enjoys an expansion). The intuition underlying this result stems from the two effects that severance pay has on the asset value of educated workers in P jobs, as illustrated in (5). When F goes up, the first effect is that, for given w_P, the expected surplus of a worker who is not dismissed (i.e., $w_P - F$ times the probability of keeping the job) decreases. This implies that jobs with P contracts, and therefore education, become less attractive choices. The second one is the direct and positive effect for workers of an increase in F in case of dismissal, which makes these jobs more attractive by providing higher severance pay.

When the economy enters a recession, the second effect becomes more relevant since the probability of losing a job is greater. As a result, an increase of F encourages workers to invest in education. The opposite occurs during a boom, in which the probability of getting dismissed is lower, so that a rise in F reduces the surplus obtained by the worker in a P job and thus decreases the incentives for education.

Thirdly, a very relevant phenomenon in the Spanish economy, such as the construction boom, can be interpreted in this model as a drop in q because temporary jobs last longer on average as a result of higher demand for this type of jobs. Therefore, as T contracts become more attractive, (12) implies that θ^* increases unambiguously, and therefore workers invest less in education.

Finally, (13) illustrates the direct effects of the business cycle on education. It can be seen how in a period of high growth, i.e., when ε goes down, θ^* decreases (more workers invest in education) while the opposite holds in a recession. The insight is that an expansion makes permanent jobs relatively more attractive because of the lower dismissal threshold. Therefore, investment in education shows a clearly pro-cyclical pattern.

DATASET AND VARIABLES

The population of interest is defined as those individuals participating in PIAAC aged 16 to 65 who have the status of employees at the time of the survey. Out of the 6055 individuals who responded fully to the questionnaires in PIAAC, the sample size is reduced to about 2500 individuals who meet the above-mentioned requirements.

Our main control variable, *temporary contract*, is a dichotomous (dummy) variable that takes the value 0 when the individual has a permanent contract and value 1 when the contract is a temporary one (i.e., fixed-term contracts, temporary employment with an employment agency, or some kind of training contracts).

As argued earlier, our empirical approach focuses on first analyzing how the type of contract, affects OJT activities in the firm to next testing how training impinges on the employees' literacy and numeracy skills according to the scores available in the PIAAC database. Both the illustrative model and the related literature suggest that temporary workers in highly dual labour markets tend to accumulate less human capital than workers with permanent contracts. This could be due to demand and supply. As regards demand, temporary workers have lower incentives to get trained because, due to the low temp-to-perm conversion rates, this does not help them to reach stable jobs. With regard to supply, firms invest less in the specific human capital of their temporary workers because they anticipate that the short duration of this type of contract does not make it profitable to invest in their workers. To empirically evaluate this prediction, we use two proxies of specific human capital accumulation at the workplace. Firstly, we use a dummy variable, D^{OJT}, which takes the value 1 if the worker claims to have attended a training session organized in the workplace or provided by their supervisors or colleagues in the past 12 months, and 0 otherwise. According to PIAAC, these training sessions should be characterized "by planned periods of training, instruction or practical experience, using the normal methods of work." They include, for example, "training or instruction courses organized by the directors, managers or colleagues to help the respondent to do their job better or to familiarize them with their new tasks."

While the D^{OJT} dummy variable is an indicator of training activities within the firm, it does not accurately reflect the intensity of these activities. To address this shortcoming, we use additionally the number of training activities which the worker has attended during the past 12 months, n^{OJT}. It should be noted that, in accordance with the design of the survey, the respondent should count all training tasks that are interrelated as a single activity, even if they have taken place on different days,. The essential feature of each activity is that it should be designed "to facilitate the adaptation of personnel to a particular set of new competences". Therefore, the variable n^{OJT} reflects the intensity of investment in new competences regardless of their level of difficulty or the time that has been devoted to each one of them. [1]

1.PIAAC also provides a subjective measurement that reflects to some degree the intensity with which the worker acquires new skills in the job. In the survey, workers are asked to indicate, approximately, the frequency with which their job involves learning

In line with our theoretical predictions we will show that, in general, temporary workers receive less OJT than those with permanent contracts. Yet, an interesting feature which has not been explicitly considered in our model is that, despite receiving less training, temporary workers may not perceive this as a problem since their skills requirements on these jobs tend to be low in general. The PIACC database allows us to explore this issue through the availability of a subjective measure of workers' demand of higher OJT. In particular, we use a dummy variable, denoted as $more^{OJT}$, which takes the value 1 if the worker claims that he/she needs more training to perform his/her job tasks properly, and 0 if otherwise.

It is plausible that differences in the training processes within the firm generate differences in workers' promotion opportunities workers to better contracts. However, the extent to which these differences in human capital accumulation could lead to differences in general human capital that the worker could use in other firms remains an open question. To address this issue, we analyze the effect of OTJ activities on the two measurements of general cognitive skills reported in the Spanish PIAAC sample, namely, the scores achieved on the literacy and numeracy tests.

Table 1.1. Descriptive Statisitics (PIAAC)

Panel A	**No. Obs.**	**Pop. 16- 65 years**[(a)]	**Employed**[(a)]	**Employees**[(a)]	
PIAAC sample	6055				
Sample with ages between 16 and 65 years old	5954				
Type of workers	3060	53.18			
Self-employed	547	9.41	17.69		
Employee	2513	43.77	82.31		
Temporary	589	9.71	18.26	22.18	
Panel B	Training and abilities by type of contract[(a)]		Difference (%)	Stand. Dev.[(b)]	P-value
	Permanent	**Temporary**			
Percentage of employees with training activities	48.43	31.81	16.62 (52.25)	2.35	0.000
Average number of activities	2.85	2.33	0.52 (22.32)	0.29	0.073
Percentage which believes it needs training	39.55	35.42	4.13 (11.66)	2.48	0.096
Index of literacy[(c)]	262.68	255.63	7.05 (2.76)	2.10	0.001
Index of numeracy [(c)]	260.94	246.81	14.13 (5.73)	2.00	0.000
	$D^{OJT}=1$	$D^{OJT}=0$			
Index of reading literacy [(c)]	268.89	254.69	14.2 (5.58)	1.51	0.000
Index of numeracy [(c)]	268.09	249.44	18.65 (7.48)	1.49	0.000

new skills. Besides the problem of interpretation often encountered with such subjective statements, this variable does not have enough variation to be really informative: over 90% of respondents reply that their job involves learning new skills "at least once a month." For these reasons, we have decided to discard it in this study.

Notes: A worker has a temporary contract when he/she has a fixed-term contract, a temporary job with a temporary work agency or any type of training contract. D^{OJT} takes the value 1 when the worker claims to have attended training activities in the last 12 months, and 0 in the opposite case. The indices of *literacy* and *numeracy* are measurements attributed from the responses to exercises which are part of the survey. *Literacy* measures the ability to understand and use texts (written or in a digital format) in different contexts, while *numeracy* measures the use, application, interpretation and communication of mathematical information and ideas.
[(a)] Percentages of population estimated using weights of the whole sample as weightings.
[(b)] Using the replication method JK1.
[(c)] Using the attributed value 5.

Table 1 presents the main descriptive statistics of the main outcome variables in the subsequent empirical analysis, i.e., the availability and intensity of OTJ activities, the perception on the efficacy of the training process and, finally, the scores in both tests.

The results of Table 1 are fairly consistent with the basic predictions of the model. As can be observed, temporary workers undertake less training activities than permanent workers. This finding is robust both in the *extensive margin* (i.e., using D^{OJT} as a measure of the availability of training) and the *intensive margin* (i.e., using n^{OJT} as a measure of the intensity of training). Further, in line with our previous conjecture, the results for $more^{OJT}$ suggest that the reduced OJT of temporary workers does not translate into a greater demand of extra training. Finally, both literacy and numeracy scores are significantly lower among temporary workers.

However, it is important to stress that the negative relationship found between temporary contracts and OTJ activities does not necessarily imply causality. In particular, the results in Table 1 do not allow us to state that workers accumulate less specific human capital in the firm because their contract is a temporary one. The fundamental reason for why this may be a misleading conclusion is that both the type of contract and training activities could be, in general, jointly affected by other variables. For example, consider a worker with a high level of motivation to perform well in the job. Then, precisely because of this feature, this individual could influence his/her employer to obtain a permanent contract and freely choose to participate intensively in OJT activities. In that case, we would observe a positive correlation between having a permanent contract and a high intensity of training activities but the intense process of accumulating specific human capital would be the result of the high motivation of the individual, not of holding a permanent contract. To avoid such confounding issues in our analysis, it is essential to control for all potential factors which simultaneously affect the respective outcome variables (i.e., both variables related to training activities as well as the skills competence variables) and the treatment variable (in our case, the type of contract).

To do so, in the the next section we present the estimates of several econometric models which include two types of controls. First, we use the individuals' basic characteristics such as age, gender, educational attainment, marital status, whether they have children, whether they are immigrants and the parental educational background. In addition, we will also control for a potentially key variable which often is not available in other datasets but which PIAAC reports. This is the degree of motivation of the worker, measured by a dummy variable, denoted as *motivation*, which takes the value 1 when the individual claims to feel identified "to a great extent" or "to a very great extent" with learning new skills, with working out difficult tasks, with relating new things to what they already know, and with seeking more information when they do not understand something". Secondly, in some specifications we also control for

occupational dummies (as measured by the ISCO08 classification to two digits) and industry dummies (as measured by the one-digit classification from the fourth ISIC revision).

RESULTS

The first set of results is reported in Table 2. They are expressed in terms of marginal effects and correspond to the estimation by maximum likelihood of a *probit* model to explain the probability of receiving training at the workplace (D^{OJT} = 1) depending on our explanatory variable of interest, *temporary contract*, and on other types of controls. In column [1], we present the results in the case when the type of contract is the only covariate in the *probit* model. In column [2], job tenure, worker's age and its square (as a proxy for potential experience, given the higher educational level reached), gender (female = 1) and educational level (with a low level as the reference category) are included as additional regressors. In column [3], the previous group of controls is extended by also including dummy variables of the parents' educational level, marital status, immigrant status and the degree of motivation of the worker. Finally, in column [4], dummy variables of sector/industry and occupation are also added, thereby constituting the more general specification of the *probit* model. For convenience, this ordering by columns, from the most restrictive specification to the most general, is kept for the rest of Tables presented in this section. It is also important to note that the number of observations used in the different regression specifications varies slightly because some controls are not available for all individuals analyzed in the larger samples.

The main result in Table 2 is that, in line with our main hypothesis, the estimated coefficient on the "*temporary contract*" dummy variable is negative and statistically very significant in all specifications,. Furthermore, the estimates suggest that the marginal effect is quantitatively very relevant. In the absence of further controls (column [1]) , having a temporary contract is associated with a reduction in the probability of receiving OTJ of 16.4 percentage points (pp.), where the unconditional probability of receiving OTJ among permanent workers is 43.7%. By progressively adding further controls, the estimated marginal effect is halved, falling to about 8-9 percentage points, a result which is fairly robust across columns [2] to [4]. Therefore, one can infer from this evidence that the detrimental effect of contractual instability on the specific training received in the workplace is sizeable. For example, the marginal effect in the specification with all of the controls (reported in column [4]) implies that for the typical worker with a permanent contract, switching to a temporary contract reduces the probability of receiving training at the workplace by 18 % (= -0.08/.44).

With respect to the other controls, it is worth pointing out that a higher educational level increases the probability of receiving OJT and also that that probability also increases with age up to a threshold of about 30 years due to the concave shape of the quadratic polynomial for this variable. Furthermore, although statistically less significant than the above-mentioned estimates, there is evidence about women having a lower probability of OJT, although this gender effect disappears as the number of controls in columns [3] and [4] is extended. In this

regard it should be pointed out that another variable (not reported in Table 2) which has been included in all the specifications is whether the individual has a part-time job (where the reference category is full-time work). Its inclusion did not change any of the previous results, either in this Table or in any of those shown further below, but it did cancel out the above-mentioned gender effect. This is probably explained by the high incidence of part-time working schedules among female employees, making it impossible to identify whether the relevant covariate is gender or working part time. Finally, although not reported in order to save space, the variables of immigrant status and motivation proved to be significant in columns [2] and [3], with negative and positive signs, respectively. However, unlike what happens with the covariate *temporary contract*, the effect of *motivation* becomes weaker on adding the set of occupational and industry dummy variables.

Table 2. Probit Model (Marginal Effects). Dependent variable: DOJT.

	[1]	[2]	[3]	[4]
Temporary contract	**-0.1636*** **	**-0.0923*** **	**-0.0795*** **	**-0.0774*** **
	(0.0223)	**(0.0265)**	**(0.0284)**	**(0.0306)**
Job tenure	---	0.0053***	0.0049***	0.0035**
		(0.0014)	(0.0015)	(0.0016)
Age	---	0.0132*	0.0179**	0.0150*
		(0.0071)	(0.0084)	(0.0088)
(*Age*) ^{2} / 100	---	-0.0002**	-0.0002**	-0.0002**
		(0.0001)	(0.0001)	(0.0001)
Woman	---	-0.0359*	-0.0376*	-0.0117
		(0.0205)	(0.0219)	(0.0270)
Middle educational level	---	0.1279***	0.1359***	0.0947***
		(0.0286)	(0.0305)	(0.0329)
High educational level	---	0.2731***	0.2550***	0.1578***
		(0.0227)	(0.0258)	(0.0328)
Educational level of parents	No	No	Yes	Yes
Civil status, children	No	No	Yes	Yes
Immigrant	No	No	Yes	Yes
Motivation	No	No	Yes	Yes
Dummies by Sector and Occupation	No	No	No	Yes
No. obs.	2503	2501	2258	2206
Pseudo R-sq.	0.015	0.065	0.074	0.102
Prob. obs.	0.4371	0.4374	0.4353	0.4424

Note: The marginal effects of the dichotomous variables are calculated as the change of the estimation of the probability when the variable changes from 0 to 1. The *temporary contract* variable is a dichotomous variable which takes the value 0 when the individual has a permanent contract and 1 when he/she has a temporary contract. *Job tenure* measures the duration of the current job. *Middle educational level* is a dichotomous variable which takes value 1 when an individual has vocational training at an intermediate level, the baccalaureate, or old higher baccalaureates and pre-university courses. *High educational level* takes a value of 1 when the individual has a tertiary education degree. The variables about the educational level of the parents are dichotomous variables for the three levels of education. *Civil status* reflects whether the individual is married, *children* reflects whether they have children, and *immigrant* reflects whether the individual was born in this country. The *motivation* variable takes the value 1 when the individual claims to feel "greatly" or "very greatly" identified with the learning of new skills, working out difficult tasks, relating new things to what they already know, and looking for information when they don't understand something. The variables of *occupation* are obtained with the ISCO08 to two digits while the variables of *sector* are obtained with the one-digit classification from the fourth ISIC revision.
Levels of significance: * p<0.10, ** p<0.05, *** p<0.01

We next report In Table 3 the results from estimating the coefficients of a count data model based on the *Negative Binomial* distribution (this distribution is used after rejecting the equality of mean and variance implied by the more restrictive *Poisson* distribution), in order to detect the discrete nature of the dependent variable, namely, the number of training activities which the worker has attended over the past 12 months, n^{OJT}. The results for our variable of interest, *temporary contract*, are similar to those obtained in Table 2, in the sense that this covariate systematically exhibits a negative sign, indicating again that holding a temporary contract reduces the number of OJT activities. However, unlike what happened in the *probit* model for D^{OJT}, the estimated coefficients of this variable are no longer statistically significant and become smaller as the range of further controls s increased. This may be because the number of individuals who report this information (around 1000) represent less than half the sample size used in the *probit* model.

Table 3. Binomial Negative Model (Coefficients). Dependent variable: nOJT.

	[1]	[2]	[3]	[4]
Temporary contract	**-0.1399****	**-0.1266***	**-0.0845**	**-0.0399**
	(0.0712)	**(0.07714)**	**(0.0884)**	**(0.0899)**
Job tenure	---	0.0076*	0.0052	0.0049
		(0.0039)	(0.0041)	(0.0043)
Age	---	-0.0152	-0.0417*	-0.0109
		(0.0193)	(0.0231)	(0.0236)
(*Age*) ^{2} / 100	---	0.0066	0.0401	0.0043
		(0.0239)	(0.0277)	(0.0281)
Woman	---	-0.0144	-0.0367	-0.1367**
		(0.0543)	(0.0576)	(0.0657)
Middle educational level	---	0.0574	-0.014	-0.0645
		(0.0846)	(0.0900)	(0.0923)
High educational level	---	0.2234***	0.0954	0.0094
		(0.0688)	(0.0769)	(0.0906)
Educational level of parents	No	No	Yes	Yes
Civil status, children	No	No	Yes	Yes
Immigrant	No	No	Yes	Yes
Motivation	No	No	Yes	Yes
Dummies by Sector and Occupation	No	No	No	Yes
Dispersion Coefficient	-0.8518***	-0.8766***	-0.8999***	-1.1637***
	(0.0689)	(0.0695)	(0.0736)	(0.0823)
No. obs.	1092	1092	981	974
Pseudo R-squared	0.001	0.005	0.015	0.056

Note: The variable n^{OJT} measures the number of training activities which the worker has attended in the last 12 months. See the note from Table 2 for the definition of the controls.
Levels of significance: * p<0.10, ** p<0.05, *** p<0.01

Finally, in Table 4 we report the results of estimating another *probit* model, this time applied to explaining the probability associated with the dummy variable on the need for a higher level of training, $more^{OJT}$. Although the estimated marginal effect on the *temporary contract* variable is positive in all cases, it is statistically significant only in column [1]. In agreement with what was argued in the previous section, this lack of statistical significance could be due to the fact that some of the additional controls (especially the educational level or the dummies of occupation and sector) may be detecting the potential mismatch between the training of the individual and the job requirements in a much more accurate way than the type of contract the individual holds.

Table 4. Probit Model (Marginal Effects). Dependent variable: moreOJT.

	[1]	[2]	[3]	[4]
Temporary contract	**0.0532****	**0.0168**	**0.0148**	**-.0175**
	(0.0225)	**(0.0260)**	**(0.0276)**	**(0.0295)**
Job tenure	---	0.0016	0.002	0.0011
		(0.0013)	(0.0014)	(0.0015)
Age	---	0.0210***	0.0201**	0.0215***
		(0.0067)	(0.0080)	(0.0083)
(*Age*) ^{2} / 100	---	-0.0003***	-0.0003***	-0.0003***
		(0.0001)	(0.0001)	(0.0001)
Woman	---	-0.0209	-0.0251	0.0126
		(0.0197)	(0.0210)	(0.0259)
Middle educational level	---	0.0807***	0.0749**	0.0483
		(0.0282)	(0.0300)	(0.0319)
High educational level	---	0.1588***	0.1492***	0.0685**
		(0.0228)	(0.0257)	(0.0321)
Educational level of parents	No	No	Yes	Yes
Civil status, children	No	No	Yes	Yes
Immigrant	No	No	Yes	Yes
Motivation	No	No	Yes	Yes
Dummies by Sector and Occupation	No	No	No	Yes
No. obs.	2508	2506	2262	2235
Pseudo R-sq.	0.002	0.023	0.025	0.071
Prob. obs.	0.3792	0.3795	0.382	0.3834

Note: The marginal effects of the dichotomous variables are calculated as the change in the estimate of the probability in the caseof a change of the variable from o to 1. The variable $more^{OJT}$ takes the value 1 if the worker claims to need more training in order to properly perform his/her work tasks and 0 if otherwise. See the note from Table 2 for the definition of the controls.
Levels of significance:.* p<0.10, ** p<0.05, *** p<0.01

A brief summary of the evidence reported so far indicates that the *temporary contract* treatment variable has a systematically negative effect on the three outcome variables we have analyzed. Moreover, the finding that this effect is robust to model specification and statistically significant only when the dependent variable is D^{OJT} may be due to the lower measurement error of this outcome variable than the other two.

In view of these results, the next step is to check whether the availability or the intensity of OJT activities has an effect on the scores obtained by the individuals in the *literacy* and *numeracy* tests. Tables 5 and 6, respectively, present the results derived from estimating a linear regression model by OLS, where the outcome variables are the scores and the variables of interest are the two measurements of OJT for which a greater effect of temporary contract has been found, namely D^{OJT} , and to a lesser extent, n^{OJT}. Note that in both models the *temporary contract* treatment variable is not included as a regressor in order to test if the effect of this variable on the scores is mainly brought about through the amount of OTJ received at the workplace, and not directly.

Tables 5 and 6 present the estimated coefficients in a regression where the dependent variable is *literacy* and *numeracy*, respectively. Columns [1] and [2] in both Tables differ in that D^{OJT} is used as a regressor in the first column while n^{OJT} is used in the second column. As can be observed, the results indicate that both variables have a positive effect on scores in the PIAAC tests, except in the last column of Table 5. Furthermore, this effect tends to be stronger and statistically more significant in Table 6, when examining the relationship between D^{OJT} and *numeracy*. So, from the comparison of the estimates in both Tables with the raw differences reported in Table 1 between the PIAAC scores achieved by employees with and without OJT (14.2 pp. in *literacy* and *18.6* pp. in numeracy), we get that, *ceteris paribus*, the availability of such specific training activities account for 15 % (2 pp.) and 28% (5 pp.) of the raw score gaps in *literacy* and *numerac*y, respectively.

Therefore, our evidence suggests that training at the workplace and, to a lesser extent, the intensity of this training improves the cognitive skills of the workers. In order to check if the effect is mainly due having a temporary contract, this covariate was also added to the previous specifications, together with the two training variables. The main result that we find (not reported in the Tables) is that the coefficient on *temporary contract* is never significant and the estimated coefficients on D^{OJT} and n^{OJT} hardly experience any significant changes. Thus, we conclude that OJT plays an important role in explaining the PIAAC scores.

Table 5. Ordinary Least Squares (Coefficients). Dependent variable*: literacy* scores.

	[1]	[2]	[3]	[4]
D^{OJT}	**3.5467****	---	**2.072**	**1.2566**
	(1.5939)		**(1.6009)**	**(1.6095)**
n^{OJT}	---	**0.5380****	---	---
		(0.2557)		
Job tenure	0.2672**	0.3766**	0.1667	0.0734
	(0.1059)	(0.1727)	(0.1085)	(0.1119)
Age	2.6996***	2.6412***	3.4779***	3.6443***
	(0.5096)	(0.8166)	(0.5709)	(0.5850)
(*Age*) ^{2} / 100	-4.2135***	-4.1243***	-4.9442***	-5.1794***
	(0.6347)	(1.0341)	(0.6886)	(0.7046)
Woman	-9.2612***	-7.8979***	-7.4145***	-9.7869***
	(1.5476)	(2.3168)	(1.5449)	(1.9085)
Middle educational level	24.1234***	24.1112***	21.7160***	17.6391***
	(2.2114)	(3.6625)	(2.2112)	(2.3179)
High educational level	45.3710***	45.8212***	36.8107***	24.6992***
	(1.8098)	(2.8883)	(1.9208)	(2.2671)
Educational level of parents	No	No	Yes	Yes
Civil status, children	No	No	Yes	Yes
Immigrant	No	No	Yes	Yes
Motivation	No	No	Yes	Yes
Dummies by Sector and Occupation	No	No	No	Yes
No. obs.	2807	1162	2536	2475
R-sq.	0.250	0.219	0.295	0.327

Note: Levels of significance:.* p<0.10, ** p<0.05, *** p<0.01

Table 6. Ordinary Least Squares (Coefficients). Dependent variable: *numeracy* scores.

	[1]	[2]	[3]	[4]
D^{OJT}	**7.4523*** **	---	**5.7716*** **	**3.7712** **
	(1.6198)		**(1.6325)**	**(1.6500)**
n^{OJT}	---	**0.3888**	---	---
		(0.2555)		
Job tenure	0.3878***	0.3854**	0.2628**	0.1511
	(0.1055)	(0.1728)	(0.1094)	(0.1135)
Age	2.5632***	3.1910***	3.1082***	3.2456***
	(0.5295)	(0.8415)	(0.5917)	(0.6103)
$(Age)^2 / 100$	-4.1618***	-4.8786***	-4.6634***	-4.8173***
	(0.6566)	(1.0565)	(0.7117)	(0.7327)
Woman	-16.9921***	-14.6935***	-16.3784***	-16.4630***
	(1.5759)	(2.3156)	(1.5976)	(1.9500)
Middle educational level	25.9530***	27.3051***	23.1693***	18.6021***
	(2.2359)	(3.6899)	(2.2672)	(2.4043)
High educational level	48.1732***	48.5652***	39.9913***	27.4181***
	(1.8621)	(3.0138)	(1.9874)	(2.3328)
Educational level of parents	No	No	Yes	Yes
Civil status, children	No	No	Yes	Yes
Immigrant	No	No	Yes	Yes
Motivation	No	No	Yes	Yes
Dummies by Sector and Occupation	No	No	No	Yes
No. obs.	2807	1162	2536	2475
R-sq.	0.288	0.247	0.322	0.35

Note: See the notes of Tables 1 and 2 for definitions of the variables.
Levels of significance:.* p<0.10, ** p<0.05, *** p<0.01

Finally, Tables 7 (dependent variable: *literacy*) and 8 (dependent variable: *numeracy*) report the estimated coefficients obtained from the reduced forms of the previous models in which the two training variables considered previously are now replaced by the *temporary contract* covariate, to which the remaining the set of controls are gradually added. The idea of these reduced forms is that if the mechanism we explore is valid, we should expect a negative effect of this treatment variable on the s PIAAC scores. In other words, *ceteris paribus*, being a temporary worker has a negative effect on the scores mainly through the reduction of the amount of OJT provided at the workplace and not so much through other alternative channels. The results show a certain degree of support for this hypothesis, since the coefficient on the "*temporary contract*" variable is always negative, albeit it only turns out to be statistically significant in the case of *numeracy* (with the exception of column [4]).

Table 7. Ordinary Least Squares (Reduced Form). Dependent variable: *literacy* scores.

	[1]	[2]	[3]	[4]
Temporary contract	**-6.5503*** **	**-4.0915***	**-2.9321**	**-2.0831**
	(2.2086)	**(2.1914)**	**(2.1618)**	**(2.2537)**
Job tenure	---	0.2758**	0.1982*	0.0748
		(0.1174)	(0.1204)	(0.1236)
Age	---	3.2708***	3.6018***	3.5278***
		(0.5666)	(0.6226)	(0.6257)
(*Age*) ^{2} / 100	---	-0.0479***	-0.0511***	-0.0505***
		(0.0070)	(0.0075)	(0.0075)
Woman	---	-8.3752***	-7.2715***	-9.6194***
		(1.6260)	(1.6280)	(1.9786)
Middle educational level	---	22.3422***	21.6332***	17.4162***
		(2.3669)	(2.3380)	(2.4210)
High educational level	---	42.0032***	37.3696***	24.7004***
Educational level of parents	No	No	Yes	Yes
Civil status, children	No	No	Yes	Yes
Immigrant	No	No	Yes	Yes
Motivation	No	No	Yes	Yes
Dummies by Sector and Occupation	No	No	No	Yes
No. obs.	2513	2447	2266	2244
R-sq.	0.003	0.262	0.291	0.321

Note: See the notes of Tables 1 and 2 for definitions of the variables.
Levels of significance:.* p<0.10, ** p<0.05, *** p<0.01

Table 8. Ordinary Least Squares (Reduced Form). Dependent variable: *numeracy* scores.

	[1]	[2]	[3]	[4]
Temporary contract	**-12.5522*** **	**-4.5196** **	**-3.668***	**-2.5884**
	(2.2851)	**(2.2124)**	**(2.2375)**	**(2.3210)**
Job tenure	---	0.3751***	0.2631**	0.1115
		(0.1190)	(0.1217)	(0.1253)
Age	---	3.2379***	3.4562***	3.4258***
		(0.5779)	(0.6392)	(0.6438)
(*Age*) ^{2} / 100	---	-0.0486***	-0.0509***	-0.0503***
		(0.0071)	(0.0077)	(0.0077)
Woman	---	-15.8232***	-15.6563***	-15.7823***
		(1.6537)	(1.6757)	(2.0082)
Middle educational level	---	23.6664***	22.8811***	18.3916***
		(2.3976)	(2.3863)	(2.4894)
High educational level	---	44.2566***	40.2667***	27.2830***
		(2.0353)	(2.0713)	(2.3874)
Educational level of parents	No	No	Yes	Yes
Civil status, children	No	No	Yes	Yes
Immigrant	No	No	Yes	Yes
Motivation	No	No	Yes	Yes
Dummies by Sector and Occupation	No	No	No	Yes
No. obs.	2513	2447	2266	2244
R-sq.	0.012	0.289	0.313	0.345

Note: See the notes of Tables 1 and 2 for definitions of the variables.
Levels of significance:.* p<0.10, ** p<0.05, *** p<0.01

In sum, the results presented in this section are, in general, consistent with the basic prediction of our model. Temporary workers are significantly less likely to engage in OJT activities at the workplace that workers with a permanent contract, even after controlling for a large number of individual and job characteristics including workers' motivation. By contrast, workers with temporary contracts do not seem to differ from workers with permanent contracts in their perceptions regarding the appropriateness of their training with respect to the skills requirements in their current jobs. Finally, both the scores on literacy and numeracy skills are significantly lower for workers who do not receive any type of training. Moreover, among those who receive OJT, the scores are lower for those who receive less training.

CONCLUSIONS

We began this study by observing that the Spanish economy has been characterized in the last two decades by its extremely dual labour market and its low TFP growth. On that basis, our goal is to analyze how the gap in firing costs between permanent and temporary workers may

have affected a relevant determinant of TFP growth, as is the amount and quality of the firm-provided training that workers receive at the workplace.

To address this issue, by means of a simple theoretical model we first illustrate the mechanism linking labour-market dualism to the deficiency in the training of temporary workers. We show that, in a context where wages are not flexible enough and the firing-costs gap between permanent and temporary workers is too high, firms are less inclined to convert unstable contracts into stable ones. In these circumstances, firms have few incentives to invest in the training for temporary workers, while the latter also lack the incentives to improve their performance through exerting more effort at the workplace.

The cross-sectional database for Spain provided by PIAAC allows us to explore how the widespread use of temporary contracts may have affected the willingness of firms to provide specific OJT to their workers and how the lack of this type of training may have negatively affected the specific human capital of the latter. Specifically, the availability of several different training measures at the workplace, as well as workers' scores on literacy and numeracy tests, allows us to check, firstly, the direct relation between the type of contract held by workers and the amount of OJT they receive and, secondly, whether this type of training affects both literacy and numeracy skills of the workers.

We present econometric results for several outcome variables: two measures of training activities (availability and intensity), a measure of workers' perceptions on the need of greater and better OTJ, and two measures of cognitive skills. For each econometric model, we report results using different specifications. In our broader specification we consider (in addition to the *temporary contract* indicator) a wide set individual and job characteristics, including proxy variables of the workers' family background, ability and motivation.

Our main empirical findings do not contradict and, in general, support our basic hypotheses that there is a negative relationship between job insecurity and training at the workplace, as well as a positive relationship between the amount of OJT activities and workers' cognitive skills. To the extent that an improvement in the educational levels of the Spanish population is a *sine qua non* condition for improving welfare through increased competitiveness in technologically-advanced sectors, reducing the excessive segmentation of the Spanish labour market seems to be an essential policy measure.

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APPENDIX

(INTEGRATION by PARTS)

Let $R = w_P - F$

$$W_P(\varepsilon,\zeta) = \zeta + \left[\int_{\underline{\zeta}(1-\varepsilon)}^{\overline{\zeta}} \max(\zeta - w_P, -F)\, dG_\zeta(\varepsilon)\right] =$$

$$= \zeta + \left[\int_{\underline{\zeta}(1-\varepsilon)}^{\overline{\zeta}} \max(\zeta - w_P + F, 0)\, dG_\zeta(\varepsilon) - F\int_{\underline{\zeta}(1-\varepsilon)}^{\overline{\zeta}} dG_\zeta(\varepsilon)\right]$$

$$= \zeta + \left[\int_{\underline{\zeta}(1-\varepsilon)}^{\overline{\zeta}} \max(\zeta - w_P + F, 0)\, dG_\zeta(\varepsilon) - F\right]$$

$$= \zeta + \left[\int_{R}^{\overline{\zeta}} (\zeta - w_P)\, dG_\zeta(\varepsilon) + F\int_{R}^{\overline{\zeta}} dG_\zeta(\varepsilon) - F\right]$$

$$= \zeta + \left[\int_{R}^{\overline{\zeta}} (\zeta - w_P)\, dG_\zeta(\varepsilon) - FG_\zeta(R)\right]$$

Then, using integration by parts for $\int_{R}^{\overline{\zeta}} (\zeta - w_P)\, dG_\zeta(\varepsilon)$ yields

$$= \zeta + \left[\left(\overline{\zeta} - w_P\right) - (R - w_P)G_\zeta(R)\right] - \int_{R}^{\overline{\zeta}} G_\zeta(\varepsilon)\, d\zeta - FG_\zeta(R) =$$

$$= \zeta + \left(\overline{\zeta} - w_P\right) - \int_{R}^{\overline{\zeta}} G_\zeta(\varepsilon)\, d\zeta$$

where the last equality follows from $(R - w_P)G_\zeta(R) = -FG_\zeta(R)$.