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Abstract

This paper studies how employers collect information about the quality of workers. Two are the strategies: screening ex-ante, through the recruitment process, and monitoring new hires at work, or screening on-the-job. Using two datasets representative of workers in Great Britain, we provide empirical evidence that the optimal choice is related to the type of employment contract offered by the firm. Our estimates show that temporary workers are associated with lower recruitment effort - in terms of lower cost and higher speed - and closer monitoring than permanent employees. But this relation depends crucially on the type of jobs. Differences in screening effort are substantial for low-level occupations, while the gap is marginal or not significant for high-skilled jobs.

JEL Classification: D21, J30, J41, J63

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1 Introduction

During the last two decades, labor markets have experienced a deep restructuring, both in the U.S. and in European countries. A common phenomenon has been the substantial growth in the use of atypical labor contracts. This term refers to fixed-term arrangements (employees hired on the company payroll either for a specific period of time or for a specific project), temporary-help agency employment (workers employed through a temporary help agency), on-call work and day labor (individuals who are called in on an as-needed basis), independent contractors (formally self-employed, but, *de facto,* they work as subordinate of the unique client) and, more generally, any employment relationship that can be regarded as contingent.[1] In this paper, we will focus the analysis only on those contracts characterized by the temporariness of the employment relationship, and show that the employment regulation has relevant implications for the firms' screening strategy.

The literature has focused on the "workers' side of the problem", analyzing, in particular, the impact of labor market reforms on the transition rates to permanent employment. On one hand, flexible contracts may provide young unexperienced workers with a "port-of-entry" into permanent employment. On the other hand, accepting a temporary contract may attach a stigma to workers, reducing their chances to get better opportunities. Both hypothesis have been tested on several national datasets.[2] In contrast, little effort has been devoted to understanding the effect of temporary contracts on the "employers' side".[3]

This paper contributes to the literature in this direction. We study the impact of atypical contracts on the screening process, i.e. the set of activities implemented by the employer to gather information about workers' quality.

The importance of search for information in the labor market is widely recognized, starting from the seminal work of Stigler (1962). The literature on employers' search behavior focuses on the recruitment process and results point out that the choice of the recruitment method varies with firm characteristics, vacancy characteristics and skill requirements of jobs. We argue that it also depends on the type of contract is going to be signed. Furthermore, we analyze both the recruitment process, screening ex-ante, and the monitoring process, screening on-the-job. Employers may acquire information through both channels: they can choose to accurately screen applicants before hiring them or rather detect bad workers on the job, through supervision. In the former

[1] Contingent work is generally defined as an employment relationship such that there is neither an explicit nor an implicit contract for long-term employment or in which the minimum hours vary unsystematically (Polivka and Nardone, 1989).

[2] Booth, Francesconi, and Frank (2000) for UK; Canziani and Petrongolo (2001) for Spain; Contini, Pacelli and Villosio (2000) for UK, Germany and Italy; Ichino, Mealli and Nannicini (2004) for Italy find that positive effects are prevailing. While the adverse effects are pointed out in Blanchard and Landier (2001), and Guell and Petrongolo (2004).

[3] Notably, an exception is Wasmer (1999) . He examines the relative demand of temporary workers whithin a matching model where firms can choose between hiring a sequence of fixed-term employees (high-turnover strategy), or a permanent set of indefinite-term workers (low-turnover strategy).

case, the initial cost of recruitment will avoid hiring - and eventually firing - unsuitable workers. In the latter, the initial saving could be compensated by higher firing costs.

We use two datasets from the UK Data Archive: the "Survey of Employers' Recruitment Practices" (ERP)[4] and the "Skills Survey" (SS). Both of them are representative of workers in Great Britain in the 90s. The former contains detailed information about recruitment practices of over 5,000 establishments and their five more recent engagements. We construct two indicators of investment in screening ex-ante: speed and cost. They are indicative of employers' perception of the speed and cost of several available recruitment channels, such as advertisement in newspapers, noticeboards, job centre, and recommendations. The second survey includes some information about monitoring, as perceived by 2,500 workers. A major concern is the distinction between monitoring-to-learn workers' quality and monitoring-to-control workers' effort. We assume that tenured workers are supervised only in order to avoid shirking. This hypothesis is crucial to isolate the learning component of monitoring.

The data allow to identify the relationship between screening effort - recruitmen-speed, recruitment-cost, monitoring-intensity - and the employment arrangement, controlling for firms', jobs' and workers' characteristics. We provide empirical evidence that atypical workers are associated with lower investment in recruitment, and closer monitoring. This is especially true for low-level occupations, while the gap is marginal or not significant for high-skilled jobs. The robustness of our results is tested under various specifications.

The rest of the paper is organized as follows. Section 2 provides a review of the previous literature on employers' search strategies and presents the novelties of this study. Section 3 describes the data used in the empirical analysis. Methodology and results are discussed in Section 4. Section 5 summarizes the main findings and concludes.

2 Previous literature

Starting from the seminal work of Stigler (1962), the importance of search for information in the labor market has been recognized, and an extensive literature developed. Job seekers and employers acquire information about each other through several channels, and the more information they obtain, the higher the likelihood of a good employment match. Most of the literature focuses on the workers' search strategies. Instead, we are interested in the employers' search. Employers may collect information about workers' productivity in different moments: during the recruitment process, or monitoring the performance on-the-job.[5]

[4] This dataset has been used by Pellizzari (2004) in order to derive implications about the employers' recruitment strategy with respect to job qualifications. Here the focus is on the employment contract.

[5] The problem of gathering information about workers' productivity may also be confronted offering incentive-compatible contracts, such that only good workers will accept them. The design of the optimal employment arrangement is the subject of contract theory, and, in particular, of agency theory. See for istance Hart and Holmstrom (1987), for an introduction, and Hosios and Peters (1993).

The literature on recruitment has developed along two main streams: the measure and classification of the search process, and the analysis of its outcomes, expressed as vacancy duration or as the quality of the resulting employment matches. Barron and Bishop (1985) distinguish between extensive and intensive search. The former pertains to the number of applicants seen and interviewed, the latter is measured by the number of hours devoted to screening and interviewing per applicant. They empirically measure the two components of employers' search and examines the effects of employer's and job characteristics, and labor market conditions on search intensity. A different characterization has been fostered by Rees: formal versus informal recruitment methods. Rees (1966) analyzes the role of the recruitment method as an information-generating device and concludes that informal methods, i.e. asking current employees or friends for referrals, are more effective than formal methods, such as advertising and the use of employment agencies. Among the most recent studies, van Ours and Ridder (1992) and Burdett and Cunningham (1998) estimate how firm and job characteristics affect vacancy duration, as a measure of the employer's search intensity. The hazard rate of filling a vacancy is higher for larger firms, that have easier access to potential workers, while higher skill requirements and large training costs entail a longer selection process. Devaro (2003, 2005) analyzes the choice of the recruitment methods - such as newspaper advertisements, word-of-mouth, employment agencies, etc. - as determined by firm and vacancy characteristics and skill requirements of jobs. Some channels generate applicants more quickly than others, but, on average, of lower quality. The choice of the recruitment method solves the tradeoff and affects vacancy duration and starting wages.

Monitoring employees's performance is an additional information-generating device. In the theoretical model developed by Jovanovic (1979), employers update their believes about workers' quality according to the output observed at the end of each period, and decide whether to separate or not. The choice of the optimal level of monitoring has been analyzed in the principal-agent theoretical framework. On one hand, prospects of close supervision may deter low productive workers from applying for the job (see for instance Hart and Holmstrom (1987)). On the other hand monitoring too much may turn out to be suboptimal if it prevents bad workers from misbehaving and, therefore, revealing their type, during the probationary period (Ichino and Muehlheusser (2003)). Furthermore, other factors are involved in the choice of monitoring. Bac (2000) and Felli and Harris (2004) study the tradeoff between training and screening on-the-job. Screening efficiency may have to be sacrificed given the employer's postcontract incentives to invest in firm specific training, or the productivity of the investment technology may have to be reduced in order to induce an efficient screening process.

The purpose of this paper is to jointly analyze the two screening strategies. We believe that the choices of the optimal investment in recruitment and in monitoring are interdependent. The employer chooses the optimal combination of screening ex-ante and screening on-the-job comparing their costs and their benefits, which depends also on the regulation of the employment relationship, i.e. on the contract is going to be signed.

Opening a vacancy, a firm has to decide how to carry out the recruitment in order to fill the open position with a suitable worker and with the right timing. There exist several channels of recruitment: jobcentres, fee-charging agencies, notices on the press, internal notices, personal recommendation, direct applications, etc. They differ in cost, effectiveness and speed. For instance, applying to the jobcentre is cheap and even effective and fast if the firm is looking for an operative, unskilled workers, whereas it would probably be ineffective when searching for an experienced manager. The choice of the recruitment channel is strictly related to the occupation the firm wants to fill and to the characteristics of the desired applicant. However, it also depends on the type of employment contract. Searching and screening ex-ante applicants entails a cost, in terms of money spent and time devoted. Those costs are sunk: the firm recoups them during the lifetime of the employment relationship, through the surplus produced by the worker, and the more accurate is the recruitment, the higher the probability of hiring the best applicant and the larger is the expected surplus. The choice of the recruitment method has to balance the ex-ante cost of screening with the ex-post expected benefits. The duration of the contract is likely to play a determinant role: the longer is the expected length of the employment relation, the smoother the amortization of the initial investment, and the employer will be more willing to pay for recruitment. Furthermore, when long-term arrangements impose firing tax, it's even more important to closely sort out permanent workers with respect to temporary ones, in order to avoid laid off costs.[6]

A different strategy can be implemented in order to screen workers: employers may choose to save on recruitment, and invest more in monitoring the new hires, valuate their performance and, eventually, dismiss the unsuitable employees. The optimality of this strategy depends on the regulation of the employment contract: when firing costs are high, it is probably not convenient to substitute screening ex-ante with screening on-the-job, because detecting bad workers after hiring them would entails the payment of the dismissal cost or, if it is too expensive to fire them and the employees are retained, the monitoring costs would be a net loss. Instead, it could be efficient to supervise temporary workers, whose dismissal involves lower costs.[7]

Another branch of the literature is partly related to our work: the analysis of labor adjustment costs. Hiring costs are generated by the recruitment process, they consist of employer expenses on job advertising and search firm fees. Goux et al. (2001) estimate the structure of costs of hiring and firing workers and relate it to the employment arrangement. Using a French panel, they show that it is much less costly to adjust the number of temporary employees than to adjust the number of permanent ones.[8] Similar results are obtained in Abowd and Kramarz (2003), and Kramarz and Michaud (2004).

[6] This is true also in liberal labor markets. Severance payments and dismissal taxes are not prohibitive in U.K., but firing costs also include more subtle and psycological effects: hiring and firing regular workers frequently may prove to tarnish a firm's reputation, making it more difficult for the organization to recruit permanent employees in the future (Davis-Blake and Uzzi, 1993).

[7] Houseman (2001). provides some empirical evidence of the use of temporary contracts as a screening device. Firms may fill vacancies with fixed-term workers, monitor them throughout the flexible arrangement and confirmed as permanent only those employees who turn out be highly productive.

[8] Goux et al (2001) do not use direct measures of hiring and separation costs. They estimate the

They also use French data at establishment level. Hiring costs are regressed on the number of new hires under temporary contracts and permanent ones. The low estimated cost of hiring on short-term arrangements is regarded as an underlying cause of the tendency to recruit mostly on temporary contracts.

Our analysis of the screening ex-ante effort may look similar to these studies, but there are two important differences: the perspective from which we examine the hiring cost, and the data we use. The adjustment cost literature tries to explain the dynamic of labor demand as determined by the shape and magnitude of hiring and separation costs. On the contrary, we think that recruitment costs are not exogenously given, but recruitment methods, and the relative costs, are purposefully chosen by employers. Hiring temporary workers is cheaper because employers decided to spend less in recruiting them. The second difference pertains the data employed in the analysis: the ERP survey provides detailed information about jobs' and new hires' characteristics at engagement levels, whereas the dataset used in Abowd and Kramarz (2003) and in Kramarz and Michaud (2004) are at establishment level and contains information only about total expenditures, workers' flows, and the occupational distribution of new hires and separations. Therefore, we are better equipped to distinguish the role of the contract type on hiring costs from composition effects arising from the distribution of jobs and skills requirements among contracts. Furthermore, the availability of several engagements for each firms allows us to control for firm unobservables.

3 Data

We use two distinct datasets on UK: the Survey of Employers' Recruitment Practices, 1992 and the Skills Survey, 1997. The former provides information about the recruitment process, the latter includes some questions on monitoring on-the-job.

3.1 Survey of Employers' Recruitment Practices

Data used in the empirical analysis of the screening ex-ante process come from a detailed employer-engagement dataset: the Survey of Employers' Recruitment Practices (ERP) conducted in the United Kingdom in 1992.[9] This study was carried out by the British Social and Community Planning Research (SCPR), on behalf of the Employment Service, in order to provide an understanding of employers' use and perceptions of the various recruitment channels available to them. A selected sample of over 10,000 establishment, drawn by the Census of Employment for 1989,[10] were first contacted in Autumn 1991

shape of those costs exploiting data on workers' flow at establishment level. Identification relies on the structure of the model of labor demand.

[9] Hales, J., Employers' Recruitment Practices : The 1992 Survey [computer file]. Colchester, Essex: UK Data Archive [distributor], March 1999. SN: 3694.

[10] The 1989 Census covered all existing establishments with 25 or more employees and was supplemented by a random sample of smaller establishment. The sample is not random but designed to ensure

via a brief preliminary telephone interview in order to categorize them into *recruiting* - establishment that either had recruited one or more employees in the previous 12 months or had unfilled vacancies at the time of the interview - versus *non-recruiting* establishment. The longer face-to-face interview took place between May and November 1992. Within each establishment, the respondents were selected to be the main person responsible for the recruitment process.

Questions regarding the establishments were grouped into three sections: a general inquiry about the type of firm and the role of the respondent; the characteristics of the workforce and information about current vacancies and recent recruits; detailed questions about the recruitment practices usually adopted by the firm.

A further set of questions was asked to the 5,635 recruiting establishment. Five of the more recent engagements[11] were selected in order to cover the largest variety of occupational groups, as defined by the Standard Occupational Classification (SOC). This led to a sample of 20,054 engagements, for each of whom detailed information - about the characteristics of the job, those of the newly hired worker, the recruitment methods activated, whether the recruit was still employed ad how satisfied the employer was with her - were collected. Those data allow to identify the factors affecting the screening ex-ante procedures and their relation with the type of contract. Descriptive statistics of the full sample and of the subsample used in the regressions are shown in Table 1. It is worth noting that atypical contracts (temporary, causal, fixed term and self-employed) account for about 20 per cent of the total number of engagements (one third in weighted values).

We constructed two indexes of the recruitment effort using answers to questions E39 and E40 of the questionnaire:

> E39: `Using the scale on this card [from 1 (=not at all important) to 7 (=very important)], how important a factor in your use of the recruitment method(s) was the speed with which you expected it/they would provide a suitable recruit on this occasion?`
>
> E40: `Looking at the scale again, how important a factor in your use of recruitment method(s) was keeping down the cost of announcing/ advertising the vacancy on this occasion?`

They refer to the second most recent engagement and have been asked to all of the recruiting establishments.

Each answer has been associated with the channel that led to the first contact with

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that the number of establishments selected in each size category and region was sufficient to allow meaningful analysis. For this reason, small firms and firms outside London and the South East were oversampled. However, weights are provided to recover population proportions.

[11] An engagement was defined as *"Recruiting an employee, where a new contract of employment is involved"*. This includes internal transfers and promotions.

or by the person recruited[12] and indexes of speed (=E39) and cost (=−E40) of each recruitment method are computed as the average, over firm, of the respective valuations. This means that the cost-index of "`jobcentre`" is equal to the mean of the valuations assigned to E40 by all of the establishments that first met the new employee, in the second engagement, through the jobcentre. In Section 2 we stressed that the same channel may have different cost, effectiveness and speed when applied to different jobs. In order to account for this heterogeneity the averages have been computed within engagements for similar jobs. Indexes have been computed according to two different grouping schemes:

- Scheme A: skilled (professional associate & technical occupations; professionals; management and administration); unskilled (routine unskilled, operatives and assembly, sales, protective and personal services, craft and skilled services, clerical and secretarial occupations)
- Scheme B: skilled (professional associate & technical; professional; management and administration); low skilled (sales, protective and personal service, craft and skilled service, clerical and secretarial); unskilled (routine unskilled, operatives and assembly).

Results for method B are shown in Figures 1 and 2. It is clear that the valuation of each recruitment channel is not general but relative to the job position it has to fill. For instance, consulting the job centre is among the cheapest and fastest channel to fill a routine or operative occupation (SOC 1-2), but it is not regarded as cheap nor fast when looking for professional workers and managers.

The recruitment process of each engagement is valuated according to the judgement on the channel that led to the first contact with the employee. In the end, we have two indexes of recruitment effort for each engagement: `cost` and `speed`.

3.2 Skills Survey

The former dataset does not provide any information about monitoring practices of employers. Therefore we used a different source of data: the Skills Survey (SS). This survey was conducted in 1997 by the National Centre for Social Research, on behalf of the Economic and Social Research Council. The survey was the centerpiece of a

[12] The survey also provides information about the other recruitment channels involved in the selection process, and the order in which they were implemented. The set of channels used first corresponds to the initial choice of the employer. It is questionable whether answers to E39 and E40 refers to the first method or to the successful one. In the former case, we should limit our attention to the recruitment channels used first. But this piece of information is missing for more than two thirds of the engagements, whereas 95 per cent provide the answer on the first contact with the employee. Furthermore, in 63 per cent cases the channel that led to the first contact was implemented as a first choice, and in 29 per cent cases as a second choice. Associating the recruitmen effort valuations to the first-contact channel, instead of the first-implemented method, allow us to benefit from a larger sample. Estimates have been performed also using the first-implemented channels and results are qualitatively similar, but fewer coefficients are statistically significant. Detailed results are available at http://sarapinoli.at.googlepages.com.

project entitled "Learning, Skills and Economic Rewards", directed by Francis Green, with David Ashton and Alan Felstead. The major purpose was to measure and examine different types of skills of the workforce. The sample was based on the Postcode Address File (PAD) and involved random probability methods. Stratification was used to ensure the sample points were spread throughout Great Britain.[13] Only individuals in work and aged 20-60 years old were eligible to the face-to-face interview, that took place between January and May 1997. In the end, the sample includes 2467 records, with a response rate of 67 per cent.

The dataset contains information on people in work and their jobs. The questionnaire is composed of several sections: broad questions about the current job and the employing organization, including the employment contract type, attitudes and management skills, competence, transferability of skills, pay and qualifications, job held five years ago, personal details. Among the job analysis questions, it was asked:

B33: `How closely are you supervised in your job?`
`1 Very closely`
`2 Quite closely`
`3 Not very closely`
`4 Not at all closely`
`5 Don't know`

This piece of information is used in order to construct an index of monitoring intensity (=−B33). Note that, unlike the ERP survey, the SS questions were addressed to the worker, not to the employer. Therefore, we have a measure of "worker's perception" of being monitored, instead of the employer's investment in screening on-the-job. Furthermore, the dataset does not allow to control for firms nor workers specific effects. Our results are necessarily tentative because of data limitations.

4 Empirical Analysis

In Section 2 we conjectured that the optimal screening strategy depends on the type of employment contract offered. In particular we believe that employers favor recruitment to screen permanent workers, while monitoring on-the-job may be more intense on temporary recruits.

In this Section we tests these intuitions by empirically studying the link between the type of contract and the screening effort.

[13] With weights, the dataset is representative of adults in Great Britain and each individual in the file had an equal chance of selection.

4.1 Screening ex-ante

We constructed two indicators of recruitment effort: `cost` and `speed`. Note that cost and speed are two types of investment: investment in money, and investment in time. Higher values are associated to larger cost and greater speed of the screening process. If employers save on the recruitment of temporary workers, then we would observe lower cost indexes and higher speed. The statistics in the last panel of Table 1 support this intuition: the average cost index for temporary workers is -4.73, versus -4.50 for permanent ones, and the speed index is, respectively, 5.58 and 5.46.

4.1.1 Econometric specification

The relation between recruitment effort and the type of contract is estimated in a linear framework for both indicators:

$$y_{ijf} = recruitment\_effort = \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} + \varepsilon_{ijf} \qquad (1)$$

$$C_{ijf} = contract\_type = \begin{cases} 0 & \text{typical} \\ 1 & \text{atypical} \end{cases}$$

where W_{ijf} is the matrix of the characteristics of the worker in engagement i, job j, firm f; F_{if} are the firm's specificities - that do not vary across jobs in the same establishment - and job's variables are collected in J_{jf}, namely:[14]

- worker characteristics: gender, age, ethnic group, disability, previous employment status;
- firm characteristics: industry classification code, region, labor force, level of activity, trend of activity, quality of the workforce;
- job characteristics: occupation classification code, initial pay, supervision task, standard recruitment procedure.

We assumed that the choice of the contract precedes the decision over the recruitment procedure, that is C is predetermined. But, even if C comes first, it is likely to be determined by the same variables that do enter the recruitment-effort equation. An endogeneity bias may arise from the existence of unobservable characteristics of firms and jobs. Those unobservable components are grouped in the error term $\varepsilon_{ijf} = e_{ijf} + \eta_j + \eta_f$ and, if correlated with C, cause inconsistency.

Thanks to the availability of several engagements per firm, we can correct for the endogeneity bias by estimating a fixed effect (FE) model that nets out both unobservables:

[14] Most of those information have been collected for all the sample, but missing values are not unusual. At the end, the subsample we used in regressions is smaller: 12,805 observations with respect to the initial 20,054. Nevertheless, we can still assume that results are representative of the population, given that the composition of the subsample is very closed to the initial one (Table 1).

– first step: cancel the firm fixed-effect by subtracting the average over j:

$$\begin{aligned} E\left(y_{ijf}\right) &= \bar{y}_{if} = \alpha + \beta_0 \bar{W}_{if} + \beta_1 F_{if} + \beta_2 \bar{J}_f + \gamma \bar{C}_{if} + \beta_3 R_f + \bar{e}_{if} + \bar{\eta} + \eta_f \quad (2) \\ y_{ijf}^{FE} &= y_{ijf} - \bar{y}_{if} = \beta_0 W_{ijf}^{FE} + \beta_2 J_{jf}^{FE} + \gamma C_{ijf}^{FE} + e_{ijf}^{FE} + \eta_j^{FE} \quad (3) \end{aligned}$$

– second step: cancel the job fixed-effect by including dummy variables for jobs D_J:

$$y_{ijf}^{FE} = \beta_0 W_{ijf}^{FE} + \beta_2 J_{jf}^{FE} + \gamma C_{ijf}^{FE} + \phi' D_J + e_{ijf}^{FE} \quad (4)$$

Interacted terms are added to the econometric specifications to allow for differentiated effects of contracts depending on occupational level and industry.

$$\begin{aligned} y_{ijf}^{FE} &= \beta_0 W_{ijf}^{FE} + \beta_2 J_{jf}^{FE} + \gamma C_{ijf}^{FE} * D_J + \phi' D_J + e_{ijf}^{FE} \quad (5) \\ y_{ijf}^{FE} &= \beta_0 W_{ijf}^{FE} + \beta_2 J_{jf}^{FE} + \gamma C_{ijf}^{FE} * D_J * D_I + \phi' D_J + e_{ijf}^{FE} \quad (6) \end{aligned}$$

where D_J is a set of job dummy variables for routine unskilled occupations, operatives and assembly workers, sales, personal and protective services, craft and related occupations, clerical and secretarial jobs, associate professional and technical occupations, professionals, managers and administrators. Industry dummies D_I distinguish among energy and water supply, manufacturing, construction and services. In order to limit the number of regressors, D_J in equation 6 is a set of only 2 dummies: unskilled jobs (routine unskilled occupations, operatives and assembly workers, sales, personal and protective services, craft and related occupations, clerical and secretarial jobs) and skilled jobs (associate professional and technical occupations, professionals, managers and administrators). In the end, three specifications are estimated: equations 4, 5 and 6

Limitations:

All results presented in this study are derived by using data on recruiting establishments. A potential issue is the selection bias. If firms selfselect themselves into one of the two groups, *recruiting* and *non-recruiting*, according to a selection rule s such that:

$$E\left(\varepsilon_{ijf} | W_{ijf}, F_{if}, J_{jf}, C_{ijf}, s_f\right) \neq 0 \quad (7)$$

then the estimated coefficients would be inconsistent. The selection rule can be written as follows:

$$\begin{aligned} s_f &= \begin{cases} 1 & \text{if } s_f^* > 0 \quad \text{recruiting establishment} \\ 0 & \text{if } s_f^* < 0 \quad \text{non-recruiting establishment} \end{cases} \quad (8) \\ s_f^* &= S_f \delta + \upsilon_{jf} \quad (9) \\ y_{ijf} &= y_{ijf}^* \times I\left(s_f^* > 0\right) = \begin{cases} y_{ijf}^* & \text{if } s_f = 1 \\ - & \text{if } s_f = 0 \end{cases} \quad (10) \end{aligned}$$

where s_f^* represents the FOC from maximizing profits on workforce, S_f comprises economic variables likely to affect hiring decision of firm f and can include the same regressors as the main equation, 1, and y_{ijf}^* is a latent index of recruitment effort.

Estimating equation 1 would give us:

$$\begin{aligned} E\left(y_{ijf}|W_{ijf}, F_{if}, J_{jf}, C_{ijf}, s_f = 1\right) &= \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} + E\left(\varepsilon_{ijf}|\upsilon_{jf}\right) \\ &= \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} + \lambda\left(S_f\delta\right) \quad (11) \end{aligned}$$

There is no selection bias only if ε_{ijf} is not correlated with υ_{jf}. While the bias arises when both the selection equation and the main equation include correlated unobservable variables as regressors. This is likely to be true: the choices of whether to hire new workers or not, s_f, and how to recruit them, y_{ijf}, depend probably on roughly the same set of variables, observable and unobservable.

Nevertheless, controlling for firm and job fixed effects, the selection rule component, $\lambda\left(S_f\delta\right)$, is canceled out and consistency is ensured.[15]

4.1.2 Results

Results from estimates of equations 4, 5 and 6 are shown in Tables 4 and 5, columns (1), (2) and (3) respectively. They refer to cost and speed indexes computed according to scheme B (see Subsection 3.1). Different specifications and more detailed results are available upon request.

Table 3 reports the estimated effect of the contract type on recruitment cost, controlling for jobs' and workers' characteristics and firm specific effects. As expected, temporary contracts are associated with significantly lower recruitment cost.

Occupation interacted terms, column (2), are negative and most of them are statistically significant. Exceptions are protective and personal services, craft and skilled services, professionals and managers. Personal characteristics of the employees are likely to play a more relevant role in skilled job outcomes, than in routine-unskilled occupations. Therefore skilled jobs may require a thorough selection regardless of the contract type, in order to avoid an inconvenient match. This may explain the lack of significance of some interacted terms. Nonetheless, results may be traced back to the small number of engagements observed in the above-mentioned occupations.

Regression in column (3) allows the effect of the type of contract to differ according to occupations and industries: skills required to an operative workers employed in constructions are probably very different from those required to an operative workers in service sector, and the role of the contract type may also be diversified. As a matter of fact, coefficients in column (3) are significantly different: temporary workers are less screened in construction, whereas the contract effect is marginal for those employed in services. Note that coefficients are significantly negative when associated to unskilled occupations, but they are not statistically different from zero for engagements in skilled jobs, except for the construction sector.

The estimated coefficients of control variables, not reported here, have the expected sign. There is a clear pattern in the cost of recruitment methods used by occupation

[15] Note that results are representative only of recruiting firms.

and skill requirements: higher qualifications require larger investment in screening ex-ante, whereas a small cost is afforded to recruit unskilled workers. Less attention is paid to keeping down the cost of recruiting young workers, probably because they are more difficult to value - they lack employment history. Furthermore, more expensive methods are implemented when a firm is looking for an employed applicant. On the other side, firms using standard recruitment procedures tend to spend less.

Turning to the analysis of the recruitment speed index, in Table 4 we report the estimated impact of temporary arrangements. Engagements involving atypical workers are associated with faster recruitment methods: time spent in searching is also an investment that firms want to minimize when the contract is temporary.

The type of job and the industry do matters. The speed of the screening process of temporary workers is less differentiated from the screening process of permanent workers when looking for a skilled worker: the magnitude and significance of the relative coefficients are smaller, especially in the service sector. The coefficients of the interacted terms with protective and personal services and managers are not statistically different from zero, in line with results from cost regressions. Surprisingly, skilled temporary workers in manufacturing are associated with lower speed of the recruitment method with respect to permanent ones: the estimated coefficient is negative and significant at 10 per cent confidence level.

Control variables' coefficients are coherent with recruitment cost regression. Young individuals and employed applicants are associated with channels that are not only more expensive, but also slower: higher investment of time and money is devoted to screen them. Also, qualified jobs require longer and costly recruitment process.

4.1.3 Robustness tests

The relationship between the contract type and recruitment has been estimated using several specifications.

The valuation of cost and speed of a recruitment channel depends on the type of vacancy has to be filled. Therefore indexes have been computed within occupational groups. As anticipated in Section 3.1, we followed two different schemes. Tables 4 and 5 show estimates for scheme B. Results using scheme A are qualitatively and quantitatively very similar.

Among the recruitment methods, we decided to exclude `waiting list`. This channel is valued as cheap and fast, but actually the employer had to invest time and money in advance in order to build the waiting list. Therefore, valuations reported for this channel are not reliable and all the engagements that involved waiting list as the first-contact channel are dropped. Furthermore, we left out promotions and internal transfers, i.e. those employment arrangements between an employer and a worker who was already employed at the establishment, but under a different contract. We are interested in

the process through which the employer gather information about the worker's quality. Promoting, or transferring, a former employee is an outcome of the learning process, whereas screening new workers is part of the process.

Equations 4, 5 and 6 have been estimated on this smaller sample and results are reported in Tables 4 and 5, column (4), (5) and (6). Estimates for the cost index strengthen previous findings: coefficients of contract and interacted terms are negative and most of them are statistically significant. Only high level qualifications are associated to non significant values. Furthermore, the magnitude of the contract effect is bigger. Speed regressions on the subsample also confirm previous results: temporary arrangements are associated to faster recruitment method. Coefficients are very similar in magnitude and in significance level.

In Subsection 4.1.1 we showed that, if the contract type is decided before the recruitment process, implementing a fixed-effect approach correct for endogeneity bias. In the real world, the contract type is not always predetermined. The characteristics of the firm and of the vacancy uniquely identify the skill requirements and the optimal choice of employment contract and, ideally, we would like to estimate the following equation:

$$y_{ijf} = \alpha + \beta_0 W^*_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C^*_{ijf} + \varepsilon_{ijf} \tag{12}$$

where W^* and C^* are the ideal worker's characteristics and contract type. It may happen that, after screening some applicants without success, the employer decides to offer an arrangement different from the ex-ante optimal choice, so that the observed W and C do not correspond to W^* nor C^*.[16] Therefore the estimated regression would be:

$$\begin{aligned} y_{ijf} &= \alpha + \beta_0 \left(W_{ijf} + \omega_{ijf}\right) + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma \left(C_{ijf} + \psi_{ijf}\right) + \varepsilon_{ijf} \\ &= \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} + e_{ijf} \end{aligned} \tag{13}$$

where $W_{ijf} + \omega_{ijf} = W^*_{ijf}$ and $C_{ijf} + \psi_{ijf} = C^*_{ijf}$. The error term is given by $e_{ijf} = \varepsilon_{ijf} + \beta_0 \omega_{ijf} + \gamma \psi_{ijf}$, where ω_{ijf} and ψ_{ijf} are two measurement errors. If measurement errors are not correlated with W nor C, then no bias arises. Otherwise, OLS estimates are inconsistent.

Imagine that an employer has a vacancy to fill and is looking for a worker with characteristic W^* to whom offer a permanent contract $C^* = 0$. The employer chooses the screening effort y in order to attract suitable applicants. If, unexpectedly, workers with different quality $W \neq W^*$ apply for the job, the employer may decide to offer a different contract. In particular, if $W < W^*$ ($\omega < 0$) it may be optimal to offer a temporary contract, $C = 1 > C^*$ ($\psi > 0$). The observed C and W are not correlated with their respective measurement errors, but

$$Cov\left(C, \omega\right) = Cov\left(\psi, \omega\right) < 0 \tag{14}$$

$$Cov\left(W, \psi\right) = Cov\left(\omega, \psi\right) < 0 \tag{15}$$

[16] The employer may also choose to change recruitment method and to wait better quality applicants. Then, the observed W and C would correspond to the ideal ones, and no bias would arise.

so that C and W are correlated with the error term e and estimates would be biased.[17] Nonetheless, this kind of endogeneity would strengthen our results. We argued that, given W^*, the screening effort y is negatively correlated with C, i.e. lower effort is exerted to recruit temporary workers. In the example, the employer is looking for a permanent worker, therefore y is relatively high, but in the end a temporary contract is signed, so that $Cov(C, y) > 0$. The bias goes against our hypothesis, i.e. $Cov(C, y) < 0$. Therefore our estimates of the contract coefficients are a lower bound, in absolute terms, of the true values.

Endogeneity has been directly addressed by limiting the sample to non urgent engagements. We define as non urgent those engagements for which the employer answered "no" to the following question:

> D36: Suppose that for some reason he/she could not have started work till a month later. Would this delay have mattered to you or not?

If it is not urgent to fill the vacancy, then one should expect that only suitable applicants are hired, whereas when applicants do not meet the ideal requirement, $W \neq W^*$, the employer decide to wait instead than offering a different employment contract. Unfortunately question D36 has been asked for only two engagements over five, and only part of them are non urgent. In the end, the resulting subsample is fairly small: 1,489 observations versus 12,805 observations used in the main regressions. OLS estimates have been performed on the subsample and results are reported in Tables 6 and 7, columns (1), (2) and (3).[18] The effect of temporary contracts on screening cost (Table 5) is negative, except for interacted terms with high level qualifications in manufacturing and construction. Some of the coefficients are statistically significant and their magnitude is, in absolute terms, higher than estimates in Table 3 on the full sample. This support the idea that endogeneity leads to attenuation bias. With regard to speed regressions (Table 6), the contract effect is positive and significant, apart from interacted terms with skilled occupations. Again, the magnitude of the coefficients is higher than estimates on the full sample.[19]

[17] In the example, if $W > W^*$ we would have $\omega > 0$ and $\psi = 0$: the contract signed is not different from the ideal one. In this case, regressors are not correlated to the error term and estimates are consistent. Same results are obtained if we consider a vacancy to be filled with a temporary contract, $C^* = 1$, and $W \neq W^*$.

[18] We also ran FE regressions on the subsample of non urgent engagements. Results are shown in Appendix A, Tables A.1.2 and A.2.2, available upon request. Only a few coefficients are statistically significant and many interacted terms are dropped due to data limitations. Nonetheless, most of the contract coefficients have the expected sign (negative in cost regression, positive in speed regression), and some of them are statistically significant.

[19] It has been objected that endogeneity may arise from simultaneity. A clear prediction of the search literature (see Devaro (2003, 2005)) is that recruitment choice affect the quality of the applicant pool: the more you invest in screening, the higher will be the quality of applicants. Firms will be willing to offer better arrangements to better applicants and the correlation that we find among recruitment effort and contract type may reflect reverse causality. We claim that this is not the case. Let's consider two

Limiting the sample to non urgent engagements, also allows to deal with potential spurious correlation resulting from the characteristics of temporary vacancies. Often, firms hire workers under fixed-term contract when facing temporary needs,[20] due for instance to regular workers' absences, or to fluctuations in the demand. When these events are unforeseen, employers may need to implement a fast recruitment methods in order to fill the unexpected vacant position. In this case, the high speed index associated to temporary arrangements would capture a characteristic of the vacancy, i.e. the urgency, instead than the effect of the contract type. This problem is overcome in the subsample of non urgent engagements.[21]

In the end, we replicate the estimates on a subsample including only the second most recent engagements, let's call them E. As explained in Section 3.1, firms were asked to value the speed and cost of the method used to recruit E. Therefore, answers to E39 and E40 are more appropriate as speed and cost indexes for engagements E. On the other side, we cannot control for firm unobservables and the sample is fairly small. Tables 6 and 7 reports results for OLS estimates. Contract coefficients have the expected sign, but only a few of them are significant.

Overall, results are robust to several specifications: temporary contracts are associated with lower cost index and higher speed index. The difference in the recruitment effort among contract type is marginal for high qualifications.

4.2 Screening on-the-job

In this Section we use SS data to estimate the relationship between monitoring effort and employment contract. We expect the monitoring index to be lower for permanent workers than for temporary ones, ceteris paribus. Descriptive statistics in Table 2 do not give a clear prediction: a higher share of temporary workers perceive to be closely supervised, but they are also more likely to be "not at all closely supervised".

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vacancies, A and B for the same type of job, J, and requiring the same skills, W^*. The associated screening efforts are y_A and $y_B > y_A$, and the quality of applicants will be, respectively, W_A and $W_B > W_A$, so that the employer will offer a temporary contract for position A, and a permanent contract for position B. But why should the recruitment effort be differentiated among the two vacancies? The employer chooses the recruitment strategies that maximizes the expected profits, and she takes into account all the variables that are affected by the screening process. Our estimates for the recruitment cost and speed are ceteris paribus, i.e. given the type of job and the characteristics of the worker and of the firm. If the residual recruitment effort is still different, this has to be explained by some other characteristic of the vacancy: the type of contract offered, C^*. It is not reasonable to assume that the employer knows that the investment in screening y affects the quality of the applicant pool W, but does not anticipate that her choice of the employment contract depends on that quality W and, in turn, on y. Therefore, we argue that the causality may go only from C^* to y, not viceversa.

[20] Other reason to hire under fixed term contracts are screening and cost saving. See Abraham (1988) and Abraham and Taylor (1996) for a discussion.

[21] We thank Luca Nunziata for pointing out this issue.

4.2.1 Econometric specification

We used the same specification employed to analyze screening ex-ante:

$$y_{ijf} = monitoring\_perception = \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} + \varepsilon_{ijf} \quad (16)$$

$$C_{ijf} = contract\_type = \begin{cases} 0 & \text{typical} \\ 1 & \text{atypical} \end{cases}$$

Control variables include:

- worker characteristics: gender, age, ethnic group, disability;
- firm characteristics: industry classification code, public or private sector, labor force, whether the firm is committed to or recognized as an Investor in People (i.e. government scheme to promote learning in organizations);
- job characteristics: occupation classification code, working day, supervision task, whether involved in training, tenure.[22]

We also consider interacted terms of contract with occupational level and industry:

$$y_{ijf} = \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} * D_J + \phi' D_J + e_{ijf} \quad (17)$$

$$y_{ijf} = \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} * D_J * D_I + \phi' D_J + e_{ijf} \quad (18)$$

where D_J is a set of job dummy variables for routine unskilled occupations, operatives and assembly workers, sales, personal and protective services, craft and related occupations, clerical and secretarial jobs, associate professional and technical occupations, professionals, managers and administrators. Industry dummies D_I distinguish among primary sector, energy and water supply, manufacturing, construction and services. In order to limit the number of regressors, D_J in equation 18 is a set of only 2 dummies: unskilled jobs (routine unskilled occupations, operatives and assembly workers, sales, personal and protective services, craft and related occupations, clerical and secretarial jobs) and skilled jobs (associate professional and technical occupations, professionals, managers and administrators).

4.2.2 Results

Results are reported in Tables 8 and 9.

Table 7, columns (1), (2) and (3), shows results for equations 16, 17 and 18 on the full sample. Surprisingly, most of the coefficients associated to temporary contract and interacted terms are negative: temporary workers are less monitored than permanent

[22] Most of the respondents answered to all the questions, so that the sample comprises 2,020 observations, over 2,195 interviews.

ones. But estimates are not statistically different from zero. If we restrict the sample to workers with tenure lower than 5 years,[23] coefficients turn out to be mainly positive, but still not significant.

Results point out that employers monitor employees with different intensity depending on their tenure. Why? One reason may be that the object of monitoring is not only to learn the quality of workers, but also to avoid shirking behavior. We are interested only in the learning-side of monitoring, and we need to isolate it. The crucial assumption is that all workers are monitored to induce higher effort, but only newly hired workers are screened on-the-job, whereas the employer already learnt the quality of tenured employees. The difference between the monitoring intensity on tenured and on new workers gives the screening on-the-job component. Then, we want to test whether this component is higher for temporary workers. The following equations capture this idea:

$$y_{ijf} = \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} * S + \phi' D_J + \eta S + e_{ijf} \quad (19)$$

$$y_{ijf} = \alpha + \beta_0 W_{ijf} + \beta_1 F_{if} + \beta_2 J_{jf} + \gamma C_{ijf} * S * D_J + \phi' D_J + \eta S + e_{ijf} \quad (20)$$

where S is a dummy equal to one when the worker is short tenured. The effect of the contract type on screening on-the-job is accounted by γ.

Results are reported in Table 8. Column (1) corresponds to equation 19. The estimate for γ is positive, but not significant. Note that the coefficient associated to temporary workers is negative, albeit not significant. It may be that temporary workers are overall less monitored, or that they are less concerned about being supervised.[24] Both hypothesis are sensible. On one side, contract theory predicts that short term contracts enhance workers' effort because of the chance to be renewed, therefore less monitoring is needed. On the other side, Cappelli and Sherer (1990) empirically find, in a case study, that temporary workers feel significantly more satisfied with their supervision and more committed than regular workers.

In column (2), equation 20, we allow temporary short-tenured workers to be associated with different screening on-the-job intensity depending on their occupation. Now the effect of the contract type is positive and highly significant for short-tenured workers in low skilled occupation. The coefficients associated to the temporary workers, interacted with occupation, are statistically negative for low qualification, whereas there is no significant difference between temporary and permanent skilled workers.

[23] The Skills Survey include some retrospective questions. In particular it is asked:

F1: Were you in a paid work five years ago, that is in month and year?

and:

F2: Was this the same job as you have now? [INTERVIEWER: Only code 'yes' if the same job with the same employer.]

Short tenured workers are those who answered "No" either to question F1 or to question F2.

[24] We stressed in Section 3.2 that the monitoring index captures the workers' perception about monitoring, not the employers' investment. Therefore, we cannot distinguish between actual monitoring and subjective perception of being supervised.

We may interpret these results as evidence of higher screening-on-the job on short-tenured temporary workers employed in low skilled jobs. If this is the case, the lower recruitment investment found in Section 4.1 would be compensated by a more accurate monitoring. But these results are only tentative and data limitations do not allow us to further investigate this issue and to test the robustness.

5 Conclusion

Gathering information is an important process in the labor market. Both parties, the worker and the firm, need to learn the characteristics of each other in order to improve the employment match. Nonetheless, the employer screening behavior is a relatively neglected area of empirical work in labor economics, due to the lack of detailed data. Furthermore, the literature focused only on screening ex-ante, i.e. the recruitment process.

We stress that employers collect information about the quality of workers at various times: during the selection of applicants, screening ex-ante, and monitoring employees at work, screening on-the-job. It is important to analyze both components of the screening process, because they are substitutes and may be combined in different proportions. The employer's choice of the screening strategy depends on the characteristics of the vacancy to be filled and, in particular, it depends on the type of employment contract offered. Permanent workers are costly to dismiss, therefore it is important to learn their quality before firing tax becomes binding. On the contrary, temporary arrangements do not entail firing costs, and the investment in recruitment can be lowered. But a short recruitment process does not necessarily mean cursory screening, when it is compensated by close monitoring.

This paper provides empirical evidence of the lower recruitment effort exerted by employers when hiring temporary workers. Also some weak evidence of greater monitoring in provided. We exploit two cross-sectional datasets: the ERP, a large establishment-level survey about the recruitment behavior of employers, and the SS, which provides some information about the monitoring process. Results show that firms spend less and devote shorter time in hiring temporary workers, with respect to permanent ones. This is especially true for low-level occupations, while the gap is marginal or not significant for high-skilled jobs. A potential explanation is that personal characteristics of the employees affect more the outcome of skilled jobs than the output from routine-unskilled occupations. Then, hiring a bad quality worker in a skilled job would be more harmful than hiring a bad unskilled employee and a thorough selection would be needed regardless of the contract type.

Turning to monitoring intensity, a major concern is the distinction between monitoring-to-learn workers' quality and monitoring-to-control workers' effort. We attempt to identify the learning component by assuming that tenured workers are supervised only in order to avoid shirking, so that the difference in monitoring between short-tenured employees and tenured ones results from screening on-the-job. Estimates show that tem-

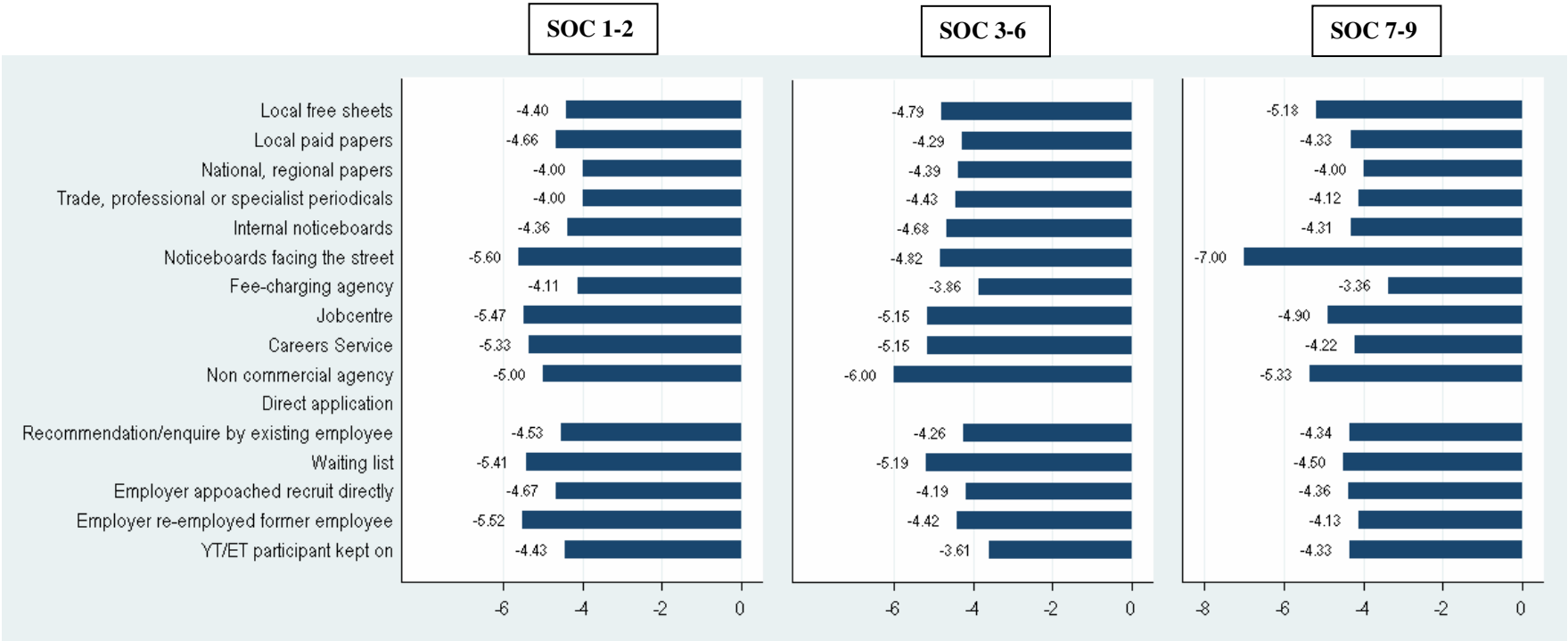
porary workers perceive to be more closely screened on-the-job than permanent ones. Again, the difference is significant for low-level occupations, not for high-skilled jobs.

The growth in the use of temporary workers has been an important phenomenon in Europe and U.S. during the last two decades. Understanding the effects of employment contracts is important to assess the reforms that led to this phenomenon. This study focus only on the effect on the employers' choice of the screening strategy. Screening effort affects the quality of the workforce, but other factors are involved: the investment in training and the adjustment to economic shocks. The role of the employment contract is unclear. On one side, there is empirical evidence of lower investment in training temporary workers.[25] On the other side, the introduction of temporary arrangements increased the response of firms to economic shocks, reducing mismatch and enhancing overall productivity.[26] Abowd et al. (2002) provide some evidence that productivity depends more on the unmeasured personal characteristics of the employees, than on the human capital accumulation. Therefore, it is more important to learn the quality of the match through recruitment and monitoring on-the-job, than to invest on training. Nevertheless, a complete understanding of the impact of temporary contracts on productivity requires a wider framework of analysis.

[25] See Arulampalam and Booth (1998), and Rix et al. (1999)

[26] Demand shocks and technology shocks change the productivity of existing jobs and may reverse the profitability of employment matches. The positive effect of temporary contracts in reducing missmatch is modeled in Alonso-Borrego et al (2004), Blanchard and Landier (2002) and Veracierto (2003).

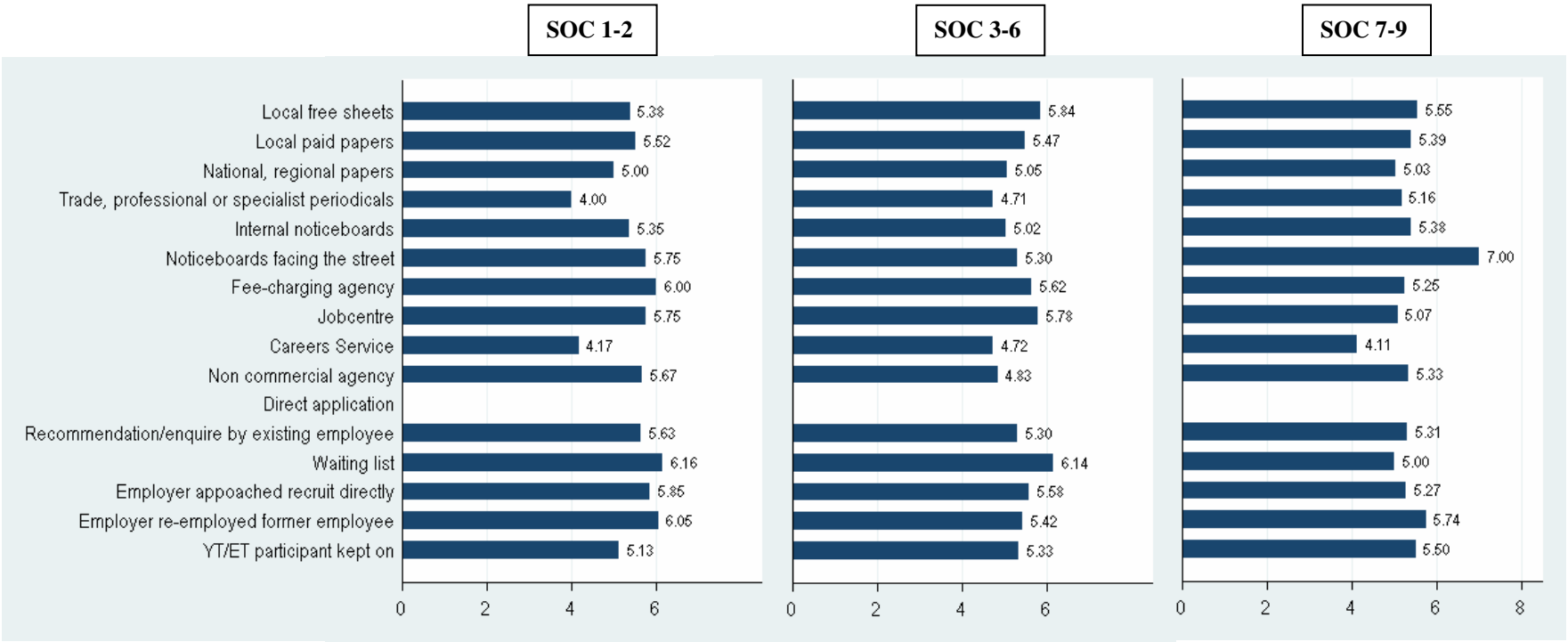
Figure 1. Recruitment channel valuation by job qualifications: cost index



Source: Computation based on ERP, Employers' Recruitment Practices Survey, 1992.
Higher absolute values of the cost index are associated to lower cost of the channel.

soc1= routine unskilled occupation
soc2= operatives and assembly
soc3= sales occupation
soc4= personal and protective service occupations
soc5= craft and related occupations
soc6= clerical and secretarial occupations
soc7= associate professional and technical occupations
soc8= professional occupations
soc9= managers and administrators

Figure 2. Recruitment channel valuation by job qualifications: speed index



Source: Computation based on ERP, Employers' Recruitment Practices Survey, 1992.
Higher values of the speed index are associated to higher speed of the channel.

soc1= routine unskilled occupation
soc2= operatives and assembly
soc3= sales occupation
soc4= personal and protective service occupations
soc5= craft and related occupations
soc6= clerical and secretarial occupations
soc7= associate professional and technical occupations
soc8= professional occupations
soc9= managers and administrators

Table 1. Composition of the ERP dataset, percentage.

Contract type:	Full dataset	Sample
Temporary	13.78	14.49
Casual	0.85	0.87
Fixed-term	5.49	5.61
Permanent	77.05	79.92
Provisional	2.47	2.10
Self-employed	0.15	-
Don't know/Not answered	0.21	-
Sample size (engagements)	*20,054*	*12,805*
Establishments' characteristics:		
SIC:		
1. Energy and water supply	1.25	1.40
2. Metals, minerals, etc.	4.44	4.25
3. Metal goods, engineering, etc.	11.24	11.06
4. Other manufacturing	12.94	13.00
5. Construction	3.19	2.68
6. Distribution, catering, etc.	22.17	19.91
7. Transport and communication	3.98	3.88
8. Banking, insurance, etc.	14.58	14.50
9. Other services	26.21	29.32
Sample size (establishment)	*5,295*	*4,069*
Size:		
3 - 10	10.75	7.90
11 - 24	14.18	12.00
25 - 49	14.39	12.76
50 - 99	13.94	13.87
100 - 199	13.66	14.19
200 - 499	15.47	18.14
500 - 999	9.07	10.78
1000 - 1999	5.51	6.68
2000 or more	3.04	3.68
Sample size (establishment)	*5,302*	*4,074*
Region:		
London/SE	17.43	17.23
South West	10.13	10.14
West Mids	10.56	10.41
E Mids/East	11.47	11.68
York/Humber	9.90	10.16
North West	11.03	10.70
North	9.68	9.50
Wales	9.51	9.60
Scotland	10.30	10.58
Sample size (establishment)	*5,302*	*4,074*
Job's characteristics:		
SOC:		
Routine, unskilled	15.31	10.52

Operatives & assembly		14.39	28.62
Sales		11.15	12,45
Protective and Personal service		7.51	6.07
Craft & Skilled Service		9.23	6.39
Clerical & Secretarial		18.47	16.98
Professional assoc & technical		8.60	6.35
Professional		8.04	9.07
Management & administration		7.31	3.54
	Sample size	*20,054*	*12,805*
Workers' characteristics:			
Gender:			
Male		48.96	51.03
Female		51.04	48.97
	Sample size	*20,013*	*12,805*
Age:			
16-18		8.33	7.56
19-24		25.63	24.41
25-34		33.41	34.70
35-44		20.26	21.02
45-54		9.80	9.79
55 or over		2.57	2.51
	Sample size	*19,807*	*12,805*
Employment status:			
Sub-contract/agency employee working at this establish.		3.18	3.69
Employee at a different establishment of this organization		4.83	5.38
Working for another employer		36.14	38.86
Unemployed		34.69	35.29
In full time education		9.66	8.68
Not in the labour market		4.73	4.82
Other		3.21	3.28
Don't know / Not stated		3.55	-
	Sample size	*20,054*	*12,805*
Screening effort:		Permanent	Temporary
Cost index: mean		-4.50	-4.73
(standard deviation)		(0.51)	(0.50)
Speed index: mean		5.46	5.58
(standard deviation)		(0.29)	(0.30)
	Sample size	*12890*	*3190*

Source: Computation based on Hales, J., Employers' Recruitment Practices: The 1992 Survey.
Values are computed as percentages over the number of answers.

Table 2. Composition of the SS dataset, percentage.

Contract type:	Full sample	Short tenure
Temporary	7.38	11.00
Permanent	92.62	89.00
Sample size	*2,195*	*1,100*
Establishments' characteristics:		
SIC:		
1. Primary sector	1.32	0.82
2. Manufacturing	21.37	21.82
3. Energy and water supply	0.77	0.82
4. Construction	4.24	3.55
5. Distribution, catering, etc.	17.77	20.09
6. Transport and communication	7.52	7.18
7. Banking, insurance, etc.	4.56	4.27
8. Other services	42.46	41.45
Sample size	*2,195*	*1,100*
Size:		
1 - 10	17.18	19.00
11 - 24	14.44	16.45
25 - 49	13.71	15.00
50 - 99	13.21	13.18
100 - 199	8.84	7.64
200 - 499	15.49	13.82
500 - 999	6.83	6.09
1000 - 1999	4.42	3.64
2000 or more	5.88	5.18
Sample size	*2,195*	*1,100*
Job's characteristics:		
SOC:		
Routine, unskilled	7.65	8.73
Operatives & assembly	11.07	10.82
Sales	7.43	8.73
Protective and Personal service	10.62	12.55
Craft & Skilled Service	10.48	8.18
Clerical & Secretarial	18.22	18.45
Professional assoc & technical	10.07	9.36
Professional	10.93	9.27

Management & administration	13.53		13.91	
Sample size	*2,195*		*1,100*	
Workers' characteristics:				
Gender:				
Female	49.43		52.64	
Male	50,57		47.36	
Sample size	*2,195*			
Age:				
20-24	8.56		14.36	
25-34	30.98		37.18	
35-44	29.16		26.18	
45-54	23.74		17.45	
55 60	7.56		4.82	
Sample size	*2,195*		*1,100*	
Monitoring perception:	permanent	temporary	permanent	temporary
not at all closely supervised	23.66	26.54	22.27	23.97
not very closely supervised	43.53	39.51	42.70	38.84
quite closely supervised	26.27	26.54	27.27	28.93
very closely supervised	6.30	7.41	7.35	8.26
don’t know	0.25	0.00	0.41	0.00
Sample size	*2,033*	*162*	*979*	*121*

Source: Computation based on Ashton, D., Felstead, A. and Green, F., Skills Survey, 1997.
Values are computed as percentages over the number of answers.

Table 3. Recruitment cost (method B), FE estimates.

	Full sample			New hires[3]		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
temporary contract	-0.089			-0.110		
	(0.013)***			(0.015)***		
temporaryxsoc1[1]		-0.082			-0.082	
		(0.027)***			(0.030)***	
temporaryxsoc2[1]		-0.159			-0.159	
		(0.029)***			(0.032)***	
temporaryxsoc3[1]		-0.115			-0.108	
		(0.043)***			(0.047)**	
temporaryxsoc4[1]		-0.032			-0.079	
		(0.037)			(0.042)*	
temporaryxsoc5[1]		-0.058			-0.092	
		(0.041)			(0.044)**	
temporaryxsoc6[1]		-0.115			-0.150	
		(0.024)***			(0.028)***	
temporaryxsoc7[1]		-0.081			-0.144	
		(0.039)**			(0.044)***	
temporaryxsoc8[1]		-0.003			-0.007	
		(0.037)			(0.043)	
temporaryxsoc9[1]		-0.068			-0.087	
		(0.058)			(0.068)	
temporaryxSOC1xSIC1[2]			-0.175			-0.260
			(0.102)*			(0.125)**
temporaryxSOC1xSIC2[2]			-0.154			-0.190
			(0.025)***			(0.028)***
temporaryxSOC1xSIC3[2]			-0.247			-0.284
			(0.107)**			(0.119)**
temporaryxSOC1xSIC4[2]			-0.068			-0.072
			(0.018)***			(0.020)***
temporaryxSOC2xSIC1[2]			-0.231			-0.212
			(0.210)			(0.265)
temporaryxSOC2xSIC2[2]			-0.027			-0.086
			(0.073)			(0.082)
temporaryxSOC2xSIC3[2]			-0.339			-0.438
			(0.173)*			(0.189)**
temporaryxSOC2xSIC4[2]			-0.036			-0.058
			(0.027)			(0.032)*
Controls:						
Workers' characteristics	yes	yes	yes	yes	yes	yes
Jobs' characteristics	yes	yes	yes	yes	yes	yes
Observations	12805	12805	12805	11441	11441	11441
Num. groups	4074	4074	4074	3926	3926	3926
R-squared (within)	0.29	0.29	0.29	0.30	0.30	0.31

Standard errors are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
The estimates are for the cost of recruitment computed according to method B (see Section 3).

Reading:
Fixed effects estimates over establishments. All models control for workers' characteristics: gender, age group (6 dummies), ethnic group (dummy equal to 1 if white), disability, previous employment status (dummy equal to 1 if employed), whether the individual was previously employed in the same firm; and jobs' characteristics: occupation (9 dummies), initial pay, supervision task, whether the engagement involved only the firm's standard recruitment procedure.

[1] interaction among temporary and a dummy equal to 1 when the new engagement is in occupation soc1-9
[2] interaction among temporary, a dummy equal to 1 when the new engagement is in occupation SOC1-2, and a dummy equal to 1 when the firm belongs to industry SIC1-4
[3] subsample composed by engagements for which it was not hired a former employee and whose recruitment didn't involved the use of waiting lists.

soc1-9: standard occupation classification (UK, 1990)
- soc1= routine unskilled occupation
- soc2= operatives and assembly workers
- soc3= sales occupation
- soc4= personal and protective service occupations
- soc5= craft and related occupations
- soc6= clerical and secretarial occupations
- soc7= associate professional and technical occupations
- soc8= professional occupations
- soc9= managers and administrators

SOC1-2: groups of soc
- SOC1= unskilled workers, i.e. soc1-6
- SOC2= skilled workers, i.e. soc7-9

SIC1-4: industry
- SIC1= energy and water supply
- SIC2= manufacturing
- SIC3= construction
- SIC4= services

Table 4. Recruitment speed (method B), FE estimates.

	Full sample			New hires[3]		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
temporary contract	0.086			0.090		
	(0.008)***			(0.009)***		
temporaryxsoc1[1]		0.099			0.093	
		(0.017)***			(0.019)***	
temporaryxsoc2[1]		0.127			0.128	
		(0.018)***			(0.020)***	
temporaryxsoc3[1]		0.111			0.083	
		(0.027)***			(0.029)***	
temporaryxsoc4[1]		0.009			0.031	
		(0.023)			(0.026)	
temporaryxsoc5[1]		0.085			0.091	
		(0.025)***			(0.027)***	
temporaryxsoc6[1]		0.105			0.110	
		(0.015)***			(0.017)***	
temporaryxsoc7[1]		0.041			0.036	
		(0.024)*			(0.027)	
temporaryxsoc8[1]		0.058			0.086	
		(0.023)**			(0.027)***	
temporaryxsoc9[1]		0.057			0.054	
		(0.035)			(0.042)	
temporaryxSOC1xSIC1[2]			0.232			0.285
			(0.062)***			(0.077)***
temporaryxSOC1xSIC2[2]			0.129			0.135
			(0.015)***			(0.017)***
temporaryxSOC1xSIC3[2]			0.158			0.215
			(0.066)**			(0.074)***
temporaryxSOC1xSIC4[2]			0.071			0.068
			(0.011)***			(0.013)***
temporaryxSOC2xSIC1[2]			0.230			0.201
			(0.129)*			(0.164)
temporaryxSOC2xSIC2[2]			-0.075			-0.059
			(0.045)*			(0.051)
temporaryxSOC2xSIC3[2]			0.239			0.274
			(0.106)**			(0.117)**
temporaryxSOC2xSIC4[2]			0.059			0.066
			(0.017)***			(0.020)***
Controls:						
Workers' characteristics	yes	yes	yes	yes	yes	yes
Jobs' characteristics	yes	yes	yes	yes	yes	yes
Observations	12805	12805	12805	11441	11441	11441
Num. groups	4074	4074	4074	3926	3926	3926
R-squared (within)	0.26	0.26	0.26	0.28	0.29	0.29

Standard errors are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
The estimates are for the speed of recruitment computed according to method B, order 1 (see Section 3).
Reading: see Table 4.

Table 5. Recruitment cost, Robustness analysis, OLS estimates.

	Non urgent engagements [4]			Engagement E [5]		
	(1)	(2)	(3)	(4)	(5)	(6)
temporary contract	-0.142			-0.359		
	(0.042)***			(0.148)**		
temporaryxsoc1 [1]		-0.252			0.180	
		(0.109)**			(0.314)	
temporaryxsoc2 [1]		-0.128			-0.532	
		(0.109)			(0.392)	
temporaryxsoc3 [1]		-0.093			-0.830	
		(0.130)			(0.412)**	
temporaryxsoc4 [1]		-0.180			1.115	
		(0.173)			(0.720)	
temporaryxsoc5 [1]		0.024			-0.574	
		(0.135)			(0.543)	
temporaryxsoc6 [1]		-0.260			-0.630	
		(0.083)***			(0.275)**	
temporaryxsoc7 [1]		-0.023			-0.458	
		(0.125)			(0.494)	
temporaryxsoc8 [1]		-0.024			0.179	
		(0.149)			(1.024)	
temporaryxsoc9 [1]		-0.018			-0.514	
		(0.251)			(1.161)	
temporaryxSOC1xSIC1 [2]			-0.005			0.164
			(0.258)			(0.921)
temporaryxSOC1xSIC2 [2]			-0.295			-0.422
			(0.075)***			(0.239)*
temporaryxSOC1xSIC3 [2]			0.863			-1.167
			(0.431)**			(0.908)
temporaryxSOC1xSIC4 [2]			-0.124			-0.294
			(0.060)**			(0.210)
temporaryxSOC2xSIC1 [2]			-0.266			0.000
			(0.431)			(0.000)
temporaryxSOC2xSIC2 [2]			0.071			-0.258
			(0.252)			(0.703)
temporaryxSOC2xSIC3 [2]			0.057			-1.724
			(0.433)			(2.039)
temporaryxSOC2xSIC4 [2]			-0.030			-0.319
			(0.101)			(0.516)
Controls:						
Workers' characteristics	yes	yes	yes	yes	yes	yes
Jobs' characteristics	yes	yes	yes	yes	yes	yes
Firms' characteristics	yes	yes	yes	yes	yes	yes
Observations	1489	1489	1489	1453	1453	1453
R-squared	0.35	0.36	0.36	0.10	0.10	0.10

Standard errors are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
The estimates are for the cost of recruitment.

[4] subsample composed by engagement for which the responder answered "No" to the question: "Suppose that for some reason he/she could not have started work till a month later. Would this delay have mattered to you or not?". The cost index is computed according to method B (see Section 3).
[5] subsample composed by the second most recent engagement of each firm. The cost index is the firm-specific valuation of the recruitment method, according to the answer to question "How important a factor in your use of the recruitment method(s) was keeping down the cost of announcing/advertising the vacancy on this occasion?"

Reading:
OLS estimates. All models control for workers' characteristics: gender, age group (6 dummies), ethnic group (dummy equal to 1 if white), disability, previous employment status (dummy equal to 1 if employed), whether the individual was previously employed in the same firm; jobs' characteristics: occupation (9 dummies), initial pay, supervision task, whether the engagement involved only the firm's standard recruitment procedure; and firms' characteristics: industry (9 dummies), region (9 dummies), labor force, level of activity, trend of activity, quality of the workforce.

Table 6. Recruitment speed, Robustness analysis, OLS estimates.

	Non urgent engagements [4]			Engagement E[5]		
	(1)	(2)	(3)	(4)	(5)	(6)
temporary contract	0.108			0.392		
	(0.028)***			(0.114)***		
temporaryxsoc1[1]		0.119			0.166	
		(0.072)*			(0.242)	
temporaryxsoc2[1]		0.126			0.339	
		(0.072)*			(0.296)	
temporaryxsoc3[1]		0.251			0.221	
		(0.086)***			(0.323)	
temporaryxsoc4[1]		0.219			1.394	
		(0.114)*			(0.575)**	
temporaryxsoc5[1]		0.265			0.338	
		(0.089)***			(0.389)	
temporaryxsoc6[1]		0.059			0.587	
		(0.055)			(0.210)***	
temporaryxsoc7[1]		-0.025			0.486	
		(0.082)			(0.383)	
temporaryxsoc8[1]		-0.044			-0.205	
		(0.098)			(0.817)	
temporaryxsoc9[1]		0.047			-0.028	
		(0.166)			(0.807)	
temporaryxSOC1xSIC1[2]			0.050			0.908
			(0.171)			(0.688)
temporaryxSOC1xSIC2[2]			0.140			0.664
			(0.050)***			(0.180)***
temporaryxSOC1xSIC3[2]			0.021			-0.004
			(0.285)			(0.669)
temporaryxSOC1xSIC4[2]			0.151			0.192
			(0.040)***			(0.162)
temporaryxSOC2xSIC1[2]			0.268			-1.023
			(0.285)			(1.631)
temporaryxSOC2xSIC2[2]			-0.369			0.117
			(0.167)**			(0.556)
temporaryxSOC2xSIC3[2]			-0.144			0.171
			(0.286)			(1.620)
temporaryxSOC2xSIC4[2]			0.020			0.473
			(0.067)			(0.399)
Controls:						
Workers' characteristics	yes	yes	yes	yes	yes	yes
Jobs' characteristics	yes	yes	yes	yes	yes	yes
Firms' characteristics	yes	yes	yes	yes	yes	yes
Observations	1489	1489	1489	1551	1551	1551
R-squared (within)	0.29	0.29	0.29	0.06	0.06	0.06

Standard errors are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
The estimates are for the speed of recruitment.
Reading: see Table 6.

Table 7. Monitoring perception, OLS estimates.

	Full sample			Short tenure sample[7]		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
temporary contract	-0.021			0.055		
	(0.075)			(0.087)		
temporaryxsoc1[1]		-0.039			0.384	
		(0.252)			(0.296)	
temporaryxsoc2[1]		0.100			0.226	
		(0.219)			(0.242)	
temporaryxsoc3[1]		-0.360			-0.522	
		(0.349)			(0.387)	
temporaryxsoc4[1]		-0.032			0.263	
		(0.191)			(0.225)	
temporaryxsoc5[1]		-0.288			-0.264	
		(0.272)			(0.357)	
temporaryxsoc6[1]		0.115			0.141	
		(0.178)			(0.204)	
temporaryxsoc7[1]		0.060			0.068	
		(0.233)			(0.261)	
temporaryxsoc8[1]		-0.017			-0.200	
		(0.169)			(0.214)	
temporaryxsoc9[1]		-0.110			-0.049	
		(0.248)			(0.277)	
temporaryxSOC1xSIC0[6]			-1.149			(dropped)
			(0.613)*			
temporaryxSOC1xSIC1[2]			(dropped)			(dropped)
temporaryxSOC1xSIC2[2]			0.211			0.331
			(0.202)			(0.227)
temporaryxSOC1xSIC3[2]			0.415			0.616
			(0.386)			(0.449)
temporaryxSOC1xSIC4[2]			-0.087			0.033
			(0.109)			(0.126)
temporaryxSOC2xSIC0[6]			(dropped)			(dropped)
temporaryxSOC2xSIC1[2]			(dropped)			(dropped)
temporaryxSOC2xSIC2[2]			-0.030			-0.044
			(0.347)			(0.353)
temporaryxSOC2xSIC3[2]			-0.337			-0.423
			(0.600)			(0.617)
temporaryxSOC2xSIC4[2]			-0.002			-0.064
			(0.130)			(0.158)
Controls:						
Workers' characteristics	yes	yes	yes	yes	yes	yes
Jobs' characteristics	yes	yes	yes	yes	yes	yes
Firms' characteristics	yes	yes	yes	yes	yes	yes
Observations	2020	2020	2020	1002	1002	1002
Adj. R-squared	0.06	0.05	0.06	0.08	0.08	0.08

Standard errors are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
The estimates are for the subjective perception of being monitored on the job.

Reading:
OLS estimates. All models control for workers' characteristics: gender, age, ethnic group (dummy equal to 1 if white), disability; jobs' characteristics: occupation (9 dummies), supervision task, working day, whether the individual is involved in training, tenure (dummy equal to 1 if tenure shorter than 5 year); firms' characteristics: size, industry (8 dummies), whether the firm belongs to the public sector, and whether it is committed to or recognized as an Investor in People (i.e. government scheme to promote learning in organizations).

[1] interaction among temporary and a dummy equal to 1 when the new engagement is in occupation soc1-9
[2] interaction among temporary, a dummy equal to 1 when the new engagement is in occupation SOC1-2, and a dummy equal to 1 when the firm belongs to industry SIC0-4.
[6] SIC0= primary sector
[7] subsample composed by worker with tenure lower than 5 year, in the same job with the same employer.

Table 8. Monitoring perception, OLS estimates.

	Full sample	
	(1)	**(2)**
short tenure	-0.013	-0.011
	(0.041)	(0.041)
temporary contract	-0.204	
	(0.148)	
temporaryxsoc1[1]		-0.518
		(0.299)*
temporaryxsoc2[1]		-0.462
		(0.288)
temporaryxsoc3[1]		-0.892
		(0.392)**
temporaryxsoc4[1]		-0.508
		(0.248)**
temporaryxsoc5[1]		-0.676
		(0.300)**
temporaryxsoc6[1]		-0.390
		(0.245)
temporaryxsoc7[1]		0.439
		(0.328)
temporaryxsoc8[1]		0.287
		(0.252)
temporaryxsoc9[1]		0.257
		(0.334)
temporaryxshort[8]	0.243	
	(0.170)	
temporaryxSOC1xshort[9]		0.646
		(0.217)***
temporaryxSOC2xshort[9]		-0.437
		(0.272)
Controls:		
Workers' characteristics		
Jobs' characteristics		
Firms' characteristics		
Observations	2020	2020
Adj. R-squared	0.06	0.06

Standard errors are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
The estimates are for the subjective perception of being monitored on the job.

[8] interaction among temporary and a dummy equal to 1 if the worker's tenure is lower than 5 years.
[9] interaction among temporary, a dummy equal to 1 when the new engagement is in occupation SOC1-2, and a dummy equal to 1 if the worker's tenure is lower than 5 years.

Reading: see Table 8.

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